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Climate controls on rainfall isotopes and their effects on cave drip water and speleothem growth: the case of Molinos cave (Teruel, NE Spain)

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Abstract

The interpretation of stable isotopes in speleothems in terms of past temperature variability or precipitation rates requires a comprehensive understanding of the climatic factors and processes that influence the $\delta^{18}O$ signal in the way through the atmosphere to the cave, where carbonate precipitates acquiring its final isotopic composition. This study presents for the first time in the Iberia Peninsula an integrated analysis of the isotopic composition of rainfall ($\delta^{18}O_p$) during 2010-2012 years and, through a detailed monitoring survey, the transference of the primary isotopic signal throughout the soil and epikarst into the Molinos cave (Teruel, NE Spain). Both air temperature and amount of precipitation have an important effect on $\delta^{18}O_p$ values, clearly imprinting a seasonal variability modulated by an *amount effect* when rainfall events are more frequent or intense. Air mass history and atmospheric circulation influences are considered through the study of weather types, synoptic-scale climate patterns and large-scale atmospheric circulation indexes (North Atlantic Oscillation, NAO, and Western Mediterranean Oscillation, WeMOi) revealing a dominant *source effect* on $\delta^{18}O_p$ values in this region where tropical North Atlantic and Western Mediterranean are the two moisture source regions. A delay of 2-3 months occurs between the dripwater oxygen isotopic composition ($\delta^{18}O_d$) respect to $\delta^{18}O_p$ values as a consequence of large residence time in the epikarst. Limited calcite precipitates are found from winter to spring when $\delta^{18}O_d$ values are less negative and dripwater rates are constant. This study suggests that NE Iberian $\delta^{18}O_{calcite}$ proxy records are best interpreted as reflecting a combination of parameters, not just paleotemperature or paleorainfall and, if extending present-day situation towards the recent past, a biased signal towards winter values should be expected in Molinos speleothem records.

Keywords: Oxygen isotopes, rainfall, cave monitoring, Iberian Peninsula

1. Introduction

Speleothems are calcium carbonate deposits which can be precisely dated and provide accurate information of climate change in the past, mostly throughout the routinely measured oxygen and carbon isotope records. However, the $\delta^{18}O$ signal of speleothem calcite is influenced by temperature and $\delta^{18}O_p$, mainly affected by atmospheric, soil and cave processes, making the untangling of the climate contributions to the records a challenging task. Thus, the $\delta^{18}O$ signal of speleothem calcite is affected by (i) the $\delta^{18}O$ value of the drip water feeding the stalagmite and (ii) isotope fractionation processes occurring during calcite precipitation.

Understanding the relationships between speleothem stable isotopes and, on one hand, *in situ* cave forcing mechanisms and, on the other hand, climatic processes that control fractionation of oxygen isotopes in rainfall, and later on dripwaters, is essential to properly interpret stalagmite paleoclimate records (Dansgaard 1964; Rozanski et al. 1993; Darling et al. 2006; Lachniet 2009). In addition, since the $\delta^{18}O$ signal preserved in speleothems is site-specific and complicated by numerous phase changes and possible kinetic isotope effects, studies on local and regional hydrology and climatology are required for every karstic system under investigation to confidently disentangle the paleoclimatic signal from other local influences (Caballero et al. 1996; Mattey et al. 2008; Breitenbach et al. 2010).

Unfortunately, interpreting stalagmite $\delta^{18}O$ records is still one of the complex tasks in speleothem research due, in part, to the insufficiency of paleoclimate studies that include investigations of the modern climate - $\delta^{18}O$ on precipitation ($\delta^{18}O_p$) relationship (Treble et al. 2005; Baldini et al. 2010). The stable isotopes of hydrogen and oxygen in precipitation are an integrated product of both the history of an air mass and specific prevailing meteorological conditions (temperature, amount of precipitation) at the time of condensation (Craig 1961; Dansgaard 1964). In fact, precipitation samples collected on the per-event basis reveal an especially strong linkage between their isotope signature and the storm's path, structure and evolution, suggesting in some cases that atmospheric circulation can be the leading cause of isotopic variability (Rozanski et al. 1993). In the Northern Hemisphere, the North Atlantic Oscillation (NAO) is the dominant mode of inter-annual atmospheric variability and a clear influence on the isotopic composition of rainfall was previously established (Baldini et al. 2008). For the Mediterranean region, the Western Mediterranean Oscillation index (WeMOi; (Martin-Vide and Lopez-Bustins 2006) has to be explored as another source of variability. Although isotopic data on precipitation have been collected since the 1960s on the framework of the International Atomic Energy Agency (http://www-naweb.iaea.org/napc/ih/index.html), the spatial coverage of the stations is still weak together with the scarcity of sites where rainfall isotopes are measured at a per-event basis. As an example, in the Iberian Peninsula, event $\delta^{18}O_p$ data are available only in Madrid and in El Rayo (Canary Islands) although at both stations cover very short periods (Araguás-Araguás and Diaz Teijeiro 2005).

The $\delta^{18}O$ signal of cave drip water ($\delta^{18}O_d$) is not only affected by the range of variation of $\delta^{18}O_p$ but also by two more factors to be taken into account. First, processes occurring in the soil and epikarst above the cave, such as averaging meteoric water of several months or the recycling of seepage water by evapotranspiration (Wackerbarth et al. 2012). These processes strongly depend on the type of vegetation above the cave and the constitution of the soil (Lachniet 2009). Second, the seasonality of meteoric precipitation may cause the $\delta^{18}O_d$ values to be biased towards the $\delta^{18}O$ signal of the season with the highest contribution to the annual amount of meteoric precipitation (Cruz et al. 2006). Importantly, all those considerations have an effect on the transference of the isotopic signal from the cave drip waters to the speleothems with potentially significant consequences on the paleoclimate interpretation.

The present study integrates rainfall and dripwater isotopic data from a touristic cave, Molinos Cave, located in Northeastern Iberian Peninsula. The monitoring study was conducted from February 2010 to October 2012 and investigates (1) the relative influence of meteorological variables (precipitation amount and temperature), atmospheric circulation and moisture source region on event $\delta^{18}O_p$ values and (2) the transference of the isotopic signal from the atmosphere first to dripwaters and later to calcite precipitates in the cave. The influence of large-scale atmospheric circulation patterns, such as the NAO or the WeMO indexes is evaluated together with the analysis of the three synoptic types that lead to rainfall in the study area. The lack of similar studies in the Iberian Peninsula, particularly the detailed analyses of rainfall $\delta^{18}O_p$ variability at per-event basis (Delgado-Huertas et al. 1991; Araguás-Araguás and Diaz Teijeiro 2005), and the growing number of speleothem records from that region make especially relevant the results obtained throughout this two-year monitoring study.

2. Site description and climate setting

The Grutas de Cristal or Graderas Cave (Molinos, Teruel) (40°47’33’’N; 0°26’57’’W; 1050 m a.s.l.) is a small touristic cave located in the eastern Iberian Ranges, an alpine intraplate orogene in Northeastern Iberia (Fig. 1A). The cave is situated in the Maestrazgo basin linking the Iberian Ranges and the Catalonian Coastal Ranges. Geological bedrock is made of Upper Triassic-Jurasic limestones, Lower Cretaceous detrital rocks and Upper Cretaceous limestones and dolostones. These materials are affected mainly by NE-SW trending folds and thrusts and NW-SE faults. Tertiary conglomerates, sandstones and mudstones overlie the Mesozoic sequence. Particularly, the cave is excavated in limestones and dolostones Cenomanien-Turonian in age with a 40° dip to the SE (Canerot and Pignatelli 1979) (Fig. 1B).

Landscape is dominated by high altitude remnants of planation surfaces. The final stage of planation, during Pliocene time, is accompanied by intensive karst processes leading large fields of dolines and poljes. Surprisingly, scarce endokarstic systems were developed. The subsequent Quaternary fluvial incision triggered the lowering of regional water table and the emergence of structural landforms. One of the endokarstic features in the Iberian Ranges is the Molinos Cave. It is formed by two horizontal galleries (upper and lower) with a total length of 620 meters including several rooms and halls. Although the speleothems are spectacular, erosive features are also observed towards the top of the cavity, likely associated to a previous phreatic phase.

The study area is characterized today by a Mediterranean climate, with an annual average temperature of 12-13 °C with a highly contrasted seasonality (very hot summers – averaged maximum temperatures around 30°C - and very cold winters - averaged minimum temperature around 0°C) and 500 mm of total annual precipitation, occurring mainly in spring and in fall. In Fig. 1C, monthly temperature and precipitation data from a nearby location (Gallipuén reservoir, Fig. 1B) averaged over five years are plotted in an ombrothermic diagram. Rainfall is controlled by the westerly winds associated with cold fronts, mostly in winter and spring. During the summer the subtropical Azores anticyclone blocks moisture from the west. However, also during summer and at the beginning of the fall, high-intensity (highly convective) storms typically occur. Winter precipitation is influenced by the NAO index: higher rainfall occurs when NAO is low and the westerly belt is located southwards, directly influencing the Iberian Peninsula (Trigo et al. 2002). Recent studies have shown a Pearson's coefficient of -0.4 between the NAO index and winter rainfall on the studied region (Fig. 4 in Lopez-Bustins et al. 2008).

At present-day, soil development is scarce and the limestone thickness above the cave is around 10 meters. As a consequence of the poor soil development, the high erosion rates and the intense human impact during centuries (mainly grazing activities), vegetation cover is really low in the area. The result is an open landscape dominated by heliophytic shrubs (*Quercus coccifera*, *Thymus vulgaris*, *Rosmarinus officinalis*, *Lavandula spp*., *Salvia spp.*, *Genista scorpius*, etc.,) and isolated supramediterranean evergreen oaks (*Quercus rotundifolia*), including scarce marcescent types like *Quercus faginea* in humid gorges and shaded exposures.

3. Sampling and analytical methods

3.1. Rainfall control and cave monitoring

Precipitation was sampled every rainfall event during the monitoring study in the vicinity locality of Molinos (Teruel) and analyzed for isotopic composition. The events sampled over the study spanned 144 rain days, from January 2010 to October 2012. Due to logistical restrictions, we conducted event-sampling only without volume and/or time integration. Rainfall amount and temperature (maximum and minimum) were obtained at a daily basis from SAIH meteorological station (http://195.55.247.237/saihebro/) located in Gallipuén, a nearby reservoir (Fig. 1, Table 1, Electronic supplementary material).

Cave environmental monitoring has been carried out since January 2010 with continuous logging of temperature, humidity, drip rates and pCO_2 values using HOBO sensors. At a monthly basis, dripwater was manually collected at two locations in the cave (upper and lower galleries), and, weekly, using a custom designed battery powered device that autonomously collect dripwater (Electronic supplementary material). Dripwater samples were filtered and stored refrigerated at 4°C for stable isotopes analyses. In addition, seasonal dripwater samples were taken for temperature and chemical composition (pH, conductivity, alkalinity, SO4=, Cl-, Ca2+, Mg2+, Na+ and K+) in order to evaluate the calcite saturation index throughout the year (Table 4A).

Several glass and limestone slabs were placed in the cave at different dripwater points that potentially could precipitate carbonate. These artificial supports were checked monthly during three years (2010-2012) for calcite precipitation, sampled when precipitates were observed and analyzed for stable isotopes (Table 4B).

3.2. Isotope analyses

The isotopic composition of oxygen and hydrogen in water (rainfall and dripwater), expressed as $\delta^{18}O$ and δD‰ V-SMOW, respectively, was analyzed by using a Finningan Delta Plus XL mass spectrometer at the IACT-CSIC in Granada. Water samples were equilibrated with CO_2 for the analysis of $\delta^{18}O$ values (Epstein and Mayeda, 1953), while the hydrogen isotopic ratios were measured on H_2 produced by the reaction of 10 µL of water with metallic zinc at 500 °C, following the analytical method of Coleman et al. (1982). The analytical error for $\delta^{18}O$ and δD was ±0.1 and ±1‰, respectively.

Oxygen and carbon stable isotopes analyses on calcite precipitates were analyzed with a Thermo Finnigan MAT252 mass spectrometer coupled with a CarboKiel-II carbonate preparation device at the Scientific and Technological Centers form the University of Barcelona. Analytical precision was estimated to be better than 0.03‰ for $\delta^{13}C$ and 0.08‰ for $\delta^{18}O$ by measuring the certified standard NBS-19. Isotope results are reported in standard delta notation relative to Vienna Peedee Belemnite scale (V-PDB).

3.3. Weather types calculation and synoptic-scale climate disaggregation

Daily weather types over the Iberian Peninsula were obtained using the objective weather typing system of Jenkinson and Collison (1977) based on the Lamb types. The method requires information of the daily sea level pressure of the 16 points at 5º of resolution which comprise the Iberian Peninsula (Figure 4 in Trigo and DaCamara 2000). These data were provided by NCAR (National Center for Atmospheric Research), from a gridded analysis of SLP based on land station reports, covering 1899 to present for latitudes 30°N-90°N. The Jenkinson and Collison method has been successfully used for daily weather type classification in the Iberian Peninsula (Goodess and Palutikof 1998; Spellman 2000) and its complete formulation can be consulted in Trigo and DaCamara (2000). The result is the discrimination of each day between 26 possible weather types: anticyclonic (A), cyclonic (C), eight directional weather types (N, NE, E, SE, S, SW, W and NW) and hybrid types between cyclonic or anticylonic and directional (CN, CNE, CE, CSE, CS, CSW, CW, CNW, AN, ANE, AE, ASE, AS, ASW, AW and ANW). For this particular study, those 26 weather types were simplified in 10 types: anticyclonic (A), cyclonic (C) and 8 more types grouped by their directional character (N, NE, E, SE, S, SW, W and NW).

An additional method to describe the origin of rainfall in our study region was based on the previous work published by Millán et al. (2005) where precipitation data were disaggregated by synoptic types, analysing surface pressure maps at 0000, 0600, 1200, and 1800 UTC, together with the 500- and 300-hPa levels at 1200 UTC. According to this work, three synoptic situations act as major rainfall inputs in the eastern region of the Iberian Peninsula: Atlantic frontal systems, Mediterranean cyclogenesis (“backdoor” cold fronts) and summer convective situations. An additional type characterized by northern winds is observed as a blocking anticyclone over Central Europe, driving dry continental winds usually without rain over the eastern Iberian Peninsula. With that analysis of rainfall disaggregation, a synoptic situation is assigned to every rainfall event at Molinos location (see Millán et al. 2005, for more details).

4. Results and discussion

4.1. Precipitation $\delta^{18}O$ and δD data and dominant effects

Event $\delta^{18}O_p$ values are highly variable, ranging from -15.85 to +1.39‰ (mean = -6.89‰; 2σ = 3.54‰; n = 144) and event δD_p ranged from -114 to +4.09‰ (mean = -45.84‰; 2σ = 24.81‰; n=144) (Table 1, Fig. 2). $\delta^{18}O_p$ mean values are in the range of rain water of the Iberian Peninsula and other GNIP stations under Mediterranean influence (Delgado-Huertas et al. 1991; Plata Bedmar 1994; Longinelli and Selmo 2003; Araguás-Araguás and Diaz Teijeiro 2005; International Atomic Energy Agency 2005) but about 2‰ more negative due to the altitudinal effect. The huge range of $\delta^{18}O_p$ highlighted by the high values of 2σ compared to other Mediterranean locations (Celle-Jeanton et al. 2001), likely responds to the fact that two main sources of precipitation are important at this site: the Atlantic and the Mediterranean, with expected marked differences on $\delta^{18}O_p$ values.

The Local Meteoric Water Line (LMWL) based on the analyzed 144 rain events is described as $\delta D = 7.05 * (\delta^{18}O) + 3.36$, ($r^2 = 0.92$), displaying a slightly lower slope than the Global Meteoric Water Line, GMWL, (Rozanski et al. 1993) and low Deuterium-excess (d) value (3.36) probably due to the presence of samples that suffered evaporation of raindrops below the cloud base, a process significant in semi-arid regions (Araguás-Araguás et al. 2000). Some of those samples (events 22, 98, 102, 103, 139, 140 and 142, enclosed by a circle in Fig. 2) even show $\delta^{18}O_p$ positive values (Table 1) and they all correspond to summer months when evaporation during rainfall is possible (Dansgaard 1953; Dansgaard 1961). Similar pattern has been observed in other Mediterranean sites (Morocco, Algeria, Greece, etc) with low d value in their LMWL and particularly low values in summer samples (International Atomic Energy Agency 2005). These seven samples, together with event 46 that plots further than $\pm 2\sigma$ from the LMWL, are the ones with lower d-excess values (from -5.4‰ to -23.3‰; Table 1) confirming the evaporative mechanism. Event 46, together with the evaporated samples, are excluded from further analyses since may be affected by non-equilibrium effects.

At Molinos location, due to the latitudinal position and other geographic factors (altitude, orography, etc), we would expect that most precipitation is generated by frontal depressions related to western Atlantic flows. However, convective storms associated with eastern flows and cyclogenetic processes in the Mediterranean basin itself are also common mainly in summer (Celle-Jeanton et al. 2001). Thus, the "source effect" would be one of the main influences in the final $\delta^{18}O_p$ values at Molinos location. This effect is due to the different air mass histories and temperatures of the moisture sources (Craig 1961; Dansgaard 1964; Rozanski et al. 1993; Araguás-Araguás et al. 2000). The Deuterium excess ($d = \delta D - 8*\delta^{18}O$), since it reflects the relative humidity and the air temperature of the region where the evaporation leading to rainfall occurred (Vandenschrick et al. 2002), is an excellent indicator of the origin of the precipitation (Lachniet 2009). In fact, the particular characteristics of Mediterranean Sea allowed defining a Western Mediterranean Meteoric Water Line that responds to this equation: $\delta D = 8* (\delta^{18}O) + 13.7$, characterized by the high Deuterium excess values (Celle-Jeanton et al. 2001) (WMMWL, red line in Fig. 2). The LMWL obtained with Molinos rainfall samples intercepts the y-axis with a Deuterium excess value of 3.36, much lower than the 13.7 value in the Western Mediterranean Meteoric Water Line. As explained above, the presence of summer samples with very low d values (Table 1) indicative of the evaporation of falling raindrops in a warm and dry atmosphere (Araguás-Araguás et al. 2000) may be the cause of this apparent contradiction. On the other hand, up to 6 samples (nº 49, 57, 63, 64, 66, 67) are indicated in Fig. 2 since they display extremely high values of Deuterium excess (from 23.04‰ to 28.27‰, Table 1). Those samples, all collected in winter, represent processes of recycling of air masses under the polar climatic regime, as was found in other Mediterranean locations (Saighi 2005). In general, rainfall samples collected for this study with intermediate d-excess values (among 0-10‰) correspond both to the entrance of Atlantic fronts in winter (30 days) and to summer convective rainfall in summer (21 days). The explanation for those d-excess values and the observed seasonality (higher values in winter and lower values in summer, Table 1) can be due to two processes, as in many European locations (Rozanski et al. 1993). On one hand, low relative humidity of air in the source region (mostly Atlantic) in winter, would lead to enhanced kinetic fractionation during the evaporation process and, consequently, higher d-excess signature of the vapor. On the other hand, low relative humidity over the continent in summer, caused by the high temperatures, would facilitate partial evaporation of raindrops below the cloud base. This, in turn will lead to reduction of the deuterium excess values of summer rains.

Variation through time of $\delta^{18}O_p$ values also indicates a seasonal control, with more negative values in fall and winter and more positive in summer (Fig. 3). Surface air temperature clearly influences event $\delta^{18}O_p$ since accelerates the Rayleigh process; this control is known as the "temperature effect". The seasonal cycle generally varies by a few per mil in the low latitudes up to 15‰ in high latitude regions (Rozanski et al. 1993), and may have been enhanced during past glacial periods (Denton et al. 2005). In our studied site, at present-day, the seasonal variation is about 10-12‰ (Fig. 3). Superimposed on the general temperature variation, there are several rainfall events that force an isotopic lightening (indicated by gray arrows in Fig. 3). Those events occur all along the year and are, mostly, the most intense rainfall events (eg. Aug 1st 2010) or those events of longer duration (several days, eg. Nov 20th-23rd, 2011). Therefore, the amount of rainfall, what is called the "amount effect" is modulating $\delta^{18}O_p$ values along the year. This result is not surprising since a negative relationship between $\delta^{18}O_p$ and precipitation amount was identified in both observational and modeling studies that, although is generally associated to tropical areas (Fleitmann et al. 2003; Cruz et al. 2006; Wang et al. 2007), is also present in Mediterranean areas (Delgado-Huertas et al. 1991; Longinelli and Selmo 2003).

To investigate the statistical relationship between $\delta^{18}O_p$ values and these climate variables, Spearman's rank correlation analysis was used. Prior to conduct the correlation analysis we removed the seasonal component of the variables by subtracting their monthly averages in order to avoid sympathetic seasonal correlations (eg. Rozanski et al. 1993) (Table 2). Single-predictor correlations reveal that event $\delta^{18}O_p$ correlate significantly with air temperature and amount of precipitation along the year, in spite of the Spearman's rank correlation with amount of precipitation all along the year is very low (r_s=-0.19; $p<0.05$; Table 2). As observed in Fig. 3, $\delta^{18}O_p$ variation seems to be influenced only by the most intense or prolonged rainfall events. Analyzing these correlations at a seasonal scale, we observe that while temperature and $\delta^{18}O_p$ correlation is focused on summer and fall, amount of precipitation correlates with $\delta^{18}O_p$ in winter and spring when rainfall events are larger and more frequent (Table 2, Fig. 3).

In addition to air temperature and amount of rainfall, important factors affecting $\delta^{18}O_p$ values at Molinos site, we explore here how large-scale variability in atmospheric circulation patterns, what has been called the "source effect", are explaining first-order changes in $\delta^{18}O_p$ values.

4.2. Synoptic-scale climate patterns

Previous studies have revealed a synoptic control on event $\delta^{18}O_p$ in Australia, India or Ireland (Treble et al. 2005; Breitenbach et al. 2010; Baldini et al. 2010). To determine if a relationship exists between $\delta^{18}O_p$ recorded in Molinos and the daily synoptic-scale atmospheric circulation pattern, Jenkinson Lamb weather types corresponding to days with rainfall isotopic values were calculated. In Fig. 4, percentages of occurrence of weather type (and percentage of total rainfall represented by each weather type) together with the $\delta^{18}O_p$ for every rainfall event are plotted. The most common weather type associated with rainfall in Molinos during the studied time interval was cyclonic (C, in Fig. 4). Rain events associated to C weather type exhibited the greatest $\delta^{18}O_p$ range (-15.85 to 1.39‰). Anticyclonic weather type (A, in Fig. 4) is the following weather type also displaying high variability, with potentially convective events all along the year and with origin on different air masses. Grouping rainfall events by the origin (Eastern or “Mediterranean” weather types – NE-E-SE, *vs* Western or “Atlantic” weather types – W-NW-N) reveals that both groups of weather type have a distinct isotopic pattern, suggesting the control of the synoptic patterns on the $\delta^{18}O_p$. Thus, rainfall events with a western origin (the Atlantic ones) have a $\delta^{18}O_p$ narrow range (-10 to -5‰) compared to the more spread values for the eastern origin (more “Mediterranean” events) with -12 to -2‰. This difference can be potentially attributed to the mixing of synoptic situations that are grouped under the “eastern” group while all rainfall originated in the west (including N-NW-W-SW) responds to very similar synoptic situation of Atlantic fronts and thus, similar $\delta^{18}O_p$ values. Unfortunately, for both western and eastern types, there are several particular rainfall events that display $\delta^{18}O_p$ outside the more common ranges (eg. rainfall events nº 143, 64, etc) not easy to accept in the presented picture. In addition, this simple classification on “Eastern” and “Western” origins leave behind the cyclonic type that is the dominant mode in terms of number of rainfall events and rainfall amount (Fig. 4). In fact, to clearly determine if these two groups are statistically different we performed a significance test, the Kruskal-Wallis test of analyses of variance using SPSS software. Low test values and p-values always above 0.05 indicate that “Western” and “Eastern” origins are not significantly different in terms of their isotopic composition (Table 3). Another way to discriminate the different air mass trajectories behind a rainfall event is thus implemented.

An exercise of synoptic disaggregation was carried out following the procedures established on Millán et al. (2005). Thus, three synoptic types are considered to trigger rainfall in Molinos area: precipitation caused by the entrance of Atlantic fronts (43%), back-door cold fronts (Levanters) (21%), and convective precipitation storms driven by the combined sea breeze and upslope winds (36%). In Fig. 5A, the three situations are illustrated, together with the synoptic pattern characterized by the entrance of northern winds, although this last type does not cause rainfall in Iberia (Millán et al. 2005).

Type 1 (top left panel in Fig. 5A) is related to Atlantic depressions sending frontal systems over the Iberian Peninsula. Precipitation from these fronts occurs mainly on the windward (west) side of the Iberian Range where the cave is located and little or no precipitation on the coastal side of those mountains. The passage of a frontal system during the rain event is the main criterion to disaggregate the Atlantic component from the daily precipitation data. This input seems to be the least affected by local and regional mesoscale and feedback processes (Millán et al. 1997). On the contrary, precipitation by Mediterranean cyclogenesis ("backdoor" cold fronts, top right panel in Fig. 5A) involves complex mesoscale convective systems causing intense rainfall in the Spanish east coast. By late summer, the European continent becomes progressively cooler, and the migration of warm-core anticyclones from the central Atlantic toward central Europe begins. Therefore, two relevant situations occur: 1) the Mediterranean Sea reaches its maximum annual temperature, and 2) the northeasterly-to-easterly flows along the southern flanks of the migrating anticyclones begin to advect increasingly colder continental air over a much warmer Mediterranean Sea. Temperature differences between the continental air (cold) and sea surface (hot) cause instability and convective activity that is associated with a vigorous moisture-recharge mechanism leading to very intense rainfall events (Millán et al. 1995). The third category, summer convective situations (bottom left panel in Fig. 5A), refers to orographic or convective storms. The genesis of this precipitation is related to the formation of the Iberian thermal low. By late spring and summer, the Iberian Peninsula becomes relatively isolated from travelling depressions and their frontal systems. An anticyclonic ridge of high pressure becomes established over the Cantabrian Sea while mesometeorological circulations, with marked diurnal cycles, develop over the peninsula. In particular, the thermal low develops during the day when a number of local circulations grow and merge into a self-organized circulatory system at peninsular scale. During the late afternoon, storms tend to develop following the ridges of the coastal mountain ranges and even can reach other mountains in Central Iberia where Molinos cave is located. Thus, rainfall events are attributed to this category whenever the thermal low is observed at 1200 and/or 1800 UTC on the day of the event. Additionally, the 500-hPa level is checked for the presence of cold air aloft.

Interestingly, those three types, particularly the two more abundant ones, have a characteristic $\delta^{18}O_p$ range that can be related to the origin of the air masses. Thus, rainfall deriving from the entrance of Atlantic fronts only occurs from September to April and the $\delta^{18}O_p$ range is between -15.85 to -0.6‰ (average = -7.91; σ=3.14), much more negative than convective rainfalls coming from the Mediterranean that only occur during the other half of the year (from April to September), with a $\delta^{18}O_p$ range is between -10.74 to 1.39 ‰ (average = -4.46; σ=2.97) (Fig. 5B, red and blue lines). The Kruskal-Wallis test applied to these three groups reveals significant differences in the $\delta^{18}O_p$ and δD values, with high test values and p values <0.05 in both cases (Table 3).

In addition to this "source effect" perfectly described by the different synoptic-scale climate patterns, large-scale changes in atmospheric circulation patterns are generally invoked to explain $\delta^{18}O_p$ interannual variability (Baldini et al. 2008). The location of Molinos cave in between Northern Spain and Mediterranean region makes rainfall at this site potentially influenced by NAO, ENSO and WeMOi modes of variability.

4.3. Large-scale atmospheric circulation patterns and their possible influences on the rainfall isotopic composition

The Iberian Peninsula receives moisture from two main sources, the tropical-subtropical Atlantic and the immediately surrounding ocean area, principally the Mediterranean Sea. Lagrangian analysis indicates that the importance of these two sources differs regionally and seasonally (Gimeno et al. 2010). Typically, the Tropical-Subtropical Atlantic source is more important in winter and the local Mediterranean more important in summer. For the Mediterranean region of Iberia, local Mediterranean sources supplies roughly 1.5 times more moisture (coming in summer-fall) than are provided from the Atlantic (coming in winter). In contrast, for Northern (Cantabric) regions, moisture supplied from Atlantic (in winter) is 1.5 times larger than local moisture supplied from the Mediterranean (in summer). Winter precipitation from Atlantic sources is strongly modulated by the state of the NAO, with NAO negative states favouring stronger winter precipitation from the Atlantic regime (Trigo et al. 2002). In more Atlantic regions such as Ireland the NAO explains 20% of $\delta^{18}O_p$ variance (Baldini et al. 2010).

In contrast to the Atlantic precipitation, locally sourced and especially Mediterranean sourced precipitation, is unrelated to the NAO but shows a modest correlation with the ENSO mode (Rodo et al. 1997). On a seasonal scale, the Nino3.4 index is directly correlated with precipitation anomalies in late summer and early fall (El Niño produces wetter conditions) and inversely correlated with precipitation anomalies in the spring (Mariotti et al. 2002) For our study location, which receives most of its precipitation in spring, we should expect a negative correlation. The fact that only three spring seasons were in our monitoring period prevents us from carrying out a significant study of the comparison of ENSO intensity (just three years) and the isotopic composition of rainfall.

In addition to these two indexes related to large scale atmospheric conditions, in order to explain precipitation in the western Mediterranean basin another index was developed as a regional teleconnection pattern (López-Bustins 2007). Thus, the Western Mediterranean Oscillation index (WeMOi), based on the pressure dipole of normalized sea level pressure between Southwest Iberian Peninsula (San Fernando, Cádiz, Spain) and Northeast Italy (Padova, Veneto, Italy) as proposed Martin-Vide and Lopez-Bustins (2006), was computed as the difference between the normalized sea level pressure at the 35ºN, 5ºW and that at the 45ºN, 10ºE, using daily sea level pressure grids from the NCEP-DOE Reanalysis 2 (http://www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis2.surface.html; last accessed 15 July 2013). To normalize the daily pressure data, a mean and standard deviation for each station were calculated using all available days from 1979-2012, following the calculation presented by Lopez-Bustins (2007) after evaluating nine different methods to standardise the WeMOi daily. Close agreement between the daily reanalysis-based WeMOi and the daily station-based WeMOi (López-Bustins 2007) was found with a correlation coefficient of 0.94 for 1979-2000, which supports the use of reanalysis data and allows extending the daily WeMOi to present day. This index is able to explain the pluviometric variability in the eastern fringe of the Iberian Peninsula, an area weakly related to the NAO pattern (Trigo et al. 2004), since it allows the detection of the variability relevant to the cyclogenesis next to the western Mediterranean (Martin-Vide and Lopez-Bustins 2006). Negative values of the WeMOi are correlated to higher precipitation in relation to the entrance of northeasterly flows over eastern Iberia (Lopez-Bustins et al. 2008).

Using the Spearman's rank correlation test, we explore if the two main above mentioned indexes (NAO, WeMOi) have an influence not only on the amount of precipitation but more importantly on the isotopic composition of that precipitation (Fig. 6, Table 2). Therefore, to understand the NAO influence on the composition of precipitation over Molinos cave, $\delta^{18}O_p$ values along the two studied years are plotted against the daily NAO index (obtained from http://www.cpc.ncep.noaa.gov) (Fig. 6A). As stated previously, due to the larger influence of NAO phenomenon on winter rainfall in the Iberian Peninsula respect to summer season (Trigo et al. 2002), we would expect a positive correlation (NAO – amount of rainfall), if any, centered on winter season. In Table 2 that correlation is shown as statistically significant only for winter (r_s= 0.55; p=0.01; Table 2). However, regarding to the NAO - $\delta^{18}O_p$ relationship, a clear in-phase pattern is observed for years 2011 and 2012 (Fig. 6A, note reversed y-axis in NAO index). This result means that, during certain months, the position and intensity of the high and low pressures in the Atlantic (i.e. Azores High and Icelandic Low) modulates the isotopic value of the rainfall generated. Unfortunately, this pattern is not so well observed during the previous year 2010 thus preventing any clear conclusion, as shown in Table 2 where the Spearman's rank correlation among NAO - $\delta^{18}O_p$ appears not significant along the year or for any season (Table 2). These observations may just indicate that NAO has not a very important effect on event $\delta^{18}O_p$ along the year at this location and leads us to explore the effect of other indexes, such as WeMOi.

In Fig. 6B, the WeMOi is plotted together with $\delta^{18}O_p$ suggesting a close similarity. Note that the axis of the WeMOi is plotted with a reversed scale, thus pointing towards an inverse correlation among that index and the isotopic composition of rainfall. Such inverse correlation can be explained by the fact that negative values of the WeMOi are correlated to the entrance of northeasterly flows (Lopez-Bustins et al. 2008), which are characterized by more positive values of $\delta^{18}O_p$ (Fig. 4, "Eastern" group). In Table 2, the Spearman's rank correlation among WeMOi - $\delta^{18}O_p$ is shown. Contrarily to the NAO index, the correlation is significant (r_s= -0.19, p=0.018) indicating a certain control of the WeMOi on the isotopic composition of rainfall, although this mechanism cannot explain by itself the observed variability in $\delta^{18}O_p$. This correlation is stronger in spring and summer, where the entrance of northeasterly flows is observed ("Back-door" cold fronts in Fig. 5).

Definitively, $\delta^{18}O_p$ variability at this region is controlled by a combination of factors, being the *source effect* the most relevant since it is controlling the dominance of air-masses trajectories with different isotopic ranges. That signal is modulated by temperature and precipitation amount, with special strength in summer-fall and winter-spring, respectively.

4.4. Hydrological and seasonal effects on dripwater isotopic composition

Dripwater rates in Molinos cave have been compared to the amount of rainfall (using the data from Gallipuén reservoir meteorological station, 8 km farther north) (Fig. 7; Electronic supplementary material). The amount of dripwater measured in the cave at a fixed location during more than 2 years clearly shows that the increase in dripwater flux occurs at two steps in the hydrological cycle. First, the rainfall that takes place in Oct-Nov, which usually is characterized by several days raining, causes a first small increase in dripwater rates. At that time in fall, the soil is quite dry after extremely warm summers and just a small fraction of precipitation percolates into the epikarst since most of it is used by the vegetation (García-Ruiz et al. 2011). During winter, rainfall is scarce and episodic, but the low temperatures (maximum temperatures below 10 °C for most of Dec-Jan-Feb, Fig.7) prevent any evaporation and most of the rainfall infiltrates into the cave, which allows keeping a constant dripwater rate (10 mm/day). Most of rainfall at this location takes part in spring with the consequent impact on dripwater rates. After the "spring peak" in dripwater (above 50 mm/day, May, 2010), there is a trend towards lower values that do not recover until rainfall arrives again in fall. Thus, summer convective rainfall events, in spite of delivering large amount of water (eg. 71 mm the 1st Aug-2010), do not influence dripwater rate in the cave (Fig. 7). The most plausible explanation is related to the evaporation in the soil zone that was very intense during summer months in Molinos area, considering maximum temperatures were above 30 °C during July and August. An exception to this annual pattern is the year 2012 when spring rainfall was scarce and took place with warmer temperatures than usual. As a consequence, dripwater flow rate in the cave is extremely low and do not increases as other years during spring (Fig. 7).

It is well-known that the oxygen isotope composition of dripwater ($\delta^{18}O_d$) reflects seasonality of surface recharge and modification within the soil and epikarst (Lachniet 2009). In Molinos cave, a seasonal control in $\delta^{18}O_d$ variation is observed, recording the lightest values in spring, synchronously with the increase in dripwater rate in the cave but asynchronously with the lightest values of the isotope composition of rainfall ($\delta^{18}O_p$) that are recorded in winter (Fig. 8). The range of variation in the isotopic composition of driwater is small (2 ‰) compared to the 18‰ in $\delta^{18}O_p$ variation, similarly to what has been observed in other monitoring studies (Caballero et al. 1996; Mattey et al. 2008). This is certainly related to the signal attenuation caused by mixing in the soil zone and epikarst. Still, this strong attenuation has not completely homogenized the seasonal $\delta^{18}O_d$ variations at Molinos, contrary to what has been observed in some other cave systems (eg. Corchia Cave, Piccini et al. 2008). The pattern of variation of $\delta^{18}O_d$ in Molinos cave is very systematic throughout the study time interval and in the three dripwater sites monitored in the cave (Fig. 8).

In addition to the different ranges of variation of $\delta^{18}O_p$ and $\delta^{18}O_d$ time series, they also display an asynchrony (Fig. 8). The observed asynchrony may be caused by the transit time of the isotopic signal from the rainfall to the cave dripwaters, caused by the water residence time in the rock above the cave. The extremely thin soil (even absent) together with the small thickness (some 10-20 m) of rock above the cave suggest a rapid infiltration of rainfall waters and a rapid response in terms of drip rate. In fact, the response of the dripwater rate to rainfall amount is very rapid as shown in Fig. 7. However, the transport of the isotopic signal is caused water storage within the rock and may explain the asynchrony among $\delta^{18}O_p$ and $\delta^{18}O_d$ profiles.

In order to gain some insight into the observed asynchrony when comparing $\delta^{18}O_p$ and $\delta^{18}O_d$ profiles, a simple time series convolution exercise was performed to understand the hydrological controls on the isotopic composition of cave dripwater. A piston-type flow model was applied to $\delta^{18}O_p$ data weighted by effective precipitation (considered here as total precipitation excluding days with maximum temperature over 35°C and precipitation lower than 1 mm) with a lognormal transit time distribution that reflects the distribution of effective hydraulic conductivities of the different flow paths (see Electronic supplementary material). The output of the model, i.e. the modelled $\delta^{18}O_d$, reproduces some of the variability trends of $\delta^{18}O_d$ data. As observed in Fig. 8, the modelled $\delta^{18}O_d$ displays very similar trends (minima and maxima are well-reproduced in time and value) and very similar range of variation than the "real" dripwater $\delta^{18}O$ profiles. To fit the model and obtain these results a long residence time in the model was required, thus suggesting that groundwater was mixed in the epikarst for long periods (8-10 weeks) before it flows into the cave, coinciding with maxima in the amount of rainfall (e.g. 2010 and 2011 spring season). These results imply that a portion of the variability in the dripwater $\delta^{18}O$ time series is described by a piston flow model that needs the mixing of waters in the epikarst for a long time (we considered 50 days) with 10 days as the peak in the distribution of arrival times (see Electronic supplementary material).

It is also clear that a full explanation of the observed variability requires a much more detailed transport model, accounting not only for mixing during transit through the rock, but also evaporation in the cave, transpiration in the soil and, possibly, dew formation during winter. Understanding the present-day control of rainfall in dripwater rates and how the seasonality influences on the transference of the isotopic signal is crucial to comprehend the information obtained from speleothems in the cave. In fact, the data presented here suggest a possible bias in the season when calcite precipitates. Since dripwater rate is much higher during the beginning of spring than any other season, we may expect calcite formation biased towards that season. However, this hypothesis must be checked with experimentally-growth calcite as will be explained below.

4.5. Transference of climate signal from dripwaters to calcite precipitates: implications for paleoclimate studies

Hydrochemical results from the four dripwater samples taken along one year in Monlinos cave indicate that calcite can precipitate in the cave all along the year (positive Saturation Index, SI, at dripwater site nº 1; Table 4A) except for winter season (negative SI, Table 4A). However, even for the positive values, the SI values are so close to zero that calcite precipitates not necessarily should be expected from the analyzed dripwaters. In fact, monthly inspections on artificial supports placed at different points in both cave galleries, indicate that calcite precipitates from the end of fall to the beginning of spring (November-April) and only at two particular locations from a total of seven monitored sites: MO-3 (that corresponds to dripwater site 1 where waters have been analyzed with a monthly periodicity) (Table 4B) and MO-5 (no dripwater data due to the height of the corresponding drips). Thus, the available data allow us to explore preliminarily the transference of the isotopic signal from dripwater to calcite precipitates at one sampling location in Molinos cave, MO-3.

Values of $\delta^{18}O_d$ collected at site nº1 (Fig. 8) range among -8‰ and -10.5 ‰ (V-SMOW), being the winter values the less negative ones. Using different calculations (eg. Kim and O'Neil 1997), we observe that the calcite $\delta^{18}O$ values can be almost perfectly reproduced when averaging dripwater values ($\delta^{18}O_d$) for the time interval when calcite precipitates (see Table 4B) and considering present-day cave temperature (12°C). The calculated water are slightly less negative that the average (Table 4B) and in equilibrium with the winter values. Only, the sample of 2010 year indicate more evaporated water (about -7.5 ‰ vs V-SMOW), which is compatible with the less negative $\delta^{13}C$ values. Additionally, it must be taken into account that dripwaters where $\delta^{18}O_d$ values have been measured may not correspond exactly to the dripwaters from whose calcite is precipitating. Other in-cave processes (evaporation-condensation in the artificial support, cave ventilation) may take place slightly modifying the calcite $\delta^{18}O$ values. In fact, previous studies have revealed the usual lack of coherence among calcite experimentally growth and $\delta^{18}O_d$ values pointing to the complexity of this process

(Wackerbarth et al. 2010; Tremaine et al. 2011). Our results here support the findings of other cave investigators that water–calcite fractionation factors observed in speleothem calcite are slightly higher than those measured in laboratory experiments (Mangini et al. 2005; Boch et al. 2009).

Although the number of samples of calcite precipitated over artificial supports is still low, these first results point to a bias in the season when calcite precipitates. Thus, from the studied calcite samples, it is observed that the season when calcite precipitates covers from November to April (Table 4B, Fig. 8), starting with the first increase in dripwater rate (see Fig. 7) and ending when usually dripwater rates are at maximum values, likely too diluted to produce calcite precipitation. Calcite is not precipitating in summer, perhaps related to the low dripwater rates reached during that season. These results need to be further supported by more analyzed calcite samples.

This monitoring study has clear implications for paleoclimate research using speleothem records from Molinos cave. Therefore, since calcite precipitates are reproducing the values of the rainfall season, and assuming that present-day situation in terms of seasonally of dripwater amount and isotopic values can be extrapolated towards the recent past (eg. Late Holocene), the isotopic record obtained from stalagmites would be biased towards winter season, thus imprinting a “winter character” on the calcite stable isotopes.

5. Conclusions

This monitoring study carried out in NE Iberia allows describing in one hand the main processes that influence $\delta^{18}O_p$ values and, on the other hand, how the transference of the isotopic signal takes place from the atmosphere to cave drip waters and, finally, to calcite precipitates in the cave. Although seasonal variation of temperature and amount of precipitation are influencing the $\delta^{18}O_p$ at Molinos location, the so-called *source effect* appears very relevant at this region since it is controlling the dominance of air-masses trajectories with different isotopic ranges: basically, Atlantic fronts with more negative $\delta^{18}O_p$ values, and Mediterranean convective storms with more positive values. The study of weather types during rainfall events complemented by the synoptic-scale disaggregation is revealed as a very effective procedure to understand temporal $\delta^{18}O_p$ variability at the studied location. Rainfall at the studied location is transferred to the cave basically from November to April, thus corresponding to the entrance of Atlantic fronts. Additionally, there is an influence of large-scale atmospheric circulation mechanisms, particularly the WeMOi, deduced from significant correlations with $\delta^{18}O_p$ in spring and summer associated to the entrance of northeasterly flows.

Cave drip waters isotopic range of variation is much smaller than that of rainfall and appears delayed by 2-3 months respect to rainfall $\delta^{18}O_p$ values, suggesting the influence of epikarst processes on attenuating and homogenizing the large variability in the $\delta^{18}O_p$ signal. Limited calcite precipitates are found from November to April when $\delta^{18}O_d$ values are less negative and dripwater rates are constant thus expecting a biased signal towards winter values in Molinos speleothem records.

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Figures

Fig. 1. A. Location of the studied cave, Molinos cave, in the Ebro River basin, Northeastern Iberian Peninsula. B. Geological map where Molinos village and cave and the meteorological station (Gallipuén reservoir) are indicated. Legend with lithological formations is also included. C. Mean monthly rainfall (mm), maximum and minimum temperature (°C) at the closest meteorological station (Gallipuén reservoir) averaged for the last seven years.

Fig. 2. Scatter plot of δD and $\delta^{18}O$ values of event precipitation. The local meteoric water line is based on a lineal regression through the Molinos precipitation isotope dataset (dashed blue line). Both the global and the Western Mediterranean meteoric water lines are indicated (black and red lines, respectively). Samples enclosed by a circle indicate possible evaporation during summer rainfall. Shaded area indicates the values of dripwaters represented in Fig. 8. Event 46 may have been subject to non-equilibrium effects and is labeled (see Table 1 for the complete dataset).

Fig. 3. Comparison of $\delta^{18}O_p$ values with the maximum temperature values and the amount of rainfall (data from Gallipuén reservoir meteorological station) from February 2010 to September 2012. A running average (time window = 15) of the $\delta^{18}O_p$ is plotted to emphasize the seasonal character. Rainfall events that cause isotope lightening are indicated by gray arrows while seasons are marked by dashed lines.

Fig. 4. Percent of the total rainfall recorded at Gallipuén reservoir meteorological station (light gray bars) and percent of total event rainfall sampled (black bars) between February 2010 to September 2012 respect to the associated daily Jenkinson Lamb weather type. All $\delta^{18}O_p$ data are plotted for every weather type (gray diamonds). Two groups are made according the origin of the air masses (eastern or western) and the isotopic range for those groups is shown by dashed lines. Six events are labeled (64, 67, 53, 131, 132 and 143) since they are outside the specified $\delta^{18}O_p$ ranges.

Fig. 5. (A) Synoptic maps for all four situations that generate rainfall at Molinos location. (B) Variation of $\delta^{18}O_p$ values along the monitored period. Colors indicate the synoptic-scale climate type for every rainfall event.

Fig. 6. (A) Daily NAO index (blue line) and (B) daily WeMO index (red line) plotted together with $\delta^{18}O_p$ values (black line) along the studied period (February 2010- Sept 2012). Running averages (time window = 25) of both indexes (NAO and WeMO) are plotted.

Fig. 7. Dripwater rates in Molinos cave (black line) compared to amount of rainfall (blue line, data from Gallipuén reservoir meteorological station). Only spring and, with less extend, fFall rainfall have an impact on dripwater rates. Rainfall events with higher rates of precipitation are labeled and their $\delta^{18}O_p$ values indicated. Note the importance of air temperature in evaporating summer rainfall causing that summer convective rainfall events (eg. Aug-2010) do not reach the cave.

Fig. 8. Comparison of $\delta^{18}O$ values from the rainfall (with a running average, windows=5) and $\delta^{18}O$ values from dripwaters (collected at three locations in the cave). Dripwater $\delta^{18}O$ profile resulting from flowpath modelling is also indicted (orange). Dripwater rates (black line with gray shadow) are also shown. Shaded areas represent the most negative $\delta^{18}O$ values in dripwaters, coinciding with maximum dripwater rates (March-July). Periods with calcite precipitation in the cave are also indicated (see Table 4B).

Table 1. Individual Molinos precipitation events sampled during the study. Synoptic types (see Figure 5): 1. Atlantic fronts; 2: Back door cold fronts; 3: Convective

Event	**Date (mm/dd/yy)**	**Gallipuén reservoir meteorological station**			**$\delta^{18}O_p$**	**δD_p**	**d-excess**	**Synoptic type**	**Weather type**
		Total event rainfall (mm)	**Daily temperature (ºC)**						
			Max	**Min**					
1	3/2/10	8.5	15	0	-10.53	-73.15	11.07	2	A
2	3/5/10	1.1	13	3	-11.34	-73.98	16.73	2	SE
3	3/7/10	12.1	9	1	-8.68	-52.37	17.10	1	CSE
4	3/30/10	1.7	21	5	-8.60	-59.13	9.64	1	C
5	4/4/10	3.1	17	6	-8.73	-56.89	12.95	2	SE
6	4/12/10	11	22	8	-10.74	-70.70	15.25	3	CE
7	4/14/10	3.8	11	6	-5.52	-29.05	15.14	2	AE
8	4/17/10	0.6	15	8	-8.66	-58.88	10.42	3	C
9	4/22/10	0.6	22	9	-9.52	-61.40	14.80		C
10	4/30/10	5.5	26	11	-3.14	-15.38	9.72	1	C
11	5/3/10	10.0	20	6	-9.72	-62.71	15.04	2	C
12	5/10/10	2.9	22	8	-6.97	-50.94	4.81	1	C
13	5/12/10	8	18	7	-12.29	-86.72	11.62	1	C
14	5/27/10	9.80	26	12	-4.48	-26.02	9.85	3	C
15	6/5/10	0.30	31	14	-4.37	-35.12	-0.19	3	C
16	6/6/10	0.3	31	17	-4.60	-36.78	-0.02	3	NE
17	6/9/10	3.0	31	15	-7.63	-60.96	0.07	1	CNW
18	6/12/10	13.30	22	12	-8.85	-66.07	4.77	3	C
19	6/14/10	2.10	23	12	-8.72	-64.85	4.91	3	NW
20	6/16/10	0.50	20	9	-8.65	-63.65	5.56	3	NW
21	6/18/10	3.00	19	10	-8.57	-64.28	4.32	3	CE
22	7/2/10	12.10	34	19	0.38	-2.38	-5.41	3	C
23	7/22/10	1.70	31	19	-2.64	-18.31	2.84	3	NE
24	8/1/10	71.00	33	16	-6.54	-39.40	12.91	3	ANW
25	8/8/10	2.30	31	14	-1.45	-12.44	-0.85	3	C
26	8/11/10	1.5	30	16	-3.74	-24.28	5.61	3	C
27	8/13/10	2.00	29	15	-4.00	-23.90	8.08	3	E
28	8/19/10	1.70	30	18	-3.68	-25.28	4.19	3	C
29	9/1/10	1.50	27	11	-4.99	-25.31	14.62	3	C
30	9/2/10	1.5	27	16	-4.61	-23.77	13.07	3	C
31	9/17/10	9.0	25	15	-5.88	-33.33	13.67	1	CNE
32	9/18/10	9.0	20	12	-5.85	-32.52	14.25	3	C
33	9/20/10	1.1	22	8	-4.95	-40.72	-1.14	3	C
34	9/21/10	1.1	23	13	-7.94	-50.29	13.25	3	C
35	9/23/10	9.0	26	13	-3.00	-17.14	6.83	1	C
36	9/24/10	9.0	26	14	-5.46	-35.20	8.46	3	C
37	10/9/10	19.5	26	12	-4.37	-26.72	8.22	1	C
38	10/10/10	19.5	24	11	-4.46	-26.98	8.74	1	C
39	10/12/10	12.3	16	10	-12.25	-79.84	18.18	2	C
40	10/13/10	17.5	19	12	-9.49	-60.98	14.94	2	C
41	10/31/10	0.6	15	7	-7.01	-59.04	-2.93	1	C
42	11/1/10	0.7	15	8	-9.54	-68.69	7.61	1	C
43	11/7/10	3.6	19	5	-7.11	-51.27	5.62	1	C
44	11/8/10	0.7	13	3	-7.87	-55.95	7.02	1	CW
45	11/15/10	0.8	17	5	-7.59	-61.26	-0.56	1	C
46	11/17/10	1.7	12	2	-11.70	-107.19	-13.63	1	C
47	11/20/10	1.0	10	2	-6.79	-49.24	5.06	1	C
48	11/21/10	1.4	13	6	-10.69	-76.87	8.65	1	C
49	12/1/10	2.3	11	1	-11.88	-68.04	27.03	1	C
50	12/5/10	0.2	8	-1	-8.36	-60.62	6.26	1	AW
51	12/9/10	1.1	19	7	-6.50	-52.40	-0.40	1	SE
52	12/14/10	0.6	13	2	-6.28	-38.29	11.92	1	SE
53	12/22/10	2.3	15	5	-15.74	-112.95	12.97	1	CNW
54	12/23/10	4.5	15	4	-15.85	-114.00	12.81	1	C
55	12/31/10	0.5	9	3	-6.72	-46.78	6.98	1	C
56	1/5/11	0.3	12	4	-6.36	-50.06	0.85	1	W
57	1/27/11	2.5	5	-3	-10.41	-58.50	24.80	2	C
58	2/14/11	1.7	15	2	-7.43	-46.74	12.68	1	W
59	2/15/11	1.0	10	3	-9.80	-69.59	8.81	1	SW

60	2/17/11	0.2	11	3	-14.16	-105.89	7.40	1	C
61	2/19/11	1.2	14	4	-6.87	-53.80	1.18	1	C
62	2/21/11	3.5	14	5	-6.93	-56.14	-0.66	1	S
63	3/3/11	2.6	8	2	-9.58	-53.57	23.04	2	C
64	3/4/11	1.9	5	0	-13.96	-83.38	28.27	2	CE
65	3/9/11	0.4	9	4	-3.26	-10.42	15.67	2	ANE
66	3/11/11	0.1	14	0	-15.06	-93.80	26.66	2	A
67	3/12/11	9.3	14	2	-14.79	-95.11	23.18	1	NW
68	3/13/11	2.0	11	4	-8.51	-52.35	15.76	1	C
69	3/14/11	6.0	16	6	-6.61	-35.56	17.32	2	CN
70	3/15/11	11.3	12	8	-4.80	-24.24	14.17	1	C
71	3/16/11	69.0	10	4	-15.21	-109.79	11.86	1	C
72	3/22/11	4.2	14	4	-5.97	-30.73	17.03	2	ANE
73	3/23/11	0.1	9	4	-5.59	-23.78	20.95	2	A
74	3/25/11	0.7	10	5	-6.98	-37.72	18.14	1	A
75	3/27/11	0.3	18	7	-6.91	-47.81	7.51	1	CNW
76	3/30/11	2.0	17	7	-5.58	-39.12	5.50	1	C
77	4/19/11	0.4	21	6	-0.60	4.09	8.86	1	C
78	4/22/11	17.0	14	9	-7.70	-53.36	8.27	1	CNW
79	4/23/11	11.0	15	8	-7.34	-47.84	10.90	1	CN
80	4/24/11	4.2	18	9	-8.44	-65.31	2.20	2	E
81	4/25/11	2.2	15	10	-7.30	-47.15	11.26	2	CSE
82	4/28/11	1.5	22	9	-5.50	-29.05	14.93	3	C
83	4/29/11	0.3	21	9	-4.29	-17.60	16.71	2	CNE
84	4/30/11	3.4	19	9	-4.18	-20.47	12.97	1	C
85	5/1/11	2.7	17	10	-2.37	-17.69	1.30	3	C
86	5/5/11	3.8	23	11	-2.14	-19.01	-1.85	3	A
87	5/7/11	8.8	22	13	-5.44	-35.40	8.14	1	ANW
88	5/11/11	0.2	25	11	-9.18	-61.51	11.94	3	ANE
89	5/14/11	3.5	25	12	-3.06	-14.47	9.97	3	E
90	5/27/11	2.1	30	14	-4.52	-35.68	0.50	3	E
91	5/29/11	0.8	25	12	-7.18	-43.37	14.11	3	C
92	5/30/11	51.0	29	15	-7.29	-43.15	15.14	3	N
93	6/2/11	1.2	18	9	-3.77	-19.02	11.18	2	E
94	6/4/11	0.8	19	8	-4.93	-21.46	18.00	3	C
95	6/6/11	5.8	23	12	-4.73	-22.86	14.99	3	C
96	6/12/11	0.2	23	12	-3.12	-14.43	10.56	3	C
97	6/21/11	7.4	30	17	-4.10	-29.24	3.55	1	A
98	6/22/11	2.8	31	16	0.14	-8.62	-9.78	3	C
99	7/12/11	3.9	32	20	-4.73	-17.21	20.65	3	C
100	7/19/11	2.0	26	13	-5.96	-31.95	15.71	3	C
101	8/5/11	5.7	33	18	-4.23	-30.09	3.78	3	C
102	8/12/11	1.9	32	17	1.39	-12.22	-23.34	3	C
103	8/19/11	?	33	17	0.45	-11.93	-15.53	3	C
104	8/29/11	0.6	30	17	-1.43	-14.03	-2.61	3	C
105	9/17/11	?	31	15	-2.65	-23.93	-2.71	3	C
106	9/23/11	1	26	13	-1.56	-11.04	1.40	3	C
107	10/28/11	0.5	18	10	-4.65	-31.72	5.48	2	NE
108	11/4/11	0.4	20	9	-6.91	-39.99	15.28	1	NW
109	11/5/11	33.6	16	7	-6.34	-38.17	12.54	1	C
110	11/6/11	1.5	10	7	-11.62	-83.19	9.80	2	C
111	11/7/11	0.7	12	8	-7.55	-55.86	4.54	1	C
112	11/15/11	16.7	16	9	-7.24	-47.14	10.77	1	C
113	11/20/11	0.3	14	7	-5.88	-33.38	13.62	2	N
114	11/21/11	32.0	14	7	-8.55	-54.55	13.87	2	C
115	11/22/11	6.0	12	8	-12.20	-78.23	19.36	2	C
116	11/23/11	24.4	10	8	-12.01	-75.65	20.47	2	SE
117	12/2/11	4.0	10	3	-9.38	-60.05	15.01	1	CN
118	12/16/11	8.4	11	2	-9.54	-61.77	14.55	1	W
119	1/16/12	4	12	-2	-9.34	-56.94	17.78	2	C
120	1/27/12	1	12	1	-7.00	-36.61	19.41	2	NE
121	2/1/12	3	13	1	-9.02	-56.33	15.83	1	C
122	2/5/12	4.5	7	-6	-11.72	-79.97	13.82	2	C
123	3/4/12	4.4	18	5	-5.60	-29.75	10.56	1	AW
124	3/20/12	24.5	13	3	-11.04	-62.41	16.88	2	E
125	3/21/12	3.7	11	1	-11.07	-67.18	15.53	2	NE
126	4/2/12	8	23	7	-8.20	-54.20	7.56	3	C
127	4/3/12	0.5	21	6	-8.31	-55.63	9.06	3	C

128	4/4/12	8.9	17	6	-5.06	-23.40	19.33	1	C
129	4/5/12	3.4	15	7	-8.70	-51.35	15.94	1	C
130	4/6/12	1.5	16	4	-11.22	-69.53	20.36	1	C
131	4/12/12	3.6	17	7	-12.35	-88.49	8.07	1	CNW
132	4/14/12	4.8	16	4	-13.38	-90.13	6.75	1	NW
133	4/19/12	4.2	17	5	-8.56	-53.82	12.94	1	NW
134	4/27/12	0.2	28	12	-5.36	-29.93	13.12	1	C
135	4/30/12	8.5	16	6	-10.54	-68.12	8.84	1	CNW
136	05/08/12	0.3	25	11	-5.81	-39.20	7.27	1	AW
137	05/13/12	0.2	34	15	-5.93	-38.46	8.97	3	E
138	05/20/12	5.4	27	7	-7.19	-50.33	7.21	1	C
139	06/02/12	0.2	35	18	-0.94	-14.66	-7.15	3	C
140	06/03/12	17.8	36	16	-0.90	-13.48	-6.24	3	A
141	06/19/12	0.2	32	17	-0.41	3.07	6.32	3	C
142	07/27/12	0.2	36	20	0.35	-8.36	-11.19	3	C
143	07/28/12	0.2	38	15	-2.76	-17.98	4.13	3	CNW
144	08/29/12	0.2	39	14	-7.00	-52.43	3.53	3	A

Table 2. Spearman's rank correlation between $\delta^{18}O_p$ and various predictors. Correlations with $p<0.05$ are indicated in italics (p-values can be read above the gray squares).

Correlation along the year					
	Event $\delta^{18}O_p$	NAO index	WeMO index	P amount	Temperature
Event $\delta^{18}O_p$		0.38843	0.018101	0.025141	4.88E-05
NAO index	-0.073451		0.0088318	0.44372	0.047999
WeMO index	*-0.19953*	*-0.22055*		0.58546	0.78312
P amount	*-0.18923*	0.065249	-0.046489		0.99816
Temperature	*0.33621*	*-0.16744*	0.02347	0.00019683	
Winter (DJF)					
Event $\delta^{18}O_p$		0.32268	0.64957	0.024959	0.42242
NAO index	-0.23308		0.70521	0.010936	0.74489
WeMO index	0.10827	0.090226		0.050867	0.41681
P amount	*-0.49944*	*0.55585*	*0.44227*		0.91705
Temperature	0.18997	-0.077648	0.19224	0.024887	
Spring (MAM)					
Event $\delta^{18}O_p$		0.66722	0.046177	0.034116	0.1198
NAO index	0.056656		0.020033	0.51582	0.72256
WeMO index	*-0.25844*	*-0.29962*		0.72081	0.32874
P amount	*-0.27403*	0.085534	0.047102		0.39632
Temperature	0.203	-0.046795	0.12826	-0.11151	
Summer (JJA)					
Event $\delta^{18}O_p$		0.072123	0.035121	0.51624	0.0099096
NAO index	-0.33304		0.59942	0.79451	0.022816
WeMO index	*-0.38603*	-0.0999		0.54795	0.48994
P amount	-0.1233	0.049633	-0.11419		0.74841
Temperature	*0.46339*	*-0.41435*	-0.13107	-0.061099	
Fall (SON)					
Event $\delta^{18}O_p$		0.82612	0.19827	0.43509	0.0010324
NAO index	-0.041129		0.2623	0.99484	0.093035
WeMO index	-0.2375	-0.20766		0.10509	0.23543
P amount	-0.14541	0.0012118	-0.29668		0.31083
Temperature	*0.56078*	-0.30695	-0.21951	0.18813	

Table 3. Kruskal-Wallis test performed on $\delta^{18}O_p$ and δD_p data to discriminate if the three synoptic patterns and the two main weather types ("Western" and "Eastern" origins) are statistically different in terms of their isotopic composition. Event data and anomaly data (seasonal component removed) have been considered.

	Anomaly data				Event data			
	Synoptic patterns		Weather types		Synoptic patterns		Weather types	
	δ^{18}O	**δD**	**δ^{18}O**	**δD**	**δ^{18}O**	**δD**	**δ^{18}O**	**δD**
Chi square (KW test)	3.374	1.095	0.01	0.281	37.23	30.18	2.653	3.72
p-value	0.185	0.578	0.976	0.596	0	0	0.103	0.054

Table 4. A) Chemical data of dripwaters sampled seasonally in Molinos cave at dripwater site nº 1. Saturation index for calcite is positive (calculations carried out by PHREEQC interactive software) all along the year except in winter. NO_2, Br, PO_4, NH_4 and K are not shown since values are zero throughout the year.

	pH	**Tª (°C)**	**Conductivity (µS)**	**TDS**	**Alkalinity**	**Anions**				**Cations**			**SI Calcite**
						F^-	Cl^-	NO_3^-	SO_4^{2-}	Na^+	Ca^{2+}	Mg^{2+}	
Spring (25 May 2010)	7.46	17	251	151.3	259	0.04	3.365	6.07	24.9090	3.768	148.9730	2.8160	0.44
Summer (1 July 2010)	8.1	14.2	253	150.9	206.1	0.0340	2.244	4.2640	16.7970	2.5640	100.2550	1.9000	0.79
Fall (10 Dec 2010)	8.15	15.4	no data	no data	181.6	0.0482	3.0122	5.0719	24.5756	3.0392	66.6584	1.5857	0.64
Winter (1 March 2012)	7.17	13.5	423	no data	232.08	0.0240	2.473	4.8800	17.2700	1.7520	88.9440	1.6790	-0.13

Table 4. B) Isotopic composition of present-day calcite growth over artificial substrates at sampling location MO-3, that corresponds to dripwater site nº1 (Table 3A). Values of $\delta^{18}O_p$ are averaged during the time interval when calcite was precipitating. Average values of $\delta^{18}O_p$ and measured range during the time interval when calcite was precipitating are indicated. Average temperature in the cave is 12ºC. The calculated isotopic composition of dripwaters using equation from Kim and O'Neil (1997) indicates that calcite precipitation took place with slightly evaporated water and/or in period with less precipitation.

Time interval with calcite precipitating	Isotopes in calcite		$\delta^{18}O_d$ ‰ (V-SMOW) in MO-3	$\delta^{18}O_d$ ‰ (V-SMOW) calculated from Kim and O'Neil (1997)
	$\delta^{13}C$ ‰ (V-PDB)	$\delta^{18}O$ ‰ (V-PDB)		
February-April 2010	-8.7	-6.9	-9.9 (-9.18 to -10.54)	-7.5
Dec 2010- March 2011	-10.5	-8.2	-9.2 (-8.69 to -9.70)	-8.8
Nov 2011 - April 2012	-10.7	-7.9	-9.3 (-8.61 to -9.51)	-8.5

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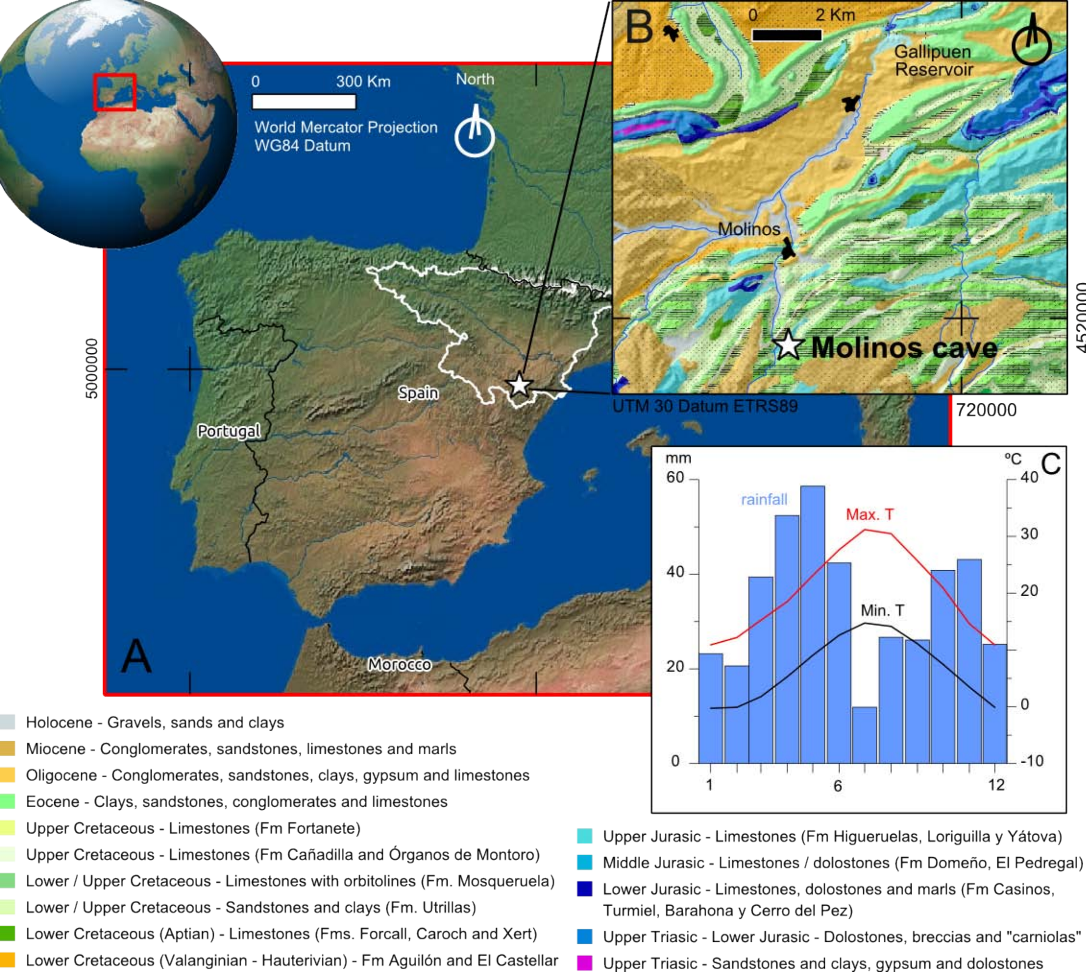
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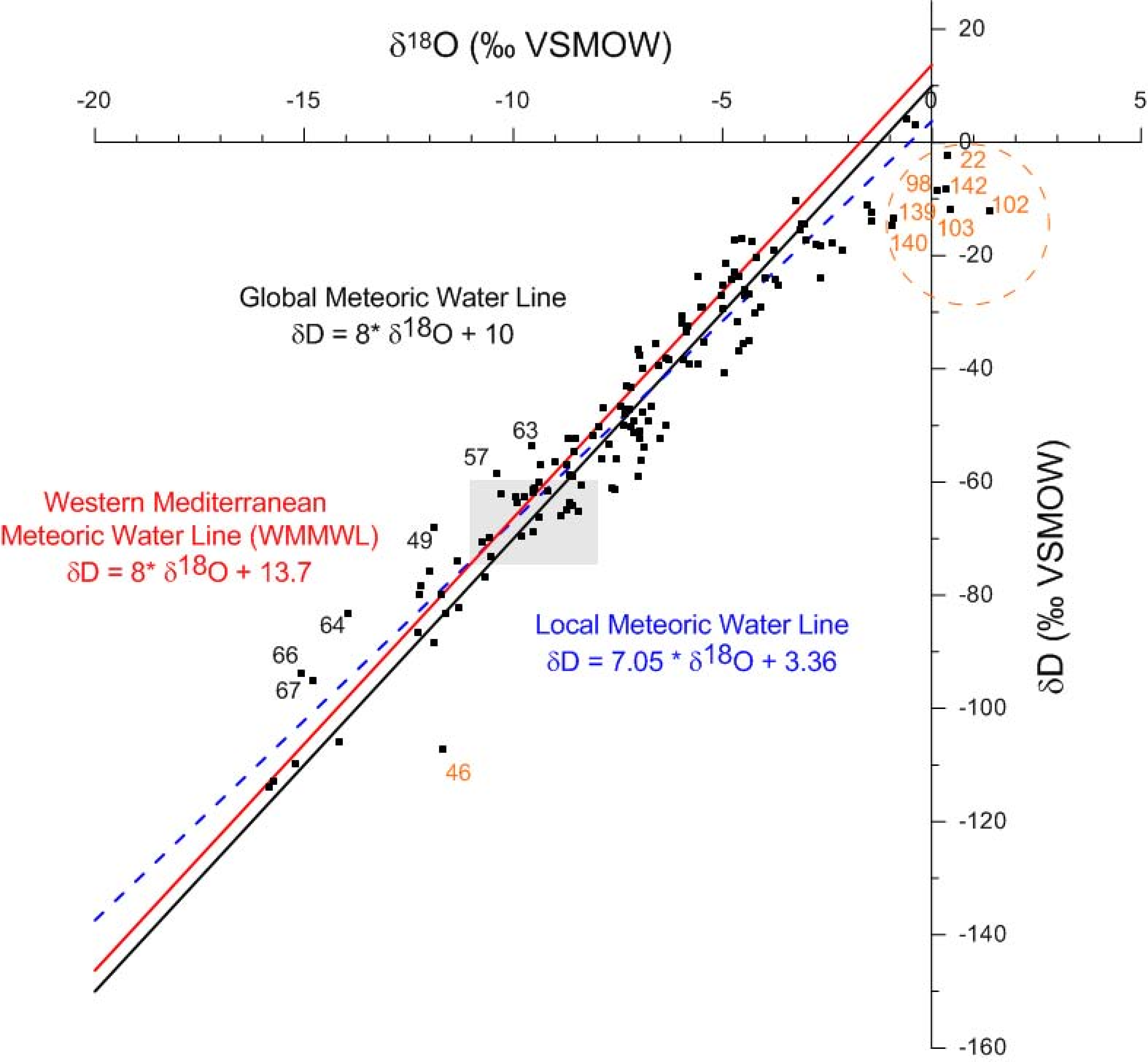
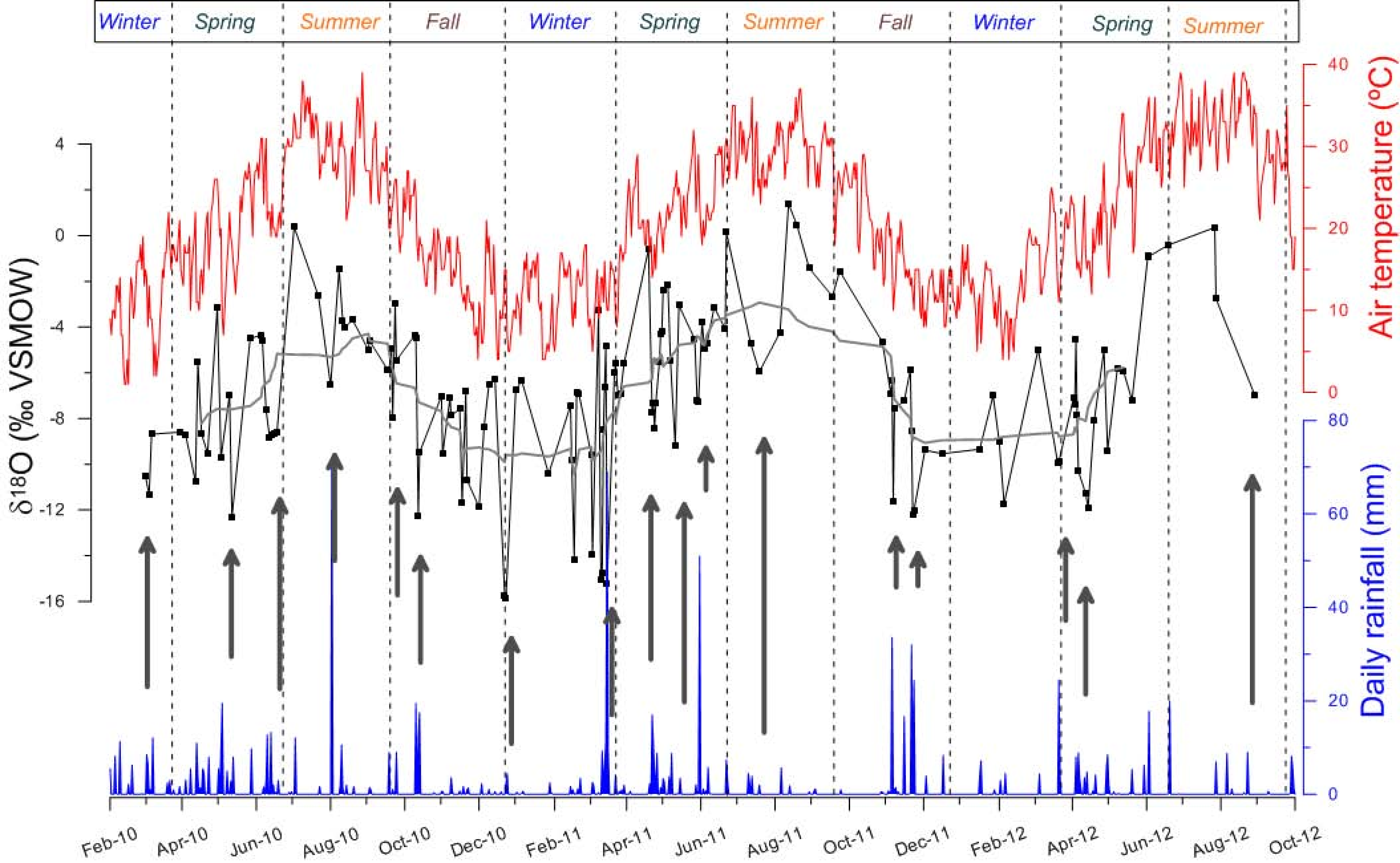
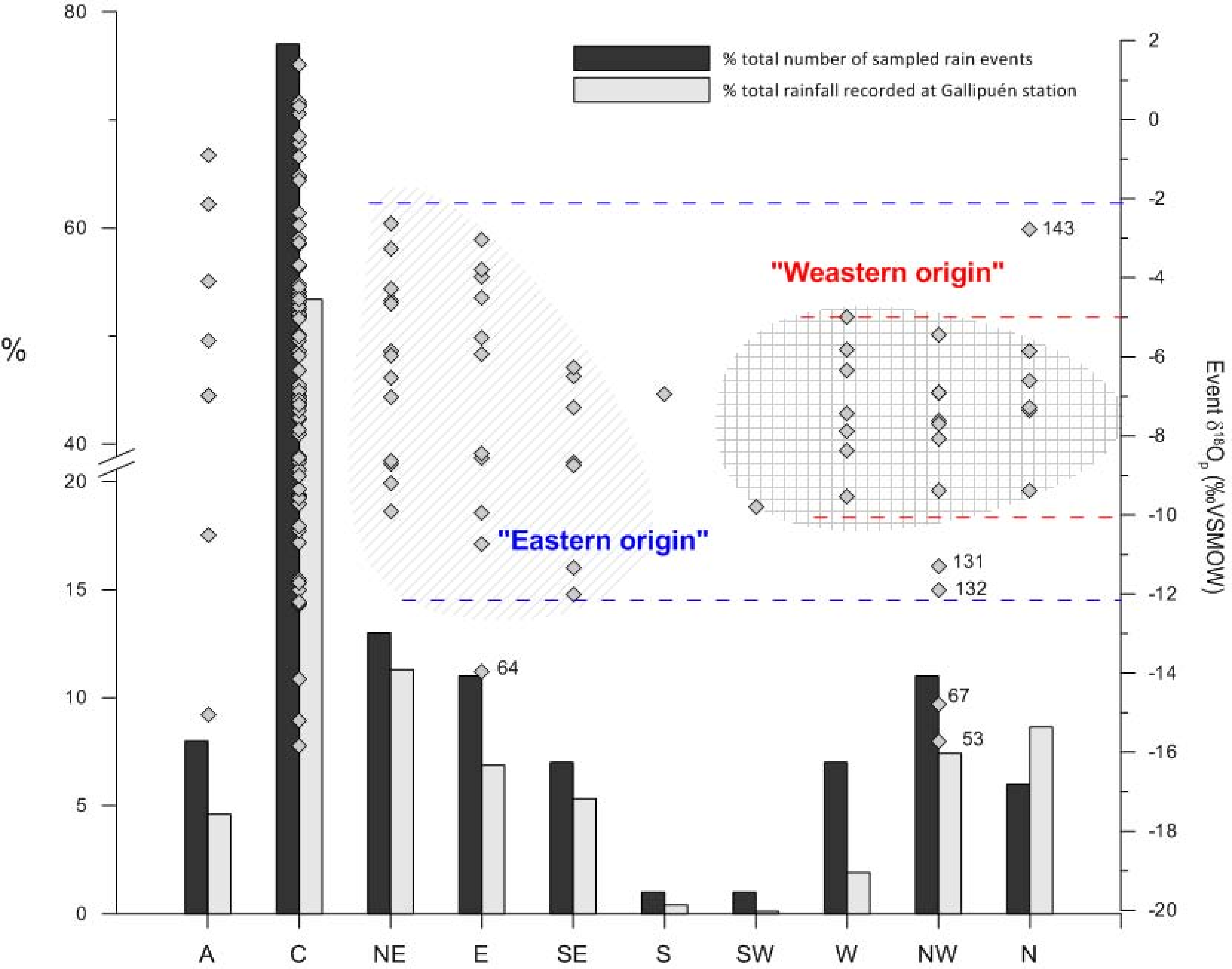
12
Holocene - Gravels, sands and clays
Miocene - Conglomerates, sandstones, limestones and marls
Oligocene - Conglomerates, sandstones, clays, gypsum and limestones
Eocene - Clays, sandstones, conglomerates and limestones
Upper Cretaceous - Limestones (Fm Fortanete)
Upper Cretaceous - Limestones (Fm Cañadilla and Órganos de Montoro)
Lower / Upper Cretaceous - Limestones with orbitolines (Fm. Mosqueruela)
Lower / Upper Cretaceous - Sandstones and clays (Fm. Utrillas)
Lower Cretaceous (Aptian) - Limestones (Fms. Forcall, Caroch and Xert)
Lower Cretaceous (Valanginian - Hauterivian) - Fm Aguilón and El Castellar
Upper Jurasic - Limestones (Fm Higueruelas, Loriguilla y Yátova)
Middle Jurasic - Limestones / dolostones (Fm Domeño, El Pedregal)
Lower Jurasic - Limestones, dolostones and marls (Fm Casinos, Turmiel, Barahona y Cerro del Pez)
Upper Triasic - Lower Jurasic - Dolostones, breccias and "carniolas"
Upper Triasic - Sandstones and clays, gypsum and dolostones

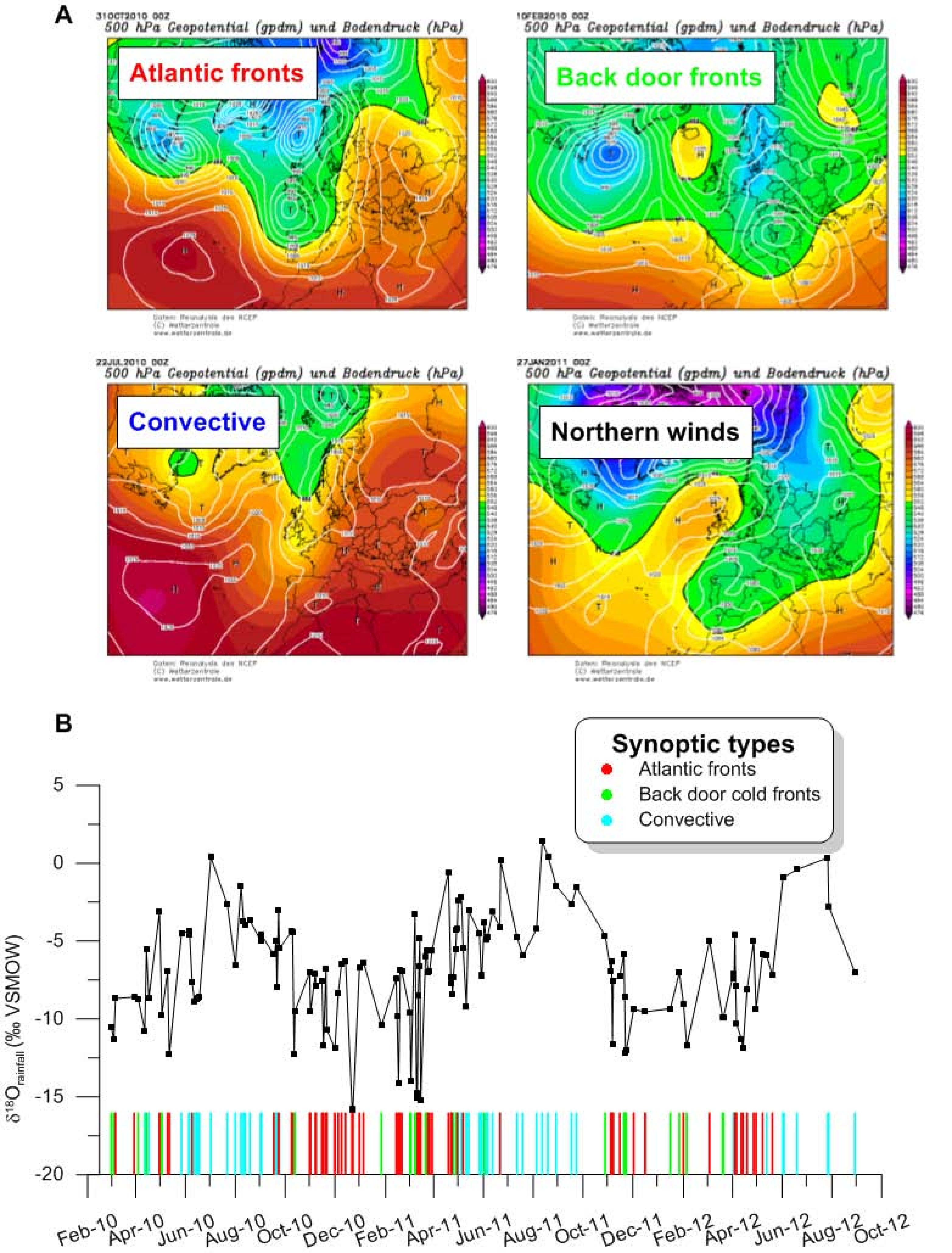

δ18O (‰ VSMOW)
-20
-15
-10
-5
0
5
20
0
-20
-40
-60
-80
-100
-120
-140
-160
δD (‰ VSMOW)
Global Meteoric Water Line
δD = 8* δ18O + 10
Western Mediterranean
Meteoric Water Line (WMMWL)
δD = 8* δ18O + 13.7
Local Meteoric Water Line
δD = 7.05 * δ18O + 3.36
22
98
142
139
102
103
140
63
57
49
64
66
67
46

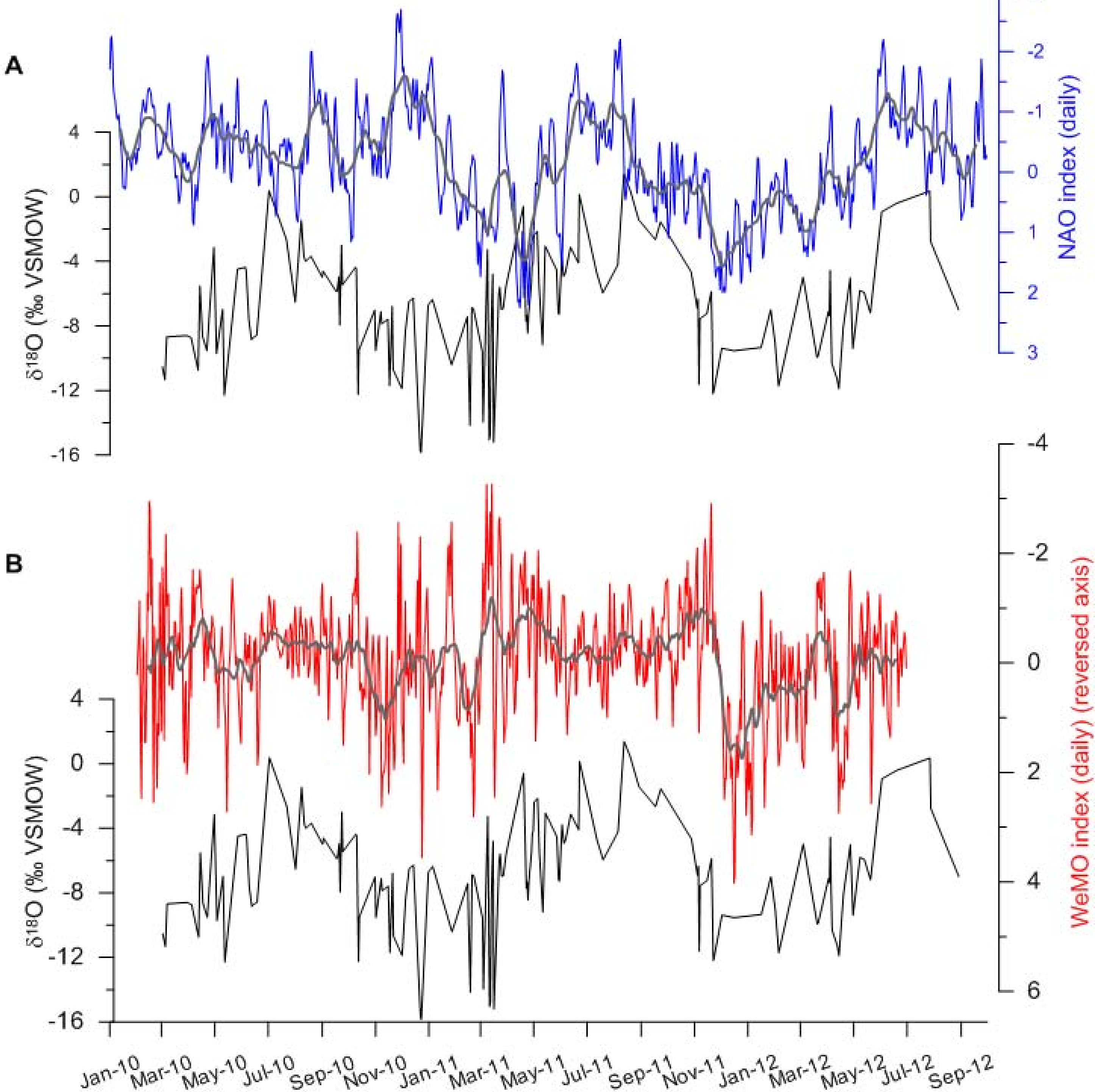


Winter
Spring
Summer
Fall
Winter
Spring
Summer
Fall
Winter
Spring
Summer
δ18O (‰ VSMOW)
Air temperature (°C)
Daily rainfall (mm)
4
0
-4
-8
-12
-16
40
30
20
10
0
80
60
40
20
0
Feb-10
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12

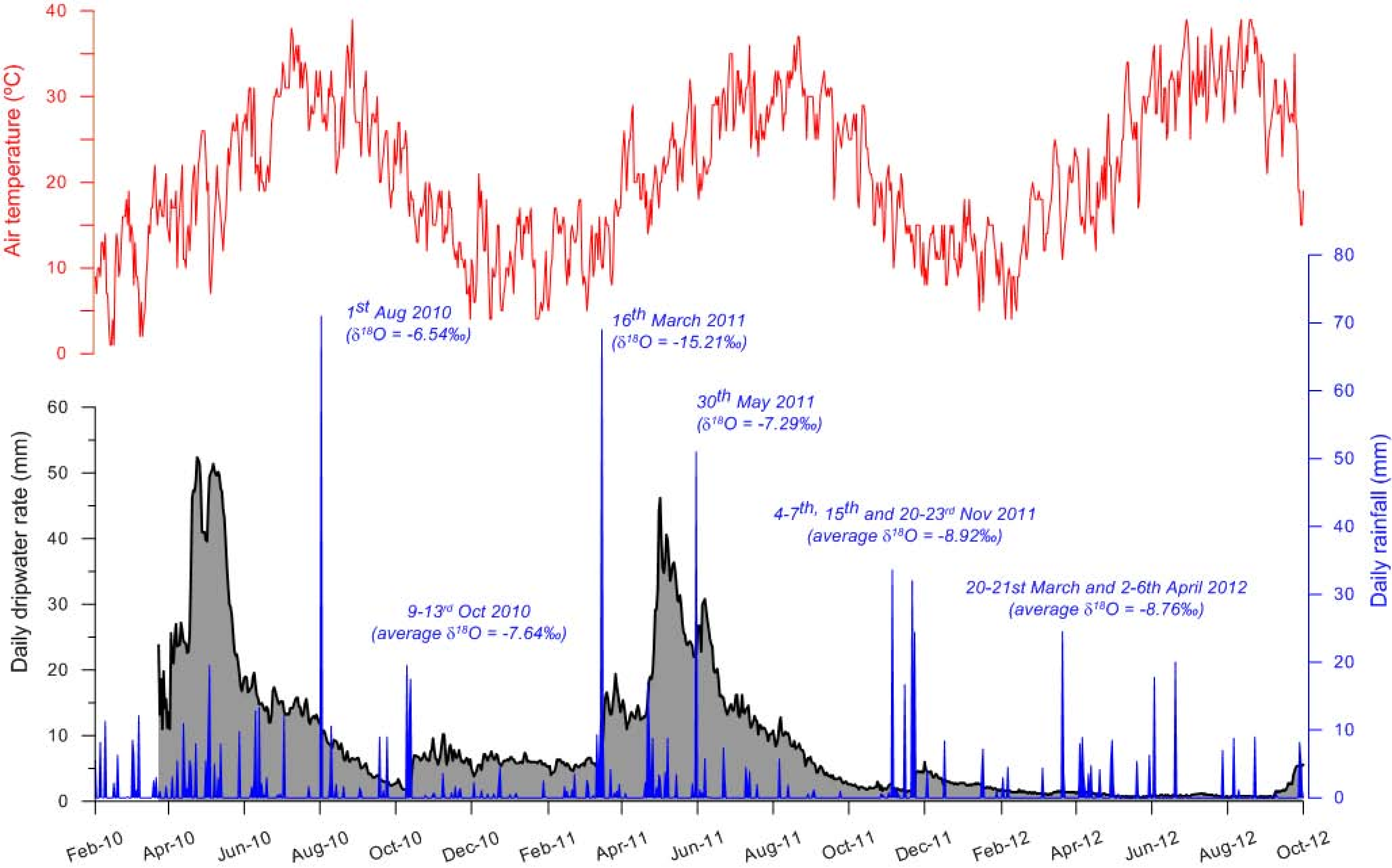


80
60
40
20
15
10
5
0
%
% total number of sampled rain events
% total rainfall recorded at Gallipuén station
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Event δ18Op (‰VSMOW)
"Weastern origin"
"Eastern origin"
143
131
132
64
67
53
A
C
NE
E
SE
S
SW
W
NW
N

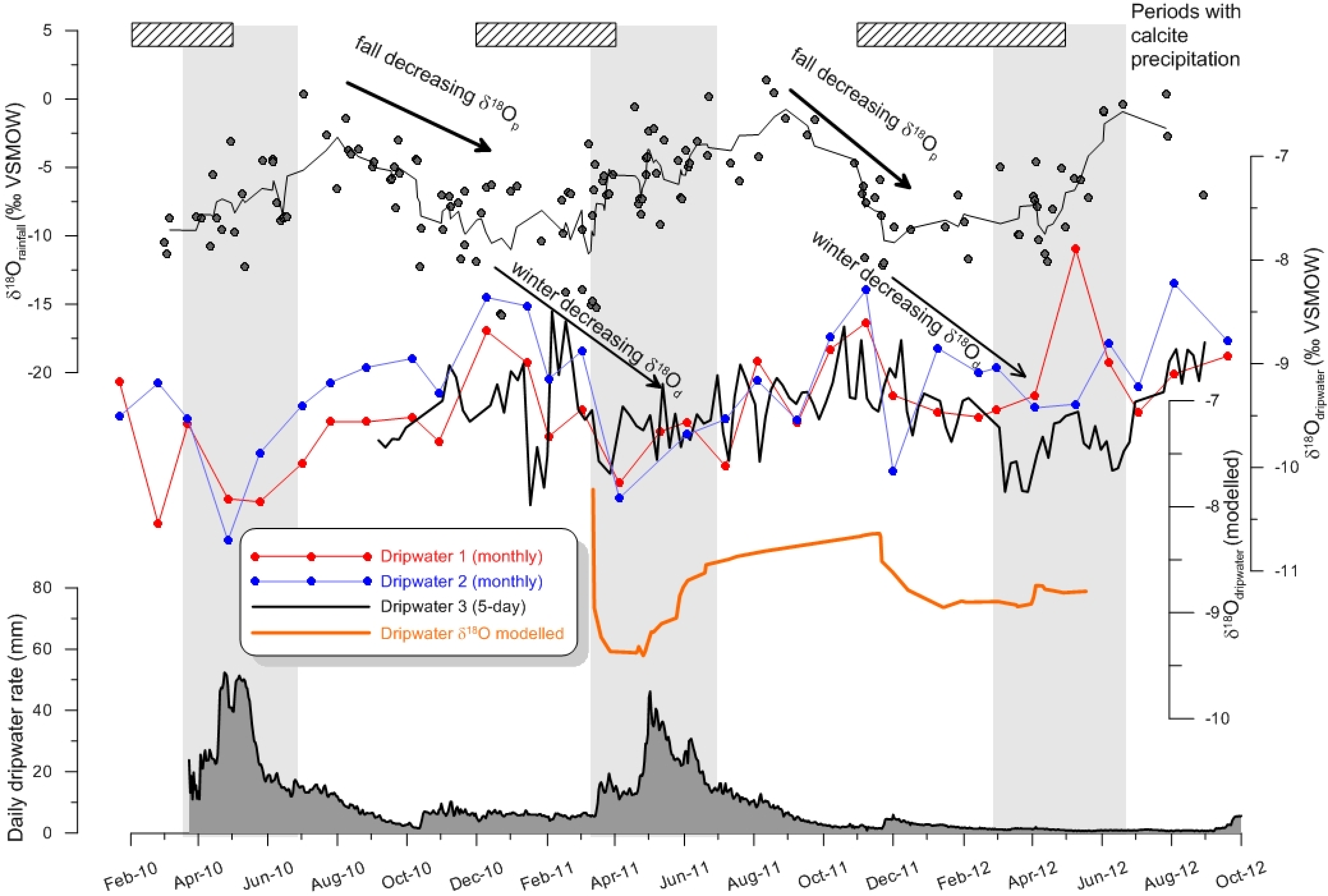

A
31OCT2010 00Z
500 hPa Geopotential (gpdm) und Bodendruck (hPa)
Atlantic fronts
10FEB2010 00Z
500 hPa Geopotential (gpdm) und Bodendruck (hPa)
Back door fronts
22JUL2010 00Z
500 hPa Geopotential (gpdm) und Bodendruck (hPa)
Convective
27JAN2011 00Z
500 hPa Geopotential (gpdm) und Bodendruck (hPa)
Northern winds
B
Synoptic types
Atlantic fronts
Back door cold fronts
Convective
δ18O rainfall (‰ VSMOW)
5
0
-5
-10
-15
-20
Feb-10
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12



A
B
δ18O (‰ VSMOW)
NAO index (daily)
WeMO index (daily) (reversed axis)
4
0
-4
-8
-12
-16
-3
-2
-1
0
1
2
3
-4
-2
0
2
4
6
Jan-10
Mar-10
May-10
Jul-10
Sep-10
Nov-10
Jan-11
Mar-11
May-11
Jul-11
Sep-11
Nov-11
Jan-12
Mar-12
May-12
Jul-12
Sep-12



Air temperature (ºC)
40
30
20
10
0
Daily dripwater rate (mm)
60
50
40
30
20
10
0
Daily rainfall (mm)
80
70
60
50
40
30
20
10
0
1st Aug 2010
(δ18O = -6.54‰)
16th March 2011
(δ18O = -15.21‰)
30th May 2011
(δ18O = -7.29‰)
4-7th, 15th and 20-23rd Nov 2011
(average δ18O = -8.92‰)
9-13rd Oct 2010
(average δ18O = -7.64‰)
20-21st March and 2-6th April 2012
(average δ18O = -8.76‰)
Feb-10
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12



Periods with calcite precipitation
fall decreasing δ18Op
fall decreasing δ18Op
winter decreasing δ18Od
winter decreasing δ18Od
δ18Orainfall (‰ VSMOW)
δ18Odripwater (‰ VSMOW)
δ18Odripwater (modelled)
Daily dripwater rate (mm)
Dripwater 1 (monthly)
Dripwater 2 (monthly)
Dripwater 3 (5-day)
Dripwater δ18O modelled
Feb-10
Apr-10
Jun-10
Aug-10
Oct-10
Dec-10
Feb-11
Apr-11
Jun-11
Aug-11
Oct-11
Dec-11
Feb-12
Apr-12
Jun-12
Aug-12
Oct-12

Gallipuen meteorological station			
Date (dd/mm/yyyy)	Rainfall (mm)	Max Temperature (ºC)	Min Temperature (ºC)
01/01/2010	0.0	12.0	4.0
02/01/2010	0.8	16.0	6.0
03/01/2010	0.0	10.0	-2.0
04/01/2010	1.5	13.0	4.0
05/01/2010	1.9	10.0	2.0
06/01/2010	0.9	7.0	0.0
07/01/2010	4.0	6.0	-2.0
08/01/2010	26.5	0.0	0.0
09/01/2010	0.0	0.0	0.0
10/01/2010	0.0	0.0	0.0
11/01/2010	0.0	0.0	0.0
12/01/2010	0.0	6.0	-5.0
13/01/2010	3.0	8.0	-4.0
14/01/2010	0.2	11.0	3.0
15/01/2010	3.7	12.0	2.0
16/01/2010	0.0	11.0	0.0
17/01/2010	0.0	15.0	3.0
18/01/2010	1.0	11.0	5.0
19/01/2010	0.0	14.0	5.0
20/01/2010	0.5	13.0	5.0
21/01/2010	0.0	13.0	2.0
22/01/2010	0.0	11.0	1.0
23/01/2010	0.0	14.0	1.0
24/01/2010	0.0	9.0	0.0
25/01/2010	0.7	8.0	0.0
26/01/2010	2.3	5.0	-2.0
27/01/2010	0.0	5.0	-3.0
28/01/2010	0.0	4.0	-6.0
29/01/2010	0.0	7.0	1.0
30/01/2010	1.2	10.0	2.0
31/01/2010	0.0	11.0	3.0
01/02/2010	5.5	9.0	-2.0
02/02/2010	0.0	7.0	-3.0
03/02/2010	0.0	10.0	-3.0
04/02/2010	0.0	10.0	2.0
05/02/2010	8.2	9.0	3.0
06/02/2010	0.2	13.0	3.0
07/02/2010	0.0	13.0	4.0
08/02/2010	0.0	11.0	3.0
09/02/2010	11.3	14.0	2.0
10/02/2010	0.0	7.0	-1.0
11/02/2010	0.0	7.0	-4.0
12/02/2010	0.0	3.0	-5.0
13/02/2010	0.0	1.0	-4.0
14/02/2010	0.0	1.0	-5.0
15/02/2010	0.0	4.0	-4.0
16/02/2010	2.2	1.0	-3.0
17/02/2010	0.0	10.0	5.0

18/02/2010	0.0	14.0	1.0
19/02/2010	6.3	13.0	2.0
20/02/2010	0.0	9.0	1.0
21/02/2010	0.0	10.0	2.0
22/02/2010	0.0	13.0	0.0
23/02/2010	0.0	16.0	6.0
24/02/2010	0.0	16.0	7.0
25/02/2010	0.0	16.0	4.0
26/02/2010	0.0	18.0	5.0
27/02/2010	0.2	15.0	3.0
28/02/2010	0.0	19.0	6.0
01/03/2010	0.0	13.0	3.0
02/03/2010	0.0	15.0	0.0
03/03/2010	8.5	14.0	3.0
04/03/2010	6.5	8.0	4.0
05/03/2010	0.0	13.0	3.0
06/03/2010	1.1	9.0	2.0
07/03/2010	0.0	9.0	1.0
08/03/2010	12.1	7.0	-4.0
09/03/2010	0.0	2.0	-3.0
10/03/2010	0.0	6.0	-5.0
11/03/2010	0.0	2.0	-3.0
12/03/2010	0.0	4.0	-2.0
13/03/2010	0.0	5.0	-2.0
14/03/2010	0.0	9.0	-1.0
15/03/2010	0.0	11.0	-4.0
16/03/2010	0.0	15.0	-3.0
17/03/2010	0.0	14.0	1.0
18/03/2010	0.0	17.0	3.0
19/03/2010	0.3	17.0	3.0
20/03/2010	2.5	20.0	7.0
21/03/2010	0.0	22.0	9.0
22/03/2010	3.0	18.0	8.0
23/03/2010	0.0	15.0	4.0
24/03/2010	0.0	17.0	5.0
25/03/2010	1.0	18.0	8.0
26/03/2010	0.0	17.0	4.0
27/03/2010	0.0	16.0	5.0
28/03/2010	0.0	16.0	5.0
29/03/2010	0.0	19.0	6.0
30/03/2010	1.7	21.0	5.0
31/03/2010	0.0	15.0	3.0
01/04/2010	0.0	14.0	2.0
02/04/2010	0.0	13.0	3.0
03/04/2010	0.0	18.0	5.0
04/04/2010	3.1	17.0	6.0
05/04/2010	0.0	17.0	8.0
06/04/2010	0.0	17.0	9.0
07/04/2010	0.0	19.0	11.0
08/04/2010	5.5	10.0	9.0

09/04/2010	0.0	15.0	6.0
10/04/2010	0.0	17.0	6.0
11/04/2010	0.0	19.0	7.0
12/04/2010	0.0	22.0	8.0
13/04/2010	11.0	11.0	9.0
14/04/2010	3.8	11.0	6.0
15/04/2010	0.5	10.0	5.0
16/04/2010	1.4	14.0	5.0
17/04/2010	0.6	15.0	8.0
18/04/2010	5.5	12.0	8.0
19/04/2010	4.7	15.0	7.0
20/04/2010	0.0	19.0	7.0
21/04/2010	0.0	21.0	7.0
22/04/2010	0.6	22.0	9.0
23/04/2010	8.0	15.0	11.0
24/04/2010	0.0	18.0	8.0
25/04/2010	0.0	22.0	8.0
26/04/2010	0.0	23.0	11.0
27/04/2010	0.0	25.0	12.0
28/04/2010	0.0	26.0	10.0
29/04/2010	0.0	26.0	11.0
30/04/2010	0.0	26.0	11.0
01/05/2010	5.5	23.0	12.0
02/05/2010	0.3	19.0	8.0
03/05/2010	10.0	20.0	6.0
04/05/2010	19.5	9.0	4.0
05/05/2010	0.0	7.0	3.0
06/05/2010	0.0	10.0	4.0
07/05/2010	0.0	13.0	3.0
08/05/2010	5.0	16.0	8.0
09/05/2010	0.6	18.0	8.0
10/05/2010	0.0	22.0	8.0
11/05/2010	2.9	19.0	7.0
12/05/2010	0.0	18.0	7.0
13/05/2010	8.0	16.0	6.0
14/05/2010	0.3	14.0	4.0
15/05/2010	0.0	12.0	4.0
16/05/2010	0.0	15.0	5.0
17/05/2010	0.0	16.0	6.0
18/05/2010	0.0	19.0	4.0
19/05/2010	0.0	24.0	5.0
20/05/2010	0.0	22.0	9.0
21/05/2010	0.0	24.0	9.0
22/05/2010	0.0	26.0	13.0
23/05/2010	0.0	27.0	11.0
24/05/2010	0.0	26.0	11.0
25/05/2010	0.0	26.0	11.0
26/05/2010	0.0	28.0	13.0
27/05/2010	0.0	26.0	12.0
28/05/2010	9.8	23.0	12.0

29/05/2010	0.0	19.0	10.0
30/05/2010	0.0	25.0	12.0
31/05/2010	0.0	27.0	15.0
01/06/2010	0.0	27.0	16.0
02/06/2010	0.0	28.0	16.0
03/06/2010	0.0	26.0	11.0
04/06/2010	0.0	29.0	11.0
05/06/2010	0.0	31.0	14.0
06/06/2010	0.3	31.0	17.0
07/06/2010	1.6	23.0	13.0
08/06/2010	0.0	28.0	14.0
09/06/2010	3.0	31.0	15.0
10/06/2010	12.8	21.0	12.0
11/06/2010	0.0	22.0	12.0
12/06/2010	0.0	22.0	12.0
13/06/2010	13.3	19.0	11.0
14/06/2010	0.0	23.0	12.0
15/06/2010	2.1	20.0	9.0
16/06/2010	0.0	20.0	9.0
17/06/2010	0.5	19.0	10.0
18/06/2010	0.0	19.0	10.0
19/06/2010	3.0	21.0	10.0
20/06/2010	0.0	22.0	12.0
21/06/2010	0.0	20.0	8.0
22/06/2010	0.0	23.0	9.0
23/06/2010	0.0	27.0	10.0
24/06/2010	0.0	28.0	12.0
25/06/2010	0.0	30.0	16.0
26/06/2010	0.0	30.0	18.0
27/06/2010	0.0	31.0	17.0
28/06/2010	0.5	30.0	15.0
29/06/2010	0.0	30.0	16.0
30/06/2010	0.6	30.0	15.0
01/07/2010	0.0	31.0	15.0
02/07/2010	0.0	34.0	19.0
03/07/2010	12.1	33.0	16.0
04/07/2010	0.0	31.0	18.0
05/07/2010	0.0	31.0	16.0
06/07/2010	0.0	31.0	15.0
07/07/2010	0.0	31.0	16.0
08/07/2010	0.0	35.0	17.0
09/07/2010	0.0	38.0	22.0
10/07/2010	0.0	37.0	20.0
11/07/2010	0.0	33.0	20.0
12/07/2010	0.0	35.0	21.0
13/07/2010	0.0	36.0	18.0
14/07/2010	0.0	34.0	19.0
15/07/2010	0.0	36.0	15.0
16/07/2010	0.0	31.0	17.0
17/07/2010	0.0	34.0	18.0

18/07/2010	0.0	31.0	15.0
19/07/2010	0.0	33.0	17.0
20/07/2010	0.0	34.0	20.0
21/07/2010	0.0	33.0	19.0
22/07/2010	0.0	31.0	19.0
23/07/2010	1.7	26.0	16.0
24/07/2010	0.0	27.0	12.0
25/07/2010	0.0	29.0	13.0
26/07/2010	0.0	28.0	15.0
27/07/2010	0.0	28.0	15.0
28/07/2010	0.0	30.0	16.0
29/07/2010	0.0	33.0	16.0
30/07/2010	0.0	30.0	15.0
31/07/2010	0.0	30.0	15.0
01/08/2010	0.0	33.0	16.0
02/08/2010	71.0	31.0	17.0
03/08/2010	0.0	27.0	16.0
04/08/2010	0.0	27.0	13.0
05/08/2010	0.0	28.0	13.0
06/08/2010	0.0	26.0	12.0
07/08/2010	0.0	27.0	12.0
08/08/2010	0.0	31.0	14.0
09/08/2010	2.3	30.0	19.0
10/08/2010	10.6	33.0	18.0
11/08/2010	1.5	30.0	16.0
12/08/2010	0.0	30.0	17.0
13/08/2010	0.0	29.0	15.0
14/08/2010	2.0	21.0	11.0
15/08/2010	0.0	22.0	12.0
16/08/2010	0.0	23.0	11.0
17/08/2010	0.0	25.0	11.0
18/08/2010	0.0	29.0	15.0
19/08/2010	0.0	30.0	18.0
20/08/2010	1.7	24.0	15.0
21/08/2010	0.0	29.0	15.0
22/08/2010	0.0	33.0	17.0
23/08/2010	0.0	36.0	18.0
24/08/2010	0.0	35.0	19.0
25/08/2010	0.0	31.0	18.0
26/08/2010	0.0	34.0	19.0
27/08/2010	0.0	39.0	20.0
28/08/2010	0.0	34.0	15.0
29/08/2010	0.0	28.0	14.0
30/08/2010	0.0	27.0	12.0
31/08/2010	0.0	27.0	10.0
01/09/2010	0.0	27.0	11.0
02/09/2010	1.5	27.0	16.0
03/09/2010	1.0	23.0	15.0
04/09/2010	0.0	27.0	15.0
05/09/2010	0.0	31.0	16.0

06/09/2010	0.0	31.0	16.0
07/09/2010	0.0	33.0	20.0
08/09/2010	0.0	28.0	12.0
09/09/2010	0.0	24.0	12.0
10/09/2010	0.0	23.0	12.0
11/09/2010	0.0	26.0	12.0
12/09/2010	0.0	28.0	11.0
13/09/2010	0.0	28.0	13.0
14/09/2010	0.0	27.0	11.0
15/09/2010	0.0	27.0	11.0
16/09/2010	0.0	30.0	14.0
17/09/2010	0.0	25.0	15.0
18/09/2010	9.0	20.0	12.0
19/09/2010	0.0	20.0	8.0
20/09/2010	0.0	22.0	8.0
21/09/2010	1.1	23.0	13.0
22/09/2010	0.0	25.0	13.0
23/09/2010	0.0	26.0	13.0
24/09/2010	9.0	26.0	14.0
25/09/2010	0.0	22.0	11.0
26/09/2010	0.0	19.0	10.0
27/09/2010	0.0	17.0	3.0
28/09/2010	0.0	19.0	4.0
29/09/2010	0.0	19.0	7.0
30/09/2010	0.0	25.0	8.0
01/10/2010	0.0	22.0	10.0
02/10/2010	0.0	23.0	10.0
03/10/2010	0.0	27.0	12.0
04/10/2010	0.0	27.0	12.0
05/10/2010	0.0	21.0	7.0
06/10/2010	0.0	24.0	8.0
07/10/2010	0.0	24.0	9.0
08/10/2010	0.0	24.0	13.0
09/10/2010	0.0	26.0	12.0
10/10/2010	19.5	24.0	11.0
11/10/2010	0.0	18.0	11.0
12/10/2010	12.3	16.0	10.0
13/10/2010	17.5	19.0	12.0
14/10/2010	0.0	18.0	10.0
15/10/2010	0.0	18.0	7.0
16/10/2010	0.0	16.0	6.0
17/10/2010	0.0	15.0	6.0
18/10/2010	0.0	13.0	5.0
19/10/2010	0.0	13.0	4.0
20/10/2010	0.0	16.0	3.0
21/10/2010	0.0	17.0	2.0
22/10/2010	0.0	16.0	3.0
23/10/2010	0.0	17.0	5.0
24/10/2010	0.0	18.0	11.0
25/10/2010	0.4	20.0	6.0

26/10/2010	0.0	12.0	3.0
27/10/2010	0.0	16.0	3.0
28/10/2010	0.0	20.0	3.0
29/10/2010	0.0	19.0	7.0
30/10/2010	0.0	18.0	8.0
31/10/2010	0.6	15.0	7.0
01/11/2010	0.7	15.0	8.0
02/11/2010	0.0	15.0	9.0
03/11/2010	0.0	16.0	8.0
04/11/2010	0.0	18.0	8.0
05/11/2010	0.0	19.0	8.0
06/11/2010	0.0	17.0	5.0
07/11/2010	0.0	19.0	5.0
08/11/2010	3.6	13.0	3.0
09/11/2010	0.7	13.0	6.0
10/11/2010	0.0	15.0	7.0
11/11/2010	0.0	14.0	3.0
12/11/2010	0.0	15.0	3.0
13/11/2010	0.0	19.0	5.0
14/11/2010	0.0	17.0	4.0
15/11/2010	0.8	17.0	5.0
16/11/2010	0.0	13.0	4.0
17/11/2010	0.0	12.0	2.0
18/11/2010	1.7	11.0	3.0
19/11/2010	0.0	12.0	3.0
20/11/2010	0.0	10.0	2.0
21/11/2010	1.0	13.0	6.0
22/11/2010	1.4	13.0	4.0
23/11/2010	0.0	11.0	3.0
24/11/2010	0.0	11.0	3.0
25/11/2010	0.0	10.0	-1.0
26/11/2010	0.0	11.0	-1.0
27/11/2010	0.0	7.0	-3.0
28/11/2010	0.0	7.0	-3.0
29/11/2010	0.0	8.0	-4.0
30/11/2010	0.0	4.0	-2.0
01/12/2010	0.0	11.0	1.0
02/12/2010	0.0	10.0	0.0
03/12/2010	2.3	6.0	0.0
04/12/2010	0.0	6.0	-2.0
05/12/2010	0.0	8.0	-1.0
06/12/2010	0.2	15.0	3.0
07/12/2010	0.0	21.0	10.0
08/12/2010	0.0	17.0	10.0
09/12/2010	1.1	19.0	7.0
10/12/2010	0.0	15.0	4.0
11/12/2010	0.0	12.0	0.0
12/12/2010	0.0	12.0	0.0
13/12/2010	0.0	18.0	3.0
14/12/2010	0.6	13.0	2.0

15/12/2010	0.0	8.0	-2.0
16/12/2010	0.0	4.0	-4.0
17/12/2010	0.0	4.0	-4.0
18/12/2010	0.0	10.0	-3.0
19/12/2010	0.6	9.0	0.0
20/12/2010	0.0	9.0	0.0
21/12/2010	0.0	11.0	0.0
22/12/2010	0.0	15.0	5.0
23/12/2010	2.3	15.0	4.0
24/12/2010	4.5	7.0	2.0
25/12/2010	0.0	5.0	0.0
26/12/2010	0.0	5.0	-3.0
27/12/2010	0.0	7.0	-4.0
28/12/2010	0.0	8.0	-3.0
29/12/2010	0.0	10.0	1.0
30/12/2010	0.0	10.0	-1.0
31/12/2010	0.0	9.0	3.0
01/01/2011	0.5	12.0	5.0
02/01/2011	0.0	11.0	6.0
03/01/2011	0.0	10.0	1.0
04/01/2011	0.0	7.0	-1.0
05/01/2011	0.3	12.0	4.0
06/01/2011	0.7	13.0	6.0
07/01/2011	0.0	16.0	7.0
08/01/2011	0.0	15.0	3.0
09/01/2011	0.0	17.0	5.0
10/01/2011	0.0	12.0	2.0
11/01/2011	0.0	11.0	3.0
12/01/2011	0.0	15.0	8.0
13/01/2011	0.0	14.0	3.0
14/01/2011	0.0	16.0	4.0
15/01/2011	0.0	16.0	2.0
16/01/2011	0.0	14.0	2.0
17/01/2011	0.0	16.0	2.0
18/01/2011	0.0	17.0	2.0
19/01/2011	0.0	11.0	2.0
20/01/2011	0.0	10.0	3.0
21/01/2011	0.0	11.0	-3.0
22/01/2011	0.0	4.0	-4.0
23/01/2011	0.0	4.0	-6.0
24/01/2011	0.0	4.0	-7.0
25/01/2011	0.0	5.0	-6.0
26/01/2011	0.0	6.0	-6.0
27/01/2011	0.0	5.0	-3.0
28/01/2011	2.5	6.0	2.0
29/01/2011	0.1	9.0	1.0
30/01/2011	0.2	12.0	2.0
31/01/2011	0.0	6.0	1.0
01/02/2011	0.0	5.0	1.0
02/02/2011	0.0	7.0	0.0

03/02/2011	0.0	10.0	2.0
04/02/2011	0.0	11.0	2.0
05/02/2011	0.0	15.0	3.0
06/02/2011	0.0	17.0	2.0
07/02/2011	0.0	17.0	2.0
08/02/2011	0.0	16.0	1.0
09/02/2011	0.0	14.0	1.0
10/02/2011	0.0	15.0	1.0
11/02/2011	0.0	14.0	2.0
12/02/2011	0.0	15.0	2.0
13/02/2011	0.0	16.0	2.0
14/02/2011	1.7	15.0	2.0
15/02/2011	0.0	10.0	3.0
16/02/2011	1.0	8.0	2.0
17/02/2011	0.0	11.0	3.0
18/02/2011	0.2	9.0	3.0
19/02/2011	0.0	14.0	4.0
20/02/2011	1.2	15.0	5.0
21/02/2011	0.0	14.0	5.0
22/02/2011	3.5	13.0	7.0
23/02/2011	0.0	13.0	9.0
24/02/2011	0.0	14.0	6.0
25/02/2011	0.0	17.0	7.0
26/02/2011	0.0	18.0	6.0
27/02/2011	0.0	18.0	6.0
28/02/2011	0.0	10.0	2.0
01/03/2011	0.0	8.0	0.0
02/03/2011	0.0	9.0	0.0
03/03/2011	0.0	8.0	2.0
04/03/2011	2.6	5.0	0.0
05/03/2011	1.9	7.0	0.0
06/03/2011	0.0	10.0	0.0
07/03/2011	0.0	13.0	0.0
08/03/2011	0.0	15.0	2.0
09/03/2011	0.4	9.0	4.0
10/03/2011	0.0	10.0	0.0
11/03/2011	0.0	14.0	0.0
12/03/2011	9.3	14.0	2.0
13/03/2011	2.0	11.0	4.0
14/03/2011	6.0	16.0	6.0
15/03/2011	11.3	12.0	8.0
16/03/2011	69.0	10.0	4.0
17/03/2011	9.0	10.0	5.0
18/03/2011	0.0	13.0	5.0
19/03/2011	0.0	16.0	4.0
20/03/2011	0.0	15.0	2.0
21/03/2011	0.0	15.0	3.0
22/03/2011	0.0	14.0	4.0
23/03/2011	4.2	9.0	4.0
24/03/2011	0.1	8.0	4.0

25/03/2011	0.0	10.0	5.0
26/03/2011	0.7	16.0	5.0
27/03/2011	0.3	18.0	7.0
28/03/2011	1.0	17.0	8.0
29/03/2011	0.0	16.0	8.0
30/03/2011	2.0	17.0	7.0
31/03/2011	0.0	17.0	8.0
01/04/2011	0.0	21.0	8.0
02/04/2011	0.0	24.0	9.0
03/04/2011	0.0	26.0	10.0
04/04/2011	0.7	23.0	8.0
05/04/2011	0.0	19.0	8.0
06/04/2011	0.0	23.0	9.0
07/04/2011	0.0	25.0	10.0
08/04/2011	0.0	25.0	10.0
09/04/2011	0.0	28.0	11.0
10/04/2011	0.0	29.0	12.0
11/04/2011	0.0	20.0	10.0
12/04/2011	0.0	20.0	10.0
13/04/2011	0.0	20.0	4.0
14/04/2011	0.0	21.0	5.0
15/04/2011	0.0	21.0	6.0
16/04/2011	0.0	18.0	5.0
17/04/2011	0.0	18.0	5.0
18/04/2011	0.0	21.0	5.0
19/04/2011	0.4	21.0	6.0
20/04/2011	2.3	17.0	8.0
21/04/2011	0.0	19.0	9.0
22/04/2011	17.0	14.0	9.0
23/04/2011	11.0	15.0	8.0
24/04/2011	4.2	18.0	9.0
25/04/2011	2.2	15.0	10.0
26/04/2011	8.8	19.0	10.0
27/04/2011	0.0	20.0	10.0
28/04/2011	0.0	22.0	9.0
29/04/2011	1.5	21.0	9.0
30/04/2011	0.3	19.0	9.0
01/05/2011	3.4	17.0	10.0
02/05/2011	2.7	20.0	9.0
03/05/2011	0.0	20.0	11.0
04/05/2011	0.0	22.0	10.0
05/05/2011	0.0	23.0	11.0
06/05/2011	3.8	21.0	11.0
07/05/2011	0.0	22.0	13.0
08/05/2011	8.8	22.0	9.0
09/05/2011	0.0	23.0	10.0
10/05/2011	0.0	25.0	11.0
11/05/2011	0.0	25.0	11.0
12/05/2011	0.0	27.0	13.0
13/05/2011	0.2	24.0	12.0

14/05/2011	0.0	25.0	12.0
15/05/2011	3.5	24.0	7.0
16/05/2011	0.0	19.0	6.0
17/05/2011	0.0	22.0	9.0
18/05/2011	0.0	24.0	11.0
19/05/2011	0.0	21.0	11.0
20/05/2011	0.0	20.0	9.0
21/05/2011	0.0	24.0	11.0
22/05/2011	0.0	25.0	12.0
23/05/2011	0.0	26.0	11.0
24/05/2011	0.0	28.0	13.0
25/05/2011	0.0	29.0	15.0
26/05/2011	0.0	32.0	16.0
27/05/2011	0.0	30.0	14.0
28/05/2011	2.1	22.0	12.0
29/05/2011	0.0	25.0	12.0
30/05/2011	0.8	29.0	15.0
31/05/2011	51.0	23.0	12.0
01/06/2011	0.0	20.0	8.0
02/06/2011	0.0	18	9
03/06/2011	1.2	21	10
04/06/2011	0.0	19	8
05/06/2011	0.8	20	11
06/06/2011	0.0	23	12
07/06/2011	5.8	22	10
08/06/2011	0.2	21	10
09/06/2011	0.0	21	9
10/06/2011	0.2	22	12
11/06/2011	0.0	22	11
12/06/2011	0.0	23	12
13/06/2011	0.0	29	15
14/06/2011	0.0	29	15
15/06/2011	0.0	29	16
16/06/2011	0.0	30	17
17/06/2011	0.0	29	15
18/06/2011	0.0	30	18
19/06/2011	0.0	25	10
20/06/2011	0.0	27	12
21/06/2011	0.0	30	17
22/06/2011	7.4	31	16
23/06/2011	2.8	30	14
24/06/2011	0.0	26	14
25/06/2011	0.0	28	14
26/06/2011	0.0	32	16
27/06/2011	0.0	35	18
28/06/2011	0.0	35	19
29/06/2011	0.0	35	14
30/06/2011	0.0	26	11
01/07/2011	0.0	27	12
02/07/2011	0.0	29	15

03/07/2011	0.0	33	19
04/07/2011	0.0	33	17
05/07/2011	0.0	29	15
06/07/2011	0.0	32	17
07/07/2011	0.0	30	14
08/07/2011	0.0	28	12
09/07/2011	0.0	29	13
10/07/2011	4.5	31	18
11/07/2011	2.5	31	16
12/07/2011	0.0	32	20
13/07/2011	3.9	36	14
14/07/2011	0.0	24	12
15/07/2011	0.0	26	13
16/07/2011	0.0	32	15
17/07/2011	0.0	33	19
18/07/2011	0.0	25	12
19/07/2011	2.0	26	13
20/07/2011	0.0	23	11
21/07/2011	0.0	27	13
22/07/2011	0.0	28	15
23/07/2011	0.0	25	14
24/07/2011	0.0	26	13
25/07/2011	0.0	25	15
26/07/2011	0.0	27	17
27/07/2011	0.0	29	16
28/07/2011	0.0	27	15
29/07/2011	0.0	28	16
30/07/2011	0.0	29	17
31/07/2011	0.0	30	16
01/08/2011	0.0	29	17
02/08/2011	0.0	32	17
03/08/2011	0.0	33	18
04/08/2011	0.0	30	17
05/08/2011	0.0	33	18
06/08/2011	5.7	32	17
07/08/2011	0.0	32	17
08/08/2011	0.0	30	16
09/08/2011	0.0	26	12
10/08/2011	0.0	28	10
11/08/2011	0.0	28	11
12/08/2011	0.0	32	17
13/08/2011	1.9	33	18
14/08/2011	0.0	31	18
15/08/2011	0.0	33	19
16/08/2011	0.0	32	18
17/08/2011	0.0	33	18
18/08/2011	0.0	36	19
19/08/2011	0.0	33	17
20/08/2011	0.0	35	18
21/08/2011	0.0	37	20

22/08/2011	0.0	37	21
23/08/2011	0.0	34	18
24/08/2011	0.0	32	18
25/08/2011	0.0	30	17
26/08/2011	0.0	31	17
27/08/2011	0.0	30	11
28/08/2011	0.0	25	12
29/08/2011	0.6	30	17
30/08/2011	0.0	30	14
31/08/2011	0.0	30	15
01/09/2011	0.0	30	17
02/09/2011	0.8	30	17
03/09/2011	1.2	27	12
04/09/2011	0.0	25	13
05/09/2011	0.0	28	15
06/09/2011	0.0	25	11
07/09/2011	0.0	27	12
08/09/2011	0.0	30	15
09/09/2011	0.0	31	15
10/09/2011	0.0	32	16
11/09/2011	0.0	33	18
12/09/2011	0.0	31	14
13/09/2011	0.0	30	14
14/09/2011	0.0	31	15
15/09/2011	0.0	30	15
16/09/2011	0.0	31	15
17/09/2011	0.0	31	15
18/09/2011	0.0	28	15
19/09/2011	0.0	18	10
20/09/2011	0.0	21	10
21/09/2011	0.0	25	11
22/09/2011	0.0	27	12
23/09/2011	0.0	26	13
24/09/2011	1.0	25	14
25/09/2011	0.0	24	12
26/09/2011	0.0	26	12
27/09/2011	0.0	27	12
28/09/2011	0.0	28	13
29/09/2011	0.0	27	12
30/09/2011	0.0	26	11
01/10/2011	0.0	25	10
02/10/2011	0.0	25	8
03/10/2011	0.0	25	9
04/10/2011	0.0	27	10
05/10/2011	0.0	28	10
06/10/2011	0.0	26	10
07/10/2011	0.0	28	11
08/10/2011	0.0	18	9
09/10/2011	0.0	17	10
10/10/2011	0.0	20	9

11/10/2011	0.0	26	8
12/10/2011	0.0	29	11
13/10/2011	0.0	29	11
14/10/2011	0.0	28	9
15/10/2011	0.0	24	9
16/10/2011	0.0	24	9
17/10/2011	0.0	22	9
18/10/2011	0.0	21	8
19/10/2011	0.0	21	8
20/10/2011	0.0	20	8
21/10/2011	0.0	15	2
22/10/2011	0.0	15	3
23/10/2011	0.0	19	6
24/10/2011	0.0	20	8
25/10/2011	0.0	18	4
26/10/2011	0.0	17	5
27/10/2011	0.6	20	5
28/10/2011	0.5	18	10
29/10/2011	0.3	13	10
30/10/2011	0.0	14	11
31/10/2011	0.0	20	10
01/11/2011	0.0	21	10
02/11/2011	0.8	22	10
03/11/2011	0.4	19	12
04/11/2011	0.4	20	9
05/11/2011	33.6	16	7
06/11/2011	1.5	10	7
07/11/2011	0.7	12	8
08/11/2011	1.5	14	10
09/11/2011	0.0	18	5
10/11/2011	0.6	19	6
11/11/2011	0.0	17	8
12/11/2011	0.0	21	8
13/11/2011	0.0	20	8
14/11/2011	0.0	17	11
15/11/2011	16.7	16	9
16/11/2011	0.0	14	5
17/11/2011	0.0	15	4
18/11/2011	0.0	14	6
19/11/2011	0.0	15	7
20/11/2011	0.3	13	6
21/11/2011	32.0	14	7
22/11/2011	6.0	12	8
23/11/2011	24.4	10	8
24/11/2011	0.0	15	6
25/11/2011	0.0	15	3
26/11/2011	0.0	15	5
27/11/2011	0.0	15	2
28/11/2011	0.0	10	1
29/11/2011	0.0	9	1

30/11/2011	0.0	13	2
01/12/2011	0.0	8	2
02/12/2011	0.0	10	3
03/12/2011	4.0	8	4
04/12/2011	0.0	11	5
05/12/2011	0.0	13	4
06/12/2011	0.0	14	7
07/12/2011	0.0	14	5
08/12/2011	0.0	15	3
09/12/2011	0.0	13	3
10/12/2011	0.0	11	1
11/12/2011	0.0	12	1
12/12/2011	0.0	11	2
13/12/2011	0.0	11	2
14/12/2011	0.0	12	2
15/12/2011	0.0	15	4
16/12/2011	0.0	11	2
17/12/2011	8.4	15	3
18/12/2011	0.0	8	2
19/12/2011	0.0	8	1
20/12/2011	0.0	10	1
21/12/2011	0.0	13	5
22/12/2011	0.0	15	8
23/12/2011	0.0	14	0
24/12/2011	0.0	15	12
25/12/2011	0.0	11	-2
26/12/2011	0.0	11	-2
27/12/2011	0.0	10	-2
28/12/2011	0.0	9	-1
29/12/2011	0.0	13	4
30/12/2011	0.0	10	3
31/12/2011	0.0	11	3
01/01/2012	0.0	15	6
02/01/2012	0.0	18	4
03/01/2012	0.0	13	3
04/01/2012	0.0	16	2
05/01/2012	0.0	15	6
06/01/2012	0.0	18	7
07/01/2012	0.0	14	7
08/01/2012	0.0	13	1
09/01/2012	0.0	12	0
10/01/2012	0.0	14	-2
11/01/2012	0.0	13	-2
12/01/2012	0.0	11	-1
13/01/2012	0.0	9	-6
14/01/2012	0.0	5	-6
15/01/2012	0.0	11	-2
16/01/2012	4.0	12	-2
17/01/2012	7.2	6	-1
18/01/2012	0.0	9	0

19/01/2012	0.0	13	1
20/01/2012	0.0	14	5
21/01/2012	0.0	16	5
22/01/2012	0.0	15	5
23/01/2012	0.0	15	6
24/01/2012	0.0	15	4
25/01/2012	0.0	15	-2
26/01/2012	0.0	13	-2
27/01/2012	0	12	1
28/01/2012	1	9	2
29/01/2012	0	11	-1
30/01/2012	0	8	-2
31/01/2012	0	10	-1
01/02/2012	0	13	1
02/02/2012	3	11	-4
03/02/2012	0	7	-7
04/02/2012	0	4	-7
05/02/2012	0	7	-6
06/02/2012	4.5	9	0
07/02/2012	0	10	-1
08/02/2012	0	9	-6
09/02/2012	0	4	-4
10/02/2012	0	9	-3
11/02/2012	0	9	-6
12/02/2012	0	6	-6
13/02/2012	0	5	-5
14/02/2012	0	9	1
15/02/2012	0	9	-2
16/02/2012	0	11	0
17/02/2012	0	12	-2
18/02/2012	0	13	-3
19/02/2012	0	15	-2
20/02/2012	0	13	0
21/02/2012	0	11	-4
22/02/2012	0	12	-4
23/02/2012	0	15	-3
24/02/2012	0	18	-1
25/02/2012	0	19	1
26/02/2012	0	20	3
27/02/2012	0	19	1
28/02/2012	0	18	1
29/02/2012	0	18	1
01/03/2012	0	18	2
02/03/2012	0	19	1
03/03/2012	0	18	1
04/03/2012	0	18	5
05/03/2012	4.4	18	2
06/03/2012	0	12	1
07/03/2012	0	12	0
08/03/2012	0	14	2

09/03/2012	0	14	2
10/03/2012	0	16	0
11/03/2012	0	17	0
12/03/2012	0	18	1
13/03/2012	0	20	2
14/03/2012	0	24	4
15/03/2012	0	25	5
16/03/2012	0	24	4
17/03/2012	0	22	4
18/03/2012	0	22	5
19/03/2012	0	17	0
20/03/2012	0	13	3
21/03/2012	24.5	11	1
22/03/2012	3.7	13	0
23/03/2012	0	15	1
24/03/2012	0	16	2
25/03/2012	0	18	3
26/03/2012	0	21	3
27/03/2012	0	22	3
28/03/2012	0	20	3
29/03/2012	0	20	4
30/03/2012	0	22	5
31/03/2012	0	24	7
01/04/2012	0	23	7
02/04/2012	0	23	7
03/04/2012	0	21	6
04/04/2012	8	17	6
05/04/2012	0.5	15	7
06/04/2012	8.9	16	4
07/04/2012	3.4	15	1
08/04/2012	1.5	14	1
09/04/2012	0	17	2
10/04/2012	0	21	2
11/04/2012	3.6	24	5
12/04/2012	0	17	7
13/04/2012	4.8	15	4
14/04/2012	0	16	4
15/04/2012	0	16	3
16/04/2012	0	14	3
17/04/2012	0	12	1
18/04/2012	0.8	20	4
19/04/2012	0	17	5
20/04/2012	4.2	18	7
21/04/2012	0.4	20	7
22/04/2012	0	22	7
23/04/2012	0	18	5
24/04/2012	0	23	5
25/04/2012	0	18	6
26/04/2012	0	25	7
27/04/2012	0	28	12

28/04/2012	0	22	12
29/04/2012	5.6	22	6
30/04/2012	8.5	16	6
01/05/2012	2	14	4
02/05/2012	0	18	5
03/05/2012	0	21	7
04/05/2012	0	23	9
05/05/2012	0.6	22	9
06/05/2012	0	20	8
07/05/2012	0	22	8
08/05/2012	0	25	11
09/05/2012	0.3	25	13
10/05/2012	0	30	13
11/05/2012	0	32	15
12/05/2012	0	34	17
13/05/2012	0	34	15
14/05/2012	0	29	11
15/05/2012	0	28	11
16/05/2012	0	26	7
17/05/2012	0	25	10
18/05/2012	0.4	27	13
19/05/2012	0	25	10
20/05/2012	5.4	27	7
21/05/2012	0.6	17	7
22/05/2012	0	18	10
23/05/2012	0	23	8
24/05/2012	0	28	11
25/05/2012	0	30	12
26/05/2012	0	30	15
27/05/2012	0	28	14
28/05/2012	0	29	15
29/05/2012	0	30	15
30/05/2012	6.3	30	14
31/05/2012	0	32	16
01/06/2012	0	33	16
02/06/2012	0	35	18
03/06/2012	17.8	36	16
04/06/2012	0	28	12
05/06/2012	0	28	12
06/06/2012	0	31	16
07/06/2012	0	33	18
08/06/2012	0	36	16
09/06/2012	0	27	10
10/06/2012	0	27	11
11/06/2012	0	31	14
12/06/2012	0	31	10
13/06/2012	0	25	10
14/06/2012	0	26	13
15/06/2012	0	32	16
16/06/2012	0	32	19

17/06/2012	0	33	17
18/06/2012	0	32	17
19/06/2012	0.2	32	17
20/06/2012	20	26	14
21/06/2012	0	30	16
22/06/2012	0	33	13
23/06/2012	0	30	14
24/06/2012	0	32	17
25/06/2012	0	34	17
26/06/2012	0	35	18
27/06/2012	0	36	20
28/06/2012	0.2	38	21
29/06/2012	0	39	23
30/06/2012	0	38	16
01/07/2012	0	35	13
02/07/2012	0	25	9
03/07/2012	0	30	11
04/07/2012	0	33	17
05/07/2012	0	32	17
06/07/2012	0	30	12
07/07/2012	0	29	14
08/07/2012	0	37	17
09/07/2012	0	30	15
10/07/2012	0	32	15
11/07/2012	0	33	13
12/07/2012	0	30	13
13/07/2012	0	31	16
14/07/2012	0	36	17
15/07/2012	0	27	13
16/07/2012	0	28	14
17/07/2012	0	31	14
18/07/2012	0	35	17
19/07/2012	0	38	18
20/07/2012	0	35	15
21/07/2012	0	33	14
22/07/2012	0	31	14
23/07/2012	0	30	15
24/07/2012	0	32	15
25/07/2012	0	32	17
26/07/2012	0	35	17
27/07/2012	0	36	20
28/07/2012	7	30	15
29/07/2012	0	27	14
30/07/2012	0	30	16
31/07/2012	0	33	17
01/08/2012	0	35	18
02/08/2012	0	37	16
03/08/2012	0	33	15
04/08/2012	0	33	16
05/08/2012	0	33	16

06/08/2012	8.8	30	13
07/08/2012	0	28	14
08/08/2012	0	31	15
09/08/2012	0	34	17
10/08/2012	1.2	36	22
11/08/2012	0	38	22
12/08/2012	0	39	18
13/08/2012	0	31	15
14/08/2012	0	33	16
15/08/2012	0	33	17
16/08/2012	0	36	17
17/08/2012	0	34	18
18/08/2012	0	38	20
19/08/2012	0	39	21
20/08/2012	0.4	39	22
21/08/2012	0	38	22
22/08/2012	0	38	20
23/08/2012	9	35	18
24/08/2012	0	37	18
25/08/2012	0	36	19
26/08/2012	0	32	13
27/08/2012	0	30	15
28/08/2012	0	35	17
29/08/2012	0	34	18
30/08/2012	0	34	17
31/08/2012	0	27	12
01/09/2012	0	23	10
02/09/2012	0	21	9
03/09/2012	0	25	10
04/09/2012	0	26	13
05/09/2012	0	27	12
06/09/2012	0	28	13
07/09/2012	0	29	13
08/09/2012	0	32	15
09/09/2012	0.7	32	16
10/09/2012	0.1	28	14
11/09/2012	0	28	13
12/09/2012	0	29	14
13/09/2012	0	29	12
14/09/2012	0	23	11
15/09/2012	0	26	12
16/09/2012	0	32	13
17/09/2012	0	31	15
18/09/2012	0	30	16
19/09/2012	0	28	15
20/09/2012	0	27	11
21/09/2012	0	28	13
22/09/2012	0	28	14
23/09/2012	0	27	15
24/09/2012	0	35	15

25/09/2012	0	27	10
26/09/2012	0	26	15
27/09/2012	0.3	19	9
28/09/2012	8.2	19	10
29/09/2012	5.6	15	12
30/09/2012	1.2	15	10
01/10/2012	0	19	5
02/10/2012	0	21	6
03/10/2012	0	24	8
04/10/2012	0	25	11
05/10/2012	0	25	11
06/10/2012	0	25	10
07/10/2012	0	26	11
08/10/2012	0	29	16
09/10/2012	0	30	13
10/10/2012	0	28	13
11/10/2012	0	29	15
12/10/2012	3	24	13
13/10/2012	0	19	9
14/10/2012	0	20	8
15/10/2012	6.5	26	6
16/10/2012	0	16	5
17/10/2012	0	21	7
18/10/2012	0	25	8
19/10/2012	0.3	24	16
20/10/2012	19.5	25	12
21/10/2012	49.5	22	11
22/10/2012	17.5	18	10
23/10/2012	0	19	9
24/10/2012	0	20	9
25/10/2012	1.8	21	10
26/10/2012	8.5	19	12
27/10/2012	0.4	18	11
28/10/2012	0	16	1
29/10/2012	0	10	0
30/10/2012	0	13	1
31/10/2012	14.8	10	3
01/11/2012	0	14	6
02/11/2012	0	17	7
03/11/2012	0.9	18	7
04/11/2012	0.7	16	9
05/11/2012	5	17	5
06/11/2012	0	14	5
07/11/2012	0	12	0
08/11/2012	0.2	11	5
09/11/2012	15	17	7
10/11/2012	9	17	7
11/11/2012	0	18	4
12/11/2012	0	10	4
13/11/2012	0	13	1

14/11/2012	0.6	11	7
15/11/2012	4.8	13	8
16/11/2012	0	15	6
17/11/2012	0	16	6
18/11/2012	2.3	12	7
19/11/2012	0.2	12	3
20/11/2012	0	17	3
21/11/2012	0	18	4
22/11/2012	0	19	6
23/11/2012	0	14	4
24/11/2012	0	18	6
25/11/2012	0	16	6
26/11/2012	0	16	9
27/11/2012	1.1	14	3
28/11/2012	2	9	2
29/11/2012	0	8	2
30/11/2012	0	8	1
01/12/2012	0	8	-2
02/12/2012	0	7	-1
03/12/2012	0	9	1
04/12/2012	0	14	5
05/12/2012	1	16	2
06/12/2012	0	10	2
07/12/2012	0	11	1
08/12/2012	0	15	3
09/12/2012	0	10	0
10/12/2012	0	11	-2
11/12/2012	0	13	-1
12/12/2012	0	11	-4
13/12/2012	0	7	-3
14/12/2012	0.4	13	0
15/12/2012	1.1	16	6
16/12/2012	0.1	17	5
17/12/2012	0	19	7
18/12/2012	0	13	6
19/12/2012	0	15	7
20/12/2012	0	15	4
21/12/2012	0	13	5

Molinos dripwater site nº 1		Molinos dripwater site nº2		Molinos dripwater site nº 3 (averaged every 5 days)		Dripwater rates		
Date (dd/mm/yyyy)	δ^{18}O VSMOW	Date (dd/mm/yyyy)	δ^{18}O VSMOW	Date (dd/mm/yyyy)	δ^{18}O VSMOW	Date (m/dd/yy)	Drops nº	l/m2
22/01/2010	-9.18	22/01/2010	-9.51	06/09/2010	-9.74	3/24/10	119	23.8
25/02/2010	-10.54	25/02/2010	-9.19	12/09/2010	-9.81	3/25/10	66	13.2
23/03/2010	-9.58	23/03/2010	-9.53	18/09/2010	-9.73	3/26/10	93	18.6
27/04/2010	-10.30	27/04/2010	-10.70	24/09/2010	-9.73	3/27/10	55	11
25/05/2010	-10.33	25/05/2010	-9.86	30/09/2010	-9.62	3/28/10	99	19.8
01/07/2010	-9.96	01/07/2010	-9.40	01/11/2010	-9.36	3/29/10	71	14.2
26/07/2010	-9.56	26/07/2010	-9.18	07/11/2010	-9.01	3/30/10	78	15.6
26/08/2010	-9.56	26/08/2010	-9.04	13/11/2010	-9.13	3/31/10	56	11.2
06/10/2010	-9.52	06/10/2010	-8.95	19/11/2010	-9.45	4/1/10	68	13.6
29/10/2010	-9.75	29/10/2010	-9.28	25/11/2010	-9.56	4/2/10	55	11
10/12/2010	-8.69	10/12/2010	-8.36	13/12/2010	-9.40	4/3/10	128	25.6
14/01/2011	-8.99	14/01/2011	-8.44	19/12/2010	-9.20	4/4/10	107	21.4
02/02/2011	-9.70	02/02/2011	-9.15	25/12/2010	-9.47	4/5/10	105	21
03/03/2011	-9.44	03/03/2011	-8.88	31/12/2010	-9.07	4/6/10	125	25
05/04/2011	-10.15	05/04/2011	-10.30	06/01/2011	-9.16	4/7/10	135	27
11/05/2011	-9.65	03/06/2011	-9.68	11/01/2011	-9.00	4/8/10	118	23.6
03/06/2011	-9.56	07/07/2011	-9.54	17/01/2011	-10.36	4/9/10	119	23.8
07/07/2011	-9.99	04/08/2011	-9.16	23/01/2011	-9.80	4/10/10	119	23.8
04/08/2011	-8.97	08/09/2011	-9.55	29/01/2011	-10.20	4/11/10	136	27.2
08/09/2011	-9.57	07/10/2011	-8.74	01/02/2011	-9.88	4/12/10	130	26
07/10/2011	-8.86	07/11/2011	-8.29	05/02/2011	-8.49	4/13/10	122	24.4
07/11/2011	-8.61	01/12/2011	-10.04	11/02/2011	-9.11	4/14/10	121	24.2
01/12/2011	-9.30	09/01/2012	-8.85	17/02/2011	-8.59	4/15/10	120	24
09/01/2012	-9.47	14/02/2012	-9.09	23/02/2011	-9.00	4/16/10	113	22.6
14/02/2012	-9.51	01/03/2012	-9.04	28/02/2011	-9.44	4/17/10	114	22.8
01/03/2012	-9.45	03/04/2012	-9.43	06/03/2011	-9.54	4/18/10	127	25.4
03/04/2012	-9.31	09/05/2012	-9.39	12/03/2011	-9.45	4/19/10	172	34.4
09/05/2012	-7.90	07/06/2012	-8.80	18/03/2011	-9.94	4/20/10	231	46.2
07/06/2012	-8.99	03/07/2012	-9.23	28/03/2011	-10.06	4/21/10	237	47.4
03/07/2012	-9.47	03/08/2012	-8.23	08/04/2011	-9.41	4/22/10	236	47.2
03/08/2012	-9.10	19/09/2012	-8.78	14/04/2011	-9.50	4/23/10	244	48.8
19/09/2012	-8.93			20/04/2011	-9.60	4/24/10	262	52.4
				26/04/2011	-9.64	4/25/10	260	52
				02/05/2011	-9.50	4/26/10	257	51.4
				08/05/2011	-9.93	4/27/10	240	48
				13/05/2011	-9.19	4/28/10	205	41
				19/05/2011	-9.81	4/29/10	205	41
				24/05/2011	-9.48	4/30/10	205	41
				29/05/2011	-9.80	5/1/10	199	39.8
				01/06/2011	-9.66	5/2/10	198	39.6
				06/06/2011	-9.74	5/3/10	227	45.4
				12/06/2011	-9.49	5/4/10	247	49.4
				18/06/2011	-9.58	5/5/10	250	50
				24/06/2011	-9.54	5/6/10	252	50.4
				30/06/2011	-9.11	5/7/10	257	51.4
				05/07/2011	-9.66	5/8/10	252	50.4
				10/07/2011	-9.94	5/9/10	249	49.8
				15/07/2011	-9.32	5/10/10	248	49.6
				20/07/2011	-9.01	5/11/10	251	50.2
				25/07/2011	-9.15	5/12/10	248	49.6
				30/07/2011	-9.31	5/13/10	238	47.6
				02/08/2011	-9.39	5/14/10	236	47.2
				06/08/2011	-9.94	5/15/10	222	44.4
				11/08/2011	-9.52	5/16/10	216	43.2
				16/08/2011	-9.25	5/17/10	198	39.6
				21/08/2011	-9.14	5/18/10	178	35.6
				26/08/2011	-9.21	5/19/10	164	32.8
				01/09/2011	-9.33	5/20/10	150	30

07/09/2011	-9.39	5/21/10	148	29.6
12/09/2011	-9.28	5/22/10	141	28.2
17/09/2011	-9.27	5/23/10	128	25.6
22/09/2011	-9.39	5/24/10	115	23
27/09/2011	-9.54	5/25/10	111	22.2
03/10/2011	-9.37	5/26/10	112	22.4
09/10/2011	-9.18	5/27/10	106	21.2
14/10/2011	-8.91	5/28/10	98	19.6
19/10/2011	-8.64	5/29/10	88	17.6
24/10/2011	-9.32	5/30/10	84	16.8
29/10/2011	-9.34	5/31/10	89	17.8
03/11/2011	-8.77	6/1/10	94	18.8
08/11/2011	-9.33	6/2/10	95	19
13/11/2011	-9.42	6/3/10	94	18.8
18/11/2011	-9.46	6/4/10	83	16.6
23/11/2011	-9.22	6/5/10	84	16.8
28/11/2011	-9.04	6/6/10	86	17.2
03/12/2011	-9.13	6/7/10	87	17.4
08/12/2011	-8.77	6/8/10	95	19
13/12/2011	-9.46	6/9/10	98	19.6
18/12/2011	-9.69	6/10/10	89	17.8
23/12/2011	-9.42	6/11/10	81	16.2
28/12/2011	-9.29	6/12/10	79	15.8
11/01/2012	-9.36	6/13/10	74	14.8
16/01/2012	-9.61	6/14/10	74	14.8
21/01/2012	-9.75	6/15/10	75	15
26/01/2012	-9.57	6/16/10	73	14.6
31/01/2012	-9.36	6/17/10	70	14
05/02/2012	-9.33	6/18/10	69	13.8
03/03/2012	-9.61	6/19/10	72	14.4
08/03/2012	-10.23	6/20/10	70	14
13/03/2012	-9.96	6/21/10	60	12
18/03/2012	-9.94	6/22/10	60	12
23/03/2012	-10.23	6/23/10	66	13.2
28/03/2012	-10.24	6/24/10	84	16.8
05/04/2012	-9.87	6/25/10	87	17.4
10/04/2012	-9.70	6/26/10	84	16.8
15/04/2012	-9.91	6/27/10	80	16
20/04/2012	-9.58	6/28/10	76	15.2
25/04/2012	-9.56	6/29/10	74	14.8
30/04/2012	-9.50	6/30/10	76	15.2
11/05/2012	-9.46	7/1/10	76	15.2
16/05/2012	-9.77	7/2/10	76	15.2
21/05/2012	-9.82	7/3/10	69	13.8
26/05/2012	-9.60	7/4/10	66	13.2
31/05/2012	-9.83	7/5/10	66	13.2
05/06/2012	-9.75	7/6/10	67	13.4
10/06/2012	-10.03	7/7/10	66	13.2
15/06/2012	-10.01	7/8/10	71	14.2
20/06/2012	-9.85	7/9/10	71	14.2
25/06/2012	-9.76	7/10/10	71	14.2
30/06/2012	-9.37	7/11/10	74	14.8
25/07/2012	-9.27	7/12/10	77	15.4
30/07/2012	-8.98	7/13/10	79	15.8
05/08/2012	-8.86	7/14/10	79	15.8
10/08/2012	-9.19	7/15/10	72	14.4
15/08/2012	-8.86	7/16/10	72	14.4
20/08/2012	-8.92	7/17/10	66	13.2
25/08/2012	-9.17	7/18/10	65	13
30/08/2012	-8.79	7/19/10	69	13.8
		7/20/10	75	15
		7/21/10	78	15.6
		7/22/10	71	14.2

7/23/10	61	12.2
7/24/10	59	11.8
7/25/10	63	12.6
7/26/10	64	12.8
7/27/10	65	13
7/28/10	63	12.6
7/29/10	66	13.2
7/30/10	64	12.8
7/31/10	60	12
8/1/10	60	12
8/2/10	55	11
8/3/10	52	10.4
8/4/10	54	10.8
8/5/10	52	10.4
8/6/10	48	9.6
8/7/10	45	9
8/8/10	44	8.8
8/9/10	43	8.6
8/10/10	42	8.4
8/11/10	41	8.2
8/12/10	47	9.4
8/13/10	46	9.2
8/14/10	46	9.2
8/15/10	44	8.8
8/16/10	40	8
8/17/10	40	8
8/18/10	44	8.8
8/19/10	40	8
8/20/10	33	6.6
8/21/10	31	6.2
8/22/10	34	6.8
8/23/10	38	7.6
8/24/10	32	6.4
8/25/10	30	6
8/26/10	32	6.4
8/27/10	33	6.6
8/28/10	32	6.4
8/29/10	32	6.4
8/30/10	32	6.4
8/31/10	33	6.6
9/1/10	33	6.6
9/2/10	29	5.8
9/3/10	25	5
9/4/10	26	5.2
9/5/10	26	5.2
9/6/10	28	5.6
9/7/10	29	5.8
9/8/10	25	5
9/9/10	21	4.2
9/10/10	21	4.2
9/11/10	21	4.2
9/12/10	19	3.8
9/13/10	18	3.6
9/14/10	18	3.6
9/15/10	19	3.8
9/16/10	20	4
9/17/10	20	4
9/18/10	17	3.4
9/19/10	16	3.2
9/20/10	16	3.2
9/21/10	15	3
9/22/10	15	3
9/23/10	15	3

9/24/10	15	3
9/25/10	15	3
9/26/10	13	2.6
9/27/10	12	2.4
9/28/10	12	2.4
9/29/10	13	2.6
9/30/10	13	2.6
10/1/10	14	2.8
10/2/10	14	2.8
10/3/10	17	3.4
10/4/10	15	3
10/5/10	12	2.4
10/6/10	10	2
10/7/10	9	1.8
10/8/10	9	1.8
10/9/10	9	1.8
10/10/10	8	1.6
10/11/10	8	1.6
10/12/10	8	1.6
10/13/10	14	2.8
10/14/10	22	4.4
10/15/10	31	6.2
10/16/10	35	7
10/17/10	35	7
10/18/10	34	6.8
10/19/10	34	6.8
10/20/10	33	6.6
10/21/10	31	6.2
10/22/10	32	6.4
10/23/10	34	6.8
10/24/10	37	7.4
10/25/10	34	6.8
10/26/10	32	6.4
10/27/10	31	6.2
10/28/10	31	6.2
10/29/10	38	7.6
10/30/10	39	7.8
10/31/10	48	9.6
11/1/10	40	8
11/2/10	33	6.6
11/3/10	32	6.4
11/4/10	28	5.6
11/5/10	31	6.2
11/6/10	35	7
11/7/10	43	8.6
11/8/10	51	10.2
11/9/10	51	10.2
11/10/10	38	7.6
11/11/10	28	5.6
11/12/10	31	6.2
11/13/10	40	8
11/14/10	43	8.6
11/15/10	37	7.4
11/16/10	31	6.2
11/17/10	39	7.8
11/18/10	35	7
11/19/10	33	6.6
11/20/10	35	7
11/21/10	39	7.8
11/22/10	34	6.8
11/23/10	30	6
11/24/10	31	6.2
11/25/10	29	5.8

11/26/10	31	6.2
11/27/10	33	6.6
11/28/10	32	6.4
11/29/10	28	5.6
11/30/10	32	6.4
12/1/10	25	5
12/2/10	22	4.4
12/3/10	19	3.8
12/4/10	21	4.2
12/5/10	23	4.6
12/6/10	27	5.4
12/7/10	28	5.6
12/8/10	27	5.4
12/9/10	24	4.8
12/10/10	30	6
12/11/10	36	7.2
12/12/10	36	7.2
12/13/10	33	6.6
12/14/10	31	6.2
12/15/10	34	6.8
12/16/10	35	7
12/17/10	38	7.6
12/18/10	34	6.8
12/19/10	32	6.4
12/20/10	32	6.4
12/21/10	36	7.2
12/22/10	35	7
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12/24/10	28	5.6
12/25/10	27	5.4
12/26/10	29	5.8
12/27/10	31	6.2
12/28/10	31	6.2
12/29/10	31	6.2
12/30/10	32	6.4
12/31/10	31	6.2
1/1/11	33	6.6
1/2/11	34	6.8
1/3/11	32	6.4
1/4/11	32	6.4
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1/7/11	29	5.8
1/8/11	29	5.8
1/9/11	30	6
1/10/11	30	6
1/11/11	29	5.8
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1/13/11	37	7.4
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1/16/11	31	6.2
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1/18/11	30	6
1/19/11	30	6
1/20/11	30	6
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1/24/11	30	6
1/25/11	31	6.2
1/26/11	31	6.2
1/27/11	28	5.6

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1/29/11	29	5.8
1/30/11	27	5.4
1/31/11	27	5.4
2/1/11	26	5.2
2/2/11	27	5.4
2/3/11	20	4
2/4/11	22	4.4
2/5/11	22	4.4
2/6/11	23	4.6
2/7/11	27	5.4
2/8/11	32	6.4
2/9/11	31	6.2
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2/11/11	31	6.2
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2/18/11	26	5.2
2/19/11	24	4.8
2/20/11	24	4.8
2/21/11	23	4.6
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2/27/11	28	5.6
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3/5/11	33	6.6
3/6/11	33	6.6
3/7/11	33	6.6
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3/9/11	29	5.8
3/10/11	29	5.8
3/11/11	27	5.4
3/12/11	29	5.8
3/13/11	28	5.6
3/14/11	27	5.4
3/15/11	28	5.6
3/16/11	37	7.4
3/17/11	49	9.8
3/18/11	71	14.2
3/19/11	80	16
3/20/11	83	16.6
3/21/11	78	15.6
3/22/11	70	14
3/23/11	66	13.2
3/24/11	67	13.4
3/25/11	76	15.2
3/26/11	84	16.8
3/27/11	97	19.4
3/28/11	88	17.6
3/29/11	82	16.4
3/30/11	75	15
3/31/11	68	13.6

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4/2/11	77	15.4
4/3/11	72	14.4
4/4/11	64	12.8
4/5/11	55	11
4/6/11	59	11.8
4/7/11	61	12.2
4/8/11	66	13.2
4/9/11	68	13.6
4/10/11	65	13
4/11/11	64	12.8
4/12/11	63	12.6
4/13/11	69	13.8
4/14/11	73	14.6
4/15/11	69	13.8
4/16/11	62	12.4
4/17/11	63	12.6
4/18/11	63	12.6
4/19/11	65	13
4/20/11	64	12.8
4/21/11	68	13.6
4/22/11	77	15.4
4/23/11	92	18.4
4/24/11	95	19
4/25/11	93	18.6
4/26/11	99	19.8
4/27/11	117	23.4
4/28/11	146	29.2
4/29/11	146	29.2
4/30/11	161	32.2
5/1/11	221	44.2
5/2/11	231	46.2
5/3/11	199	39.8
5/4/11	178	35.6
5/5/11	174	34.8
5/6/11	183	36.6
5/7/11	203	40.6
5/8/11	199	39.8
5/9/11	184	36.8
5/10/11	168	33.6
5/11/11	173	34.6
5/12/11	180	36
5/13/11	182	36.4
5/14/11	176	35.2
5/15/11	166	33.2
5/16/11	153	30.6
5/17/11	152	30.4
5/18/11	157	31.4
5/19/11	148	29.6
5/20/11	135	27
5/21/11	128	25.6
5/22/11	127	25.4
5/23/11	120	24
5/24/11	119	23.8
5/25/11	121	24.2
5/26/11	122	24.4
5/27/11	120	24
5/28/11	118	23.6
5/29/11	110	22
5/30/11	111	22.2
5/31/11	112	22.4
6/1/11	128	25.6
6/2/11	134	26.8

6/3/11	133	26.6
6/4/11	114	22.8
6/5/11	150	30
6/6/11	152	30.4
6/7/11	154	30.8
6/8/11	146	29.2
6/9/11	138	27.6
6/10/11	132	26.4
6/11/11	124	24.8
6/12/11	120	24
6/13/11	118	23.6
6/14/11	101	20.2
6/15/11	98	19.6
6/16/11	99	19.8
6/17/11	101	20.2
6/18/11	93	18.6
6/19/11	80	16
6/20/11	81	16.2
6/21/11	79	15.8
6/22/11	79	15.8
6/23/11	73	14.6
6/24/11	69	13.8
6/25/11	66	13.2
6/26/11	69	13.8
6/27/11	72	14.4
6/28/11	74	14.8
6/29/11	70	14
6/30/11	69	13.8
7/1/11	73	14.6
7/2/11	81	16.2
7/3/11	81	16.2
7/4/11	66	13.2
7/5/11	64	12.8
7/6/11	70	14
7/7/11	81	16.2
7/8/11	68	13.6
7/9/11	67	13.4
7/10/11	70	14
7/11/11	71	14.2
7/12/11	73	14.6
7/13/11	62	12.4
7/14/11	56	11.2
7/15/11	58	11.6
7/16/11	61	12.2
7/17/11	65	13
7/18/11	62	12.4
7/19/11	61	12.2
7/20/11	51	10.2
7/21/11	58	11.6
7/22/11	58	11.6
7/23/11	55	11
7/24/11	56	11.2
7/25/11	56	11.2
7/26/11	54	10.8
7/27/11	51	10.2
7/28/11	46	9.2
7/29/11	51	10.2
7/30/11	51	10.2
7/31/11	52	10.4
8/1/11	54	10.8
8/2/11	48	9.6
8/3/11	42	8.4
8/4/11	44	8.8

8/5/11	49	9.8
8/6/11	59	11.8
8/7/11	64	12.8
8/8/11	53	10.6
8/9/11	50	10
8/10/11	51	10.2
8/11/11	53	10.6
8/12/11	51	10.2
8/13/11	52	10.4
8/14/11	49	9.8
8/15/11	43	8.6
8/16/11	42	8.4
8/17/11	42	8.4
8/18/11	46	9.2
8/19/11	40	8
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8/21/11	42	8.4
8/22/11	44	8.8
8/23/11	40	8
8/24/11	39	7.8
8/25/11	39	7.8
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8/28/11	30	6
8/29/11	33	6.6
8/30/11	32	6.4
8/31/11	34	6.8
9/1/11	30	6
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9/3/11	29	5.8
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9/11/11	21	4.2
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9/22/11	17	3.4
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9/24/11	18	3.6
9/25/11	16	3.2
9/26/11	14	2.8
9/27/11	14	2.8
9/28/11	15	3
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9/30/11	13	2.6
10/1/11	13	2.6
10/2/11	13	2.6
10/3/11	13	2.6
10/4/11	12	2.4
10/5/11	12	2.4
10/6/11	13	2.6

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10/9/11	9	1.8
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10/17/11	10	2
10/18/11	11	2.2
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10/26/11	9	1.8
10/27/11	12	2.4
10/28/11	8	1.6
10/29/11	10	2
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10/31/11	9	1.8
11/1/11	10	2
11/2/11	12	2.4
11/3/11	13	2.6
11/4/11	13	2.6
11/5/11	12	2.4
11/6/11	10	2
11/7/11	10	2
11/8/11	4	0.8
11/9/11	10	2
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11/14/11	9	1.8
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11/17/11	7	1.4
11/18/11	8	1.6
11/19/11	8	1.6
11/20/11	8	1.6
11/21/11	7	1.4
11/22/11	10	2
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11/24/11	22	4.4
11/25/11	23	4.6
11/26/11	23	4.6
11/27/11	22	4.4
11/28/11	23	4.6
11/29/11	22	4.4
11/30/11	22	4.4
12/1/11	30	6
12/2/11	24	4.8
12/3/11	23	4.6
12/4/11	22	4.4
12/5/11	22	4.4
12/6/11	23	4.6
12/7/11	20	4
12/8/11	18	3.6

12/9/11	19	3.8
12/10/11	21	4.2
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12/12/11	18	3.6
12/13/11	17	3.4
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1/16/12	12.0	2.4
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1/18/12	10.0	2.0
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1/23/12	11.0	2.2
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1/25/12	9.0	1.8
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1/29/12	8.0	1.6
1/30/12	9.0	1.8
1/31/12	8.0	1.6
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2/3/12	8.0	1.6
2/4/12	8.0	1.6
2/5/12	8.0	1.6
2/6/12	9.0	1.8
2/7/12	8.0	1.6
2/8/12	8.0	1.6
2/9/12	7.0	1.4

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2/11/12	7.0	1.4
2/12/12	7.0	1.4
2/13/12	7.0	1.4
2/14/12	7.0	1.4
2/15/12	9.0	1.8
2/16/12	7.0	1.4
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2/18/12	7.0	1.4
2/19/12	8.0	1.6
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4/4/12	10.0	2.0
4/5/12	7.0	1.4
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4/10/12	7.0	1.4
4/11/12	7.0	1.4
4/12/12	6.0	1.2

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4/16/12	6.0	1.2
4/17/12	5.0	1.0
4/18/12	6.0	1.2
4/19/12	6.0	1.2
4/20/12	6.0	1.2
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5/5/12	4.0	0.8
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5/30/12	4.0	0.8
5/31/12	5.0	1.0
6/1/12	4.0	0.8
6/2/12	4.0	0.8
6/3/12	4.0	0.8
6/4/12	5.0	1.0
6/5/12	4.0	0.8
6/6/12	4.0	0.8
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6/8/12	5.0	1.0
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9/3/12	4.000000	0.800000
9/4/12	4.000000	0.800000
9/5/12	4.000000	0.800000
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10/3/12	27.000000	5.400000
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10/19/12	30.000000	6.000000
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07/01/2010	-1.205
08/01/2010	-1.033
09/01/2010	-0.895
10/01/2010	-0.872
11/01/2010	-0.957
12/01/2010	-0.794
13/01/2010	-0.53
14/01/2010	-0.425
15/01/2010	-0.155
16/01/2010	0.256
17/01/2010	0.243
18/01/2010	0.285
19/01/2010	0.266
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21/01/2010	-0.341
22/01/2010	-0.205
23/01/2010	-0.236
24/01/2010	-0.193
25/01/2010	-0.096
26/01/2010	-0.025
27/01/2010	-0.326
28/01/2010	-0.224
29/01/2010	-0.336
30/01/2010	-0.328
31/01/2010	-0.128
01/02/2010	-0.196
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03/02/2010	-0.359
04/02/2010	-0.421
05/02/2010	-0.766
06/02/2010	-0.985
07/02/2010	-1.02
08/02/2010	-1.202
09/02/2010	-1.136
10/02/2010	-1.027
11/02/2010	-0.981
12/02/2010	-1.074
13/02/2010	-1.29
14/02/2010	-1.374
15/02/2010	-1.4
16/02/2010	-1.353
17/02/2010	-1.299
18/02/2010	-1.134
19/02/2010	-1.07

Date (dd/mm/yyyy)	Zdaily_WeMOi_2010_2012
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07/01/2010	-2.16
08/01/2010	1.04
09/01/2010	3.35
10/01/2010	1.14
11/01/2010	0.74
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13/01/2010	0.98
14/01/2010	0.83
15/01/2010	1.26
16/01/2010	0.27
17/01/2010	0.60
18/01/2010	-0.14
19/01/2010	0.17
20/01/2010	1.27
21/01/2010	0.87
22/01/2010	-0.54
23/01/2010	-1.83
24/01/2010	-1.31
25/01/2010	-1.29
26/01/2010	-2.41
27/01/2010	-1.85
28/01/2010	0.71
29/01/2010	1.76
30/01/2010	2.80
31/01/2010	1.31
01/02/2010	0.22
02/02/2010	-0.16
03/02/2010	-0.53
04/02/2010	-1.13
05/02/2010	1.47
06/02/2010	2.48
07/02/2010	0.59
08/02/2010	-0.46
09/02/2010	-0.12
10/02/2010	1.46
11/02/2010	1.45
12/02/2010	0.47
13/02/2010	-1.27
14/02/2010	-0.96
15/02/2010	-2.95
16/02/2010	-2.78
17/02/2010	-1.06
18/02/2010	-1.90
19/02/2010	0.35

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22/02/2010	-0.817	22/02/2010	-0.09
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24/02/2010	-0.341	24/02/2010	2.28
25/02/2010	-0.219	25/02/2010	1.11
26/02/2010	-0.262	26/02/2010	1.31
27/02/2010	-0.339	27/02/2010	-1.47
28/02/2010	-0.276	28/02/2010	0.26
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02/03/2010	-0.396	02/03/2010	-1.75
03/03/2010	-0.546	03/03/2010	-1.11
04/03/2010	-0.658	04/03/2010	1.41
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08/03/2010	-0.905	08/03/2010	-1.20
09/03/2010	-1.113	09/03/2010	-1.26
10/03/2010	-1.144	10/03/2010	0.41
11/03/2010	-0.897	11/03/2010	-0.18
12/03/2010	-0.751	12/03/2010	-0.22
13/03/2010	-0.555	13/03/2010	0.47
14/03/2010	-0.388	14/03/2010	0.49
15/03/2010	-0.299	15/03/2010	-0.07
16/03/2010	-0.158	16/03/2010	-0.75
17/03/2010	0.098	17/03/2010	-0.75
18/03/2010	0.059	18/03/2010	-0.40
19/03/2010	0.066	19/03/2010	-0.18
20/03/2010	0.318	20/03/2010	-0.31
21/03/2010	0.52	21/03/2010	-0.54
22/03/2010	0.46	22/03/2010	-0.08
23/03/2010	0.303	23/03/2010	-1.04
24/03/2010	-0.036	24/03/2010	-1.37
25/03/2010	-0.324	25/03/2010	-0.60
26/03/2010	-0.161	26/03/2010	1.12
27/03/2010	-0.167	27/03/2010	1.82
28/03/2010	-0.311	28/03/2010	0.49
29/03/2010	-0.171	29/03/2010	0.34
30/03/2010	-0.034	30/03/2010	2.03
31/03/2010	-0.121	31/03/2010	1.80
01/04/2010	-0.166	01/04/2010	1.10
02/04/2010	-0.064	02/04/2010	0.21
03/04/2010	0.028	03/04/2010	-0.68
04/04/2010	0.04	04/04/2010	0.62
05/04/2010	0.391	05/04/2010	-1.02
06/04/2010	0.824	06/04/2010	-1.70
07/04/2010	0.881	07/04/2010	-0.65
08/04/2010	0.519	08/04/2010	-0.81
09/04/2010	0.21	09/04/2010	-1.37
10/04/2010	0.346	10/04/2010	-1.26
11/04/2010	0.48	11/04/2010	-1.42

12/04/2010	0.208	12/04/2010	-1.38
13/04/2010	-0.067	13/04/2010	-1.37
14/04/2010	-0.213	14/04/2010	-1.70
15/04/2010	-0.366	15/04/2010	-1.42
16/04/2010	-0.553	16/04/2010	-1.02
17/04/2010	-0.806	17/04/2010	-0.94
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19/04/2010	-0.797	19/04/2010	0.33
20/04/2010	-1.157	20/04/2010	-0.35
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22/04/2010	-1.864	22/04/2010	-0.20
23/04/2010	-1.935	23/04/2010	0.09
24/04/2010	-1.785	24/04/2010	-0.29
25/04/2010	-1.478	25/04/2010	-0.57
26/04/2010	-1.223	26/04/2010	-0.25
27/04/2010	-0.874	27/04/2010	-0.52
28/04/2010	-0.573	28/04/2010	-0.86
29/04/2010	-0.775	29/04/2010	-0.68
30/04/2010	-0.966	30/04/2010	-0.65
01/05/2010	-0.963	01/05/2010	-0.22
02/05/2010	-0.659	02/05/2010	0.37
03/05/2010	-0.056	03/05/2010	0.15
04/05/2010	-0.166	04/05/2010	0.47
05/05/2010	-0.58	05/05/2010	1.19
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07/05/2010	-0.908	07/05/2010	-0.08
08/05/2010	-1.088	08/05/2010	-0.30
09/05/2010	-1.134	09/05/2010	-0.67
10/05/2010	-0.818	10/05/2010	-0.23
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13/05/2010	-0.343	13/05/2010	1.01
14/05/2010	-0.663	14/05/2010	1.56
15/05/2010	-0.747	15/05/2010	2.72
16/05/2010	-0.831	16/05/2010	1.38
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18/05/2010	-0.269	18/05/2010	-0.05
19/05/2010	0.072	19/05/2010	-0.28
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21/05/2010	-0.042	21/05/2010	-1.54
22/05/2010	-0.48	22/05/2010	-1.13
23/05/2010	-0.782	23/05/2010	-0.77
24/05/2010	-0.737	24/05/2010	-0.39
25/05/2010	-0.734	25/05/2010	0.04
26/05/2010	-1.306	26/05/2010	-0.12
27/05/2010	-1.556	27/05/2010	0.20
28/05/2010	-1.178	28/05/2010	0.56
29/05/2010	-0.642	29/05/2010	0.90
30/05/2010	-0.383	30/05/2010	1.31
31/05/2010	-0.326	31/05/2010	1.48
01/06/2010	-0.309	01/06/2010	0.41

02/06/2010	-0.33	02/06/2010	0.24
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12/06/2010	-0.113	12/06/2010	0.52
13/06/2010	-0.289	13/06/2010	0.30
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19/06/2010	-0.251	19/06/2010	1.87
20/06/2010	0.224	20/06/2010	1.63
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22/06/2010	0.097	22/06/2010	-0.03
23/06/2010	-0.042	23/06/2010	-0.74
24/06/2010	-0.394	24/06/2010	-0.92
25/06/2010	-0.841	25/06/2010	-0.52
26/06/2010	-1.104	26/06/2010	-0.49
27/06/2010	-1.11	27/06/2010	-0.55
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17/07/2010	-0.429	17/07/2010	-0.14
18/07/2010	-0.427	18/07/2010	-0.26
19/07/2010	-0.544	19/07/2010	-0.33
20/07/2010	-0.553	20/07/2010	-0.45
21/07/2010	-0.34	21/07/2010	-0.56
22/07/2010	-0.175	22/07/2010	-0.61

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23/08/2010	-1.241	23/08/2010	0.01
24/08/2010	-1.062	24/08/2010	0.40
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26/08/2010	-1.149	26/08/2010	-0.38
27/08/2010	-1.218	27/08/2010	0.22
28/08/2010	-1.351	28/08/2010	0.59
29/08/2010	-1.377	29/08/2010	-0.35
30/08/2010	-1.242	30/08/2010	-0.16
31/08/2010	-1.008	31/08/2010	-1.20
01/09/2010	-0.901	01/09/2010	-1.45
02/09/2010	-0.789	02/09/2010	-0.89
03/09/2010	-0.917	03/09/2010	-0.50
04/09/2010	-1.227	04/09/2010	-0.50
05/09/2010	-1.32	05/09/2010	-0.82
06/09/2010	-1.135	06/09/2010	-0.50
07/09/2010	-1.012	07/09/2010	0.01
08/09/2010	-0.791	08/09/2010	1.04
09/09/2010	-0.345	09/09/2010	0.49
10/09/2010	-0.113	10/09/2010	-0.49
11/09/2010	-0.007	11/09/2010	-1.22

12/09/2010	0.242	12/09/2010	-0.68
13/09/2010	0.332	13/09/2010	-0.04
14/09/2010	-0.404	14/09/2010	-0.07
15/09/2010	-1.071	15/09/2010	-0.15
16/09/2010	-1.235	16/09/2010	0.00
17/09/2010	-0.861	17/09/2010	-0.26
18/09/2010	-0.524	18/09/2010	0.29
19/09/2010	-0.322	19/09/2010	-0.11
20/09/2010	-0.037	20/09/2010	-0.83
21/09/2010	0.138	21/09/2010	-0.56
22/09/2010	0.216	22/09/2010	-0.46
23/09/2010	0.018	23/09/2010	-0.31
24/09/2010	-0.242	24/09/2010	0.67
25/09/2010	-0.172	25/09/2010	1.51
26/09/2010	0.131	26/09/2010	0.87
27/09/2010	0.282	27/09/2010	0.76
28/09/2010	0.11	28/09/2010	0.45
29/09/2010	0.332	29/09/2010	0.09
30/09/2010	0.295	30/09/2010	-0.07
01/10/2010	0.353	01/10/2010	-0.16
02/10/2010	0.388	02/10/2010	-0.88
03/10/2010	0.765	03/10/2010	-0.58
04/10/2010	1.157	04/10/2010	0.05
05/10/2010	1.072	05/10/2010	0.10
06/10/2010	1.095	06/10/2010	-1.26
07/10/2010	0.391	07/10/2010	-1.24
08/10/2010	-0.299	08/10/2010	-1.35
09/10/2010	-1.01	09/10/2010	-1.55
10/10/2010	-1.549	10/10/2010	-1.07
11/10/2010	-1.154	11/10/2010	-2.39
12/10/2010	-0.936	12/10/2010	-1.46
13/10/2010	-0.892	13/10/2010	-0.26
14/10/2010	-0.923	14/10/2010	0.50
15/10/2010	-0.802	15/10/2010	0.36
16/10/2010	-0.33	16/10/2010	0.41
17/10/2010	-0.224	17/10/2010	0.87
18/10/2010	-0.739	18/10/2010	0.47
19/10/2010	-0.952	19/10/2010	0.49
20/10/2010	-1.022	20/10/2010	0.65
21/10/2010	-1.215	21/10/2010	-0.40
22/10/2010	-1.295	22/10/2010	-0.84
23/10/2010	-1.116	23/10/2010	-0.51
24/10/2010	-0.783	24/10/2010	0.44
25/10/2010	-0.393	25/10/2010	2.03
26/10/2010	-0.39	26/10/2010	0.56
27/10/2010	-0.468	27/10/2010	0.20
28/10/2010	-0.125	28/10/2010	-0.16
29/10/2010	0.06	29/10/2010	-0.51
30/10/2010	-0.257	30/10/2010	-0.16
31/10/2010	-0.302	31/10/2010	0.28
01/11/2010	-0.18	01/11/2010	1.33

02/11/2010	0.004	02/11/2010	1.15
03/11/2010	0.066	03/11/2010	0.50
04/11/2010	-0.302	04/11/2010	-0.36
05/11/2010	-0.513	05/11/2010	-0.50
06/11/2010	-0.203	06/11/2010	0.23
07/11/2010	0.097	07/11/2010	1.11
08/11/2010	-0.548	08/11/2010	2.63
09/11/2010	-0.912	09/11/2010	2.11
10/11/2010	-0.909	10/11/2010	1.99
11/11/2010	-0.895	11/11/2010	1.99
12/11/2010	-0.513	12/11/2010	1.77
13/11/2010	-0.11	13/11/2010	0.31
14/11/2010	0.104	14/11/2010	-0.48
15/11/2010	0.045	15/11/2010	1.27
16/11/2010	-0.037	16/11/2010	2.39
17/11/2010	-0.104	17/11/2010	1.33
18/11/2010	-0.321	18/11/2010	1.17
19/11/2010	-0.857	19/11/2010	0.03
20/11/2010	-1.055	20/11/2010	-0.22
21/11/2010	-1.015	21/11/2010	1.25
22/11/2010	-1.216	22/11/2010	1.96
23/11/2010	-1.506	23/11/2010	1.71
24/11/2010	-1.876	24/11/2010	0.77
25/11/2010	-2.522	25/11/2010	0.28
26/11/2010	-2.632	26/11/2010	0.02
27/11/2010	-2.527	27/11/2010	-2.57
28/11/2010	-2.317	28/11/2010	-0.06
29/11/2010	-2.504	29/11/2010	-1.31
30/11/2010	-2.696	30/11/2010	-2.17
01/12/2010	-2.043	01/12/2010	1.12
02/12/2010	-1.667	02/12/2010	1.29
03/12/2010	-1.744	03/12/2010	1.84
04/12/2010	-1.545	04/12/2010	0.10
05/12/2010	-1.211	05/12/2010	-1.13
06/12/2010	-1.082	06/12/2010	0.22
07/12/2010	-1.106	07/12/2010	-0.03
08/12/2010	-1.036	08/12/2010	0.28
09/12/2010	-0.801	09/12/2010	0.59
10/12/2010	-0.707	10/12/2010	-0.53
11/12/2010	-0.693	11/12/2010	-0.13
12/12/2010	-0.862	12/12/2010	0.45
13/12/2010	-1.416	13/12/2010	-0.25
14/12/2010	-1.544	14/12/2010	-0.19
15/12/2010	-1.279	15/12/2010	-0.15
16/12/2010	-1.119	16/12/2010	0.11
17/12/2010	-1.229	17/12/2010	0.64
18/12/2010	-1.533	18/12/2010	-0.90
19/12/2010	-1.304	19/12/2010	-1.51
20/12/2010	-0.74	20/12/2010	-0.01
21/12/2010	-0.543	21/12/2010	-1.61
22/12/2010	-0.832	22/12/2010	-2.30

23/12/2010	-1.187	23/12/2010	0.44
24/12/2010	-1.343	24/12/2010	3.56
25/12/2010	-1.144	25/12/2010	2.15
26/12/2010	-0.834	26/12/2010	0.24
27/12/2010	-0.868	27/12/2010	-0.51
28/12/2010	-0.968	28/12/2010	-0.67
29/12/2010	-1.137	29/12/2010	-1.12
30/12/2010	-1.462	30/12/2010	-1.37
31/12/2010	-1.355	31/12/2010	-0.50
01/01/2011	-1.626	01/01/2011	0.35
02/01/2011	-1.734	02/01/2011	0.89
03/01/2011	-1.814	03/01/2011	0.15
04/01/2011	-1.909	04/01/2011	-0.10
05/01/2011	-1.746	05/01/2011	-0.23
06/01/2011	-1.447	06/01/2011	-0.24
07/01/2011	-1.238	07/01/2011	-0.02
08/01/2011	-0.92	08/01/2011	0.20
09/01/2011	-0.524	09/01/2011	0.47
10/01/2011	-0.136	10/01/2011	1.35
11/01/2011	0.05	11/01/2011	2.33
12/01/2011	0.285	12/01/2011	1.56
13/01/2011	0.47	13/01/2011	0.78
14/01/2011	0.702	14/01/2011	0.52
15/01/2011	0.68	15/01/2011	0.59
16/01/2011	0.389	16/01/2011	0.09
17/01/2011	0.375	17/01/2011	0.40
18/01/2011	0.345	18/01/2011	-0.02
19/01/2011	0.193	19/01/2011	-0.29
20/01/2011	-0.048	20/01/2011	-0.26
21/01/2011	-0.424	21/01/2011	-0.77
22/01/2011	-0.777	22/01/2011	-1.51
23/01/2011	-0.797	23/01/2011	-2.10
24/01/2011	-0.944	24/01/2011	-2.16
25/01/2011	-0.872	25/01/2011	-1.23
26/01/2011	-0.619	26/01/2011	-2.06
27/01/2011	-0.358	27/01/2011	-2.57
28/01/2011	-0.071	28/01/2011	-1.02
29/01/2011	0.086	29/01/2011	-0.74
30/01/2011	0.328	30/01/2011	-0.35
31/01/2011	0.459	31/01/2011	0.01
01/02/2011	0.523	01/02/2011	0.42
02/02/2011	0.731	02/02/2011	1.02
03/02/2011	0.964	03/02/2011	1.03
04/02/2011	0.944	04/02/2011	1.15
05/02/2011	0.799	05/02/2011	1.08
06/02/2011	0.646	06/02/2011	0.54
07/02/2011	0.866	07/02/2011	0.37
08/02/2011	0.636	08/02/2011	0.54
09/02/2011	0.368	09/02/2011	0.18
10/02/2011	0.374	10/02/2011	0.00
11/02/2011	0.407	11/02/2011	0.09

12/02/2011	0.58	12/02/2011	0.42
13/02/2011	0.642	13/02/2011	0.42
14/02/2011	0.797	14/02/2011	1.07
15/02/2011	0.596	15/02/2011	0.47
16/02/2011	0.297	16/02/2011	0.95
17/02/2011	0.088	17/02/2011	0.89
18/02/2011	-0.105	18/02/2011	1.74
19/02/2011	-0.119	19/02/2011	1.11
20/02/2011	-0.283	20/02/2011	1.64
21/02/2011	-0.211	21/02/2011	2.81
22/02/2011	-0.21	22/02/2011	2.40
23/02/2011	-0.031	23/02/2011	0.52
24/02/2011	0.404	24/02/2011	-0.09
25/02/2011	1.131	25/02/2011	0.20
26/02/2011	1.536	26/02/2011	0.61
27/02/2011	1.157	27/02/2011	1.13
28/02/2011	1.272	28/02/2011	0.83
01/03/2011	1.737	01/03/2011	0.13
02/03/2011	1.351	02/03/2011	-0.12
03/03/2011	0.992	03/03/2011	-0.94
04/03/2011	0.636	04/03/2011	-1.82
05/03/2011	0.599	05/03/2011	-1.23
06/03/2011	0.8	06/03/2011	-0.67
07/03/2011	0.872	07/03/2011	-2.02
08/03/2011	0.933	08/03/2011	-3.26
09/03/2011	1.067	09/03/2011	-2.03
10/03/2011	1.032	10/03/2011	-1.34
11/03/2011	0.875	11/03/2011	-2.05
12/03/2011	0.697	12/03/2011	-2.75
13/03/2011	0.863	13/03/2011	-1.78
14/03/2011	0.921	14/03/2011	-3.27
15/03/2011	0.912	15/03/2011	-1.59
16/03/2011	0.94	16/03/2011	0.91
17/03/2011	1.083	17/03/2011	2.46
18/03/2011	1.167	18/03/2011	1.58
19/03/2011	1.082	19/03/2011	0.77
20/03/2011	0.898	20/03/2011	-0.80
21/03/2011	0.734	21/03/2011	-1.52
22/03/2011	0.205	22/03/2011	-2.60
23/03/2011	-0.766	23/03/2011	-2.66
24/03/2011	-1.169	24/03/2011	-2.16
25/03/2011	-1.406	25/03/2011	-0.88
26/03/2011	-1.691	26/03/2011	0.09
27/03/2011	-1.618	27/03/2011	0.74
28/03/2011	-1.224	28/03/2011	1.46
29/03/2011	-0.741	29/03/2011	1.21
30/03/2011	-0.43	30/03/2011	1.19
31/03/2011	-0.229	31/03/2011	0.45
01/04/2011	-0.116	01/04/2011	-0.39
02/04/2011	-0.064	02/04/2011	-0.56
03/04/2011	0.162	03/04/2011	-0.32

04/04/2011	0.364	04/04/2011	0.09
05/04/2011	0.447	05/04/2011	-1.67
06/04/2011	0.633	06/04/2011	-1.99
07/04/2011	0.631	07/04/2011	-0.70
08/04/2011	0.168	08/04/2011	0.44
09/04/2011	0.283	09/04/2011	0.93
10/04/2011	0.948	10/04/2011	0.76
11/04/2011	1.65	11/04/2011	-0.14
12/04/2011	1.905	12/04/2011	0.32
13/04/2011	2.156	13/04/2011	-0.56
14/04/2011	2.112	14/04/2011	-1.08
15/04/2011	2.253	15/04/2011	-1.56
16/04/2011	2.057	16/04/2011	-1.81
17/04/2011	1.397	17/04/2011	-1.56
18/04/2011	0.988	18/04/2011	-1.41
19/04/2011	1.627	19/04/2011	-1.07
20/04/2011	2.082	20/04/2011	-1.89
21/04/2011	1.834	21/04/2011	-2.03
22/04/2011	1.447	22/04/2011	-1.07
23/04/2011	1.495	23/04/2011	-1.30
24/04/2011	1.953	24/04/2011	-1.37
25/04/2011	2.2	25/04/2011	-0.12
26/04/2011	1.749	26/04/2011	0.27
27/04/2011	1.347	27/04/2011	-0.58
28/04/2011	1.226	28/04/2011	-1.04
29/04/2011	1.139	29/04/2011	-1.60
30/04/2011	1.071	30/04/2011	-1.16
01/05/2011	0.924	01/05/2011	-1.60
02/05/2011	0.56	02/05/2011	-0.87
03/05/2011	0.179	03/05/2011	1.43
04/05/2011	0.221	04/05/2011	1.00
05/05/2011	0.189	05/05/2011	-0.93
06/05/2011	-0.238	06/05/2011	-2.05
07/05/2011	-0.493	07/05/2011	-1.06
08/05/2011	-0.574	08/05/2011	-0.12
09/05/2011	-0.777	09/05/2011	-1.37
10/05/2011	-0.487	10/05/2011	-1.33
11/05/2011	-0.094	11/05/2011	-0.85
12/05/2011	-0.114	12/05/2011	-0.69
13/05/2011	-0.125	13/05/2011	-0.68
14/05/2011	-0.139	14/05/2011	-0.30
15/05/2011	-0.162	15/05/2011	0.01
16/05/2011	0.046	16/05/2011	-0.43
17/05/2011	0.08	17/05/2011	-0.83
18/05/2011	-0.245	18/05/2011	-1.50
19/05/2011	-0.658	19/05/2011	-1.27
20/05/2011	-0.846	20/05/2011	-0.79
21/05/2011	-0.889	21/05/2011	-0.09
22/05/2011	-0.852	22/05/2011	-0.04
23/05/2011	-0.827	23/05/2011	-0.36
24/05/2011	-0.68	24/05/2011	-0.25

25/05/2011	-0.413	25/05/2011	-0.15
26/05/2011	0.344	26/05/2011	0.22
27/05/2011	0.956	27/05/2011	0.61
28/05/2011	1.033	28/05/2011	-0.14
29/05/2011	1.063	29/05/2011	-0.65
30/05/2011	1.077	30/05/2011	-0.28
31/05/2011	1.018	31/05/2011	0.36
01/06/2011	1.357	01/06/2011	0.06
02/06/2011	1.585	02/06/2011	-0.82
03/06/2011	1.224	03/06/2011	-1.23
04/06/2011	0.652	04/06/2011	-1.24
05/06/2011	0.213	05/06/2011	-1.20
06/06/2011	-0.073	06/06/2011	-0.48
07/06/2011	-0.454	07/06/2011	0.51
08/06/2011	-0.667	08/06/2011	1.31
09/06/2011	-0.826	09/06/2011	0.84
10/06/2011	-1.085	10/06/2011	0.72
11/06/2011	-1.177	11/06/2011	0.38
12/06/2011	-1.302	12/06/2011	-0.04
13/06/2011	-1.262	13/06/2011	0.10
14/06/2011	-1.248	14/06/2011	0.14
15/06/2011	-1.35	15/06/2011	-0.03
16/06/2011	-1.459	16/06/2011	-0.10
17/06/2011	-1.553	17/06/2011	-0.44
18/06/2011	-1.711	18/06/2011	0.59
19/06/2011	-1.807	19/06/2011	0.56
20/06/2011	-1.705	20/06/2011	-0.10
21/06/2011	-1.449	21/06/2011	-0.69
22/06/2011	-1.169	22/06/2011	-0.61
23/06/2011	-0.868	23/06/2011	-0.25
24/06/2011	-0.642	24/06/2011	-0.26
25/06/2011	-0.631	25/06/2011	-0.87
26/06/2011	-0.747	26/06/2011	-0.94
27/06/2011	-0.847	27/06/2011	-0.81
28/06/2011	-0.882	28/06/2011	-0.25
29/06/2011	-0.967	29/06/2011	-0.16
30/06/2011	-1.126	30/06/2011	-0.20
01/07/2011	-1.305	01/07/2011	-0.04
02/07/2011	-1.231	02/07/2011	-0.31
03/07/2011	-1.197	03/07/2011	-0.20
04/07/2011	-0.99	04/07/2011	0.43
05/07/2011	-0.777	05/07/2011	0.25
06/07/2011	-1.008	06/07/2011	0.01
07/07/2011	-1.146	07/07/2011	-0.21
08/07/2011	-1.165	08/07/2011	-0.21
09/07/2011	-1.043	09/07/2011	-0.68
10/07/2011	-0.918	10/07/2011	-0.65
11/07/2011	-0.655	11/07/2011	-0.90
12/07/2011	-0.207	12/07/2011	-0.56
13/07/2011	-0.123	13/07/2011	0.35
14/07/2011	-0.231	14/07/2011	0.34

15/07/2011	-0.606	15/07/2011	-0.23
16/07/2011	-0.841	16/07/2011	-0.30
17/07/2011	-0.63	17/07/2011	0.24
18/07/2011	-0.548	18/07/2011	0.76
19/07/2011	-0.661	19/07/2011	0.84
20/07/2011	-0.874	20/07/2011	0.22
21/07/2011	-0.797	21/07/2011	-0.50
22/07/2011	-0.479	22/07/2011	-0.33
23/07/2011	-0.411	23/07/2011	0.74
24/07/2011	-0.427	24/07/2011	1.00
25/07/2011	-0.507	25/07/2011	0.21
26/07/2011	-0.71	26/07/2011	-0.66
27/07/2011	-0.699	27/07/2011	-1.45
28/07/2011	-0.365	28/07/2011	-0.41
29/07/2011	-0.459	29/07/2011	-0.02
30/07/2011	-0.714	30/07/2011	0.23
31/07/2011	-1.279	31/07/2011	-0.01
01/08/2011	-1.66	01/08/2011	-1.27
02/08/2011	-2.027	02/08/2011	-0.56
03/08/2011	-2.002	03/08/2011	-0.12
04/08/2011	-1.838	04/08/2011	0.12
05/08/2011	-1.696	05/08/2011	-0.05
06/08/2011	-1.873	06/08/2011	-0.19
07/08/2011	-2.157	07/08/2011	-0.32
08/08/2011	-2.206	08/08/2011	0.07
09/08/2011	-1.822	09/08/2011	-0.48
10/08/2011	-1.429	10/08/2011	-1.04
11/08/2011	-0.921	11/08/2011	-1.09
12/08/2011	-0.226	12/08/2011	-0.47
13/08/2011	0.328	13/08/2011	-0.29
14/08/2011	0.459	14/08/2011	-0.45
15/08/2011	0.338	15/08/2011	-0.21
16/08/2011	0.104	16/08/2011	-0.64
17/08/2011	-0.053	17/08/2011	-0.98
18/08/2011	0.15	18/08/2011	-1.44
19/08/2011	-0.034	19/08/2011	-1.36
20/08/2011	-0.296	20/08/2011	-1.12
21/08/2011	-0.555	21/08/2011	-0.85
22/08/2011	-0.981	22/08/2011	-0.40
23/08/2011	-1.223	23/08/2011	-0.42
24/08/2011	-1.004	24/08/2011	-0.17
25/08/2011	-0.415	25/08/2011	-0.20
26/08/2011	0.163	26/08/2011	0.20
27/08/2011	0.354	27/08/2011	0.40
28/08/2011	0.15	28/08/2011	-0.41
29/08/2011	-0.021	29/08/2011	-0.01
30/08/2011	-0.224	30/08/2011	0.23
31/08/2011	-0.096	31/08/2011	-0.34
01/09/2011	-0.071	01/09/2011	-0.78
02/09/2011	0.058	02/09/2011	-0.10
03/09/2011	0.081	03/09/2011	0.19

04/09/2011	0.344	04/09/2011	0.44
05/09/2011	0.346	05/09/2011	0.37
06/09/2011	0.134	06/09/2011	-0.10
07/09/2011	0.148	07/09/2011	0.34
08/09/2011	0.363	08/09/2011	0.22
09/09/2011	0.399	09/09/2011	-0.45
10/09/2011	0.177	10/09/2011	-0.42
11/09/2011	0.263	11/09/2011	0.05
12/09/2011	0.138	12/09/2011	-0.22
13/09/2011	0.154	13/09/2011	-0.85
14/09/2011	0.306	14/09/2011	-1.02
15/09/2011	0.658	15/09/2011	-0.86
16/09/2011	0.674	16/09/2011	-0.44
17/09/2011	0.572	17/09/2011	0.09
18/09/2011	0.827	18/09/2011	0.74
19/09/2011	0.629	19/09/2011	1.03
20/09/2011	0.135	20/09/2011	-0.65
21/09/2011	-0.357	21/09/2011	-0.35
22/09/2011	-0.49	22/09/2011	0.16
23/09/2011	-0.223	23/09/2011	0.03
24/09/2011	0.281	24/09/2011	-0.23
25/09/2011	0.525	25/09/2011	-0.83
26/09/2011	0.184	26/09/2011	-0.77
27/09/2011	-0.009	27/09/2011	-0.86
28/09/2011	0.383	28/09/2011	-1.22
29/09/2011	0.594	29/09/2011	-1.48
30/09/2011	0.236	30/09/2011	-1.49
01/10/2011	0.842	01/10/2011	-1.53
02/10/2011	1.094	02/10/2011	-0.75
03/10/2011	0.862	03/10/2011	-0.06
04/10/2011	0.627	04/10/2011	-0.03
05/10/2011	-0.044	05/10/2011	-0.22
06/10/2011	-0.493	06/10/2011	0.34
07/10/2011	-0.179	07/10/2011	1.17
08/10/2011	0.485	08/10/2011	0.27
09/10/2011	0.71	09/10/2011	0.21
10/10/2011	0.203	10/10/2011	-0.05
11/10/2011	-0.432	11/10/2011	0.41
12/10/2011	-0.476	12/10/2011	0.29
13/10/2011	-0.084	13/10/2011	-0.13
14/10/2011	0.264	14/10/2011	-1.13
15/10/2011	0.064	15/10/2011	-1.42
16/10/2011	-0.14	16/10/2011	-0.98
17/10/2011	-0.199	17/10/2011	-1.02
18/10/2011	-0.284	18/10/2011	-0.87
19/10/2011	0.114	19/10/2011	-0.06
20/10/2011	0.62	20/10/2011	-0.05
21/10/2011	0.854	21/10/2011	-1.54
22/10/2011	0.853	22/10/2011	-1.55
23/10/2011	0.661	23/10/2011	-1.24
24/10/2011	0.701	24/10/2011	-1.86

25/10/2011	0.48	25/10/2011	-0.31
26/10/2011	0.07	26/10/2011	-0.27
27/10/2011	0.149	27/10/2011	-1.39
28/10/2011	0.322	28/10/2011	-1.17
29/10/2011	0.199	29/10/2011	-0.88
30/10/2011	0.041	30/10/2011	-0.58
31/10/2011	0.054	31/10/2011	-0.70
01/11/2011	-0.185	01/11/2011	-0.63
02/11/2011	-0.326	02/11/2011	-1.27
03/11/2011	-0.136	03/11/2011	-1.85
04/11/2011	0.179	04/11/2011	-2.10
05/11/2011	0.604	05/11/2011	-0.01
06/11/2011	1.081	06/11/2011	1.27
07/11/2011	1.108	07/11/2011	0.35
08/11/2011	0.787	08/11/2011	0.00
09/11/2011	0.543	09/11/2011	-0.33
10/11/2011	0.243	10/11/2011	-0.25
11/11/2011	0.02	11/11/2011	-0.90
12/11/2011	0.045	12/11/2011	-2.00
13/11/2011	0.171	13/11/2011	-2.27
14/11/2011	-0.058	14/11/2011	-1.91
15/11/2011	-0.03	15/11/2011	-0.37
16/11/2011	-0.022	16/11/2011	-0.33
17/11/2011	-0.026	17/11/2011	-0.85
18/11/2011	0.252	18/11/2011	-1.41
19/11/2011	0.735	19/11/2011	-2.14
20/11/2011	1.233	20/11/2011	-2.91
21/11/2011	1.308	21/11/2011	-1.48
22/11/2011	1.356	22/11/2011	-0.18
23/11/2011	1.367	23/11/2011	-0.27
24/11/2011	1.51	24/11/2011	-0.93
25/11/2011	1.741	25/11/2011	-0.55
26/11/2011	1.639	26/11/2011	-0.10
27/11/2011	1.609	27/11/2011	-0.44
28/11/2011	1.561	28/11/2011	-0.25
29/11/2011	1.639	29/11/2011	0.07
30/11/2011	1.95	30/11/2011	0.03
01/12/2011	1.313	01/12/2011	0.17
02/12/2011	1.618	02/12/2011	0.57
03/12/2011	2.002	03/12/2011	0.88
04/12/2011	1.922	04/12/2011	1.64
05/12/2011	1.907	05/12/2011	2.50
06/12/2011	1.995	06/12/2011	2.10
07/12/2011	1.655	07/12/2011	2.12
08/12/2011	1.175	08/12/2011	1.24
09/12/2011	0.982	09/12/2011	0.61
10/12/2011	1.302	10/12/2011	0.81
11/12/2011	1.611	11/12/2011	0.74
12/12/2011	1.718	12/12/2011	2.11
13/12/2011	1.704	13/12/2011	1.71
14/12/2011	1.397	14/12/2011	1.81

15/12/2011	1.222	15/12/2011	2.64
16/12/2011	1.183	16/12/2011	4.02
17/12/2011	0.757	17/12/2011	3.86
18/12/2011	0.451	18/12/2011	1.93
19/12/2011	0.515	19/12/2011	1.32
20/12/2011	0.543	20/12/2011	2.09
21/12/2011	0.533	21/12/2011	1.94
22/12/2011	0.796	22/12/2011	1.21
23/12/2011	1.439	23/12/2011	0.67
24/12/2011	1.846	24/12/2011	1.22
25/12/2011	1.784	25/12/2011	-0.41
26/12/2011	1.399	26/12/2011	-0.76
27/12/2011	1.064	27/12/2011	-0.43
28/12/2011	0.966	28/12/2011	0.59
29/12/2011	0.807	29/12/2011	1.70
30/12/2011	0.98	30/12/2011	2.79
31/12/2011	1.419	31/12/2011	2.27
01/01/2012	1.358	01/01/2012	1.44
02/01/2012	1.365	02/01/2012	2.33
03/01/2012	1.526	03/01/2012	1.85
04/01/2012	1.657	04/01/2012	1.82
05/01/2012	1.029	05/01/2012	3.15
06/01/2012	0.597	06/01/2012	2.89
07/01/2012	0.467	07/01/2012	0.86
08/01/2012	0.507	08/01/2012	0.93
09/01/2012	0.732	09/01/2012	0.11
10/01/2012	0.517	10/01/2012	-0.20
11/01/2012	0.111	11/01/2012	-0.41
12/01/2012	-0.244	12/01/2012	0.09
13/01/2012	-0.223	13/01/2012	0.93
14/01/2012	0.155	14/01/2012	0.77
15/01/2012	0.586	15/01/2012	0.29
16/01/2012	0.714	16/01/2012	-1.31
17/01/2012	1.07	17/01/2012	-1.10
18/01/2012	1.427	18/01/2012	0.58
19/01/2012	1.362	19/01/2012	1.50
20/01/2012	1.137	20/01/2012	2.65
21/01/2012	0.917	21/01/2012	1.82
22/01/2012	0.686	22/01/2012	1.68
23/01/2012	0.562	23/01/2012	1.05
24/01/2012	0.443	24/01/2012	1.01
25/01/2012	0.478	25/01/2012	0.04
26/01/2012	0.37	26/01/2012	-0.23
27/01/2012	0.233	27/01/2012	-0.78
28/01/2012	0.159	28/01/2012	-0.21
29/01/2012	0.296	29/01/2012	0.53
30/01/2012	0.306	30/01/2012	0.14
31/01/2012	0.265	31/01/2012	0.60
01/02/2012	0.129	01/02/2012	0.45
02/02/2012	0.01	02/02/2012	-0.53
03/02/2012	0.081	03/02/2012	0.46

04/02/2012	0.084	04/02/2012	1.37
05/02/2012	0.135	05/02/2012	1.89
06/02/2012	0.585	06/02/2012	1.78
07/02/2012	0.88	07/02/2012	1.51
08/02/2012	1.023	08/02/2012	-0.57
09/02/2012	0.843	09/02/2012	0.18
10/02/2012	0.542	10/02/2012	0.31
11/02/2012	0.321	11/02/2012	0.10
12/02/2012	0.043	12/02/2012	-0.33
13/02/2012	-0.22	13/02/2012	0.35
14/02/2012	-0.164	14/02/2012	1.18
15/02/2012	0.23	15/02/2012	1.44
16/02/2012	0.451	16/02/2012	0.93
17/02/2012	0.477	17/02/2012	-0.29
18/02/2012	0.397	18/02/2012	-0.11
19/02/2012	0.368	19/02/2012	0.55
20/02/2012	0.401	20/02/2012	0.02
21/02/2012	0.537	21/02/2012	-0.30
22/02/2012	0.689	22/02/2012	0.16
23/02/2012	0.674	23/02/2012	0.43
24/02/2012	0.635	24/02/2012	0.33
25/02/2012	0.543	25/02/2012	1.12
26/02/2012	0.568	26/02/2012	1.45
27/02/2012	0.832	27/02/2012	0.14
28/02/2012	0.903	28/02/2012	-0.38
29/02/2012	0.998	29/02/2012	0.28
01/03/2012	0.964	01/03/2012	0.16
02/03/2012	0.677	02/03/2012	0.88
03/03/2012	0.792	03/03/2012	1.77
04/03/2012	1.119	04/03/2012	1.82
05/03/2012	1.329	05/03/2012	1.92
06/03/2012	1.309	06/03/2012	0.94
07/03/2012	1.222	07/03/2012	0.12
08/03/2012	1.246	08/03/2012	1.12
09/03/2012	1.406	09/03/2012	-0.53
10/03/2012	1.222	10/03/2012	-0.06
11/03/2012	0.968	11/03/2012	0.21
12/03/2012	0.782	12/03/2012	0.32
13/03/2012	0.816	13/03/2012	-0.27
14/03/2012	0.946	14/03/2012	-0.35
15/03/2012	1.241	15/03/2012	-0.15
16/03/2012	1.309	16/03/2012	-0.05
17/03/2012	1.113	17/03/2012	0.17
18/03/2012	0.866	18/03/2012	0.67
19/03/2012	0.65	19/03/2012	0.23
20/03/2012	0.55	20/03/2012	-1.44
21/03/2012	0.588	21/03/2012	-1.48
22/03/2012	0.627	22/03/2012	-1.18
23/03/2012	0.167	23/03/2012	-1.54
24/03/2012	-0.315	24/03/2012	-1.00
25/03/2012	-0.062	25/03/2012	-0.95

26/03/2012	0.361	26/03/2012	-1.53
27/03/2012	0.535	27/03/2012	-1.52
28/03/2012	0.507	28/03/2012	-1.66
29/03/2012	0.181	29/03/2012	-0.57
30/03/2012	-0.066	30/03/2012	0.16
31/03/2012	-0.147	31/03/2012	-0.06
01/04/2012	-0.283	01/04/2012	-0.05
02/04/2012	-0.504	02/04/2012	-0.80
03/04/2012	-0.493	03/04/2012	-0.60
04/04/2012	-0.841	04/04/2012	-0.33
05/04/2012	-1.106	05/04/2012	-0.10
06/04/2012	-0.995	06/04/2012	0.56
07/04/2012	-0.261	07/04/2012	1.61
08/04/2012	0.278	08/04/2012	1.51
09/04/2012	0.207	09/04/2012	-0.61
10/04/2012	0.237	10/04/2012	0.06
11/04/2012	0.467	11/04/2012	1.45
12/04/2012	0.566	12/04/2012	-0.03
13/04/2012	0.268	13/04/2012	1.45
14/04/2012	0.058	14/04/2012	2.74
15/04/2012	0.259	15/04/2012	2.19
16/04/2012	0.588	16/04/2012	1.82
17/04/2012	0.787	17/04/2012	1.94
18/04/2012	0.782	18/04/2012	2.31
19/04/2012	0.686	19/04/2012	2.14
20/04/2012	0.581	20/04/2012	2.17
21/04/2012	0.461	21/04/2012	1.15
22/04/2012	0.451	22/04/2012	1.27
23/04/2012	0.349	23/04/2012	1.35
24/04/2012	0.087	24/04/2012	1.77
25/04/2012	-0.102	25/04/2012	-0.13
26/04/2012	0.343	26/04/2012	-1.31
27/04/2012	0.931	27/04/2012	-1.68
28/04/2012	0.75	28/04/2012	-1.36
29/04/2012	0.367	29/04/2012	-0.26
30/04/2012	0.502	30/04/2012	0.27
01/05/2012	0.438	01/05/2012	-0.07
02/05/2012	-0.078	02/05/2012	-0.35
03/05/2012	-0.556	03/05/2012	0.42
04/05/2012	-0.745	04/05/2012	0.63
05/05/2012	-0.831	05/05/2012	0.30
06/05/2012	-0.893	06/05/2012	0.85
07/05/2012	-0.869	07/05/2012	0.73
08/05/2012	-0.517	08/05/2012	-0.20
09/05/2012	-0.113	09/05/2012	-0.88
10/05/2012	-0.137	10/05/2012	-1.09
11/05/2012	-0.332	11/05/2012	-0.68
12/05/2012	-0.288	12/05/2012	0.16
13/05/2012	-0.388	13/05/2012	-0.05
14/05/2012	-0.427	14/05/2012	-0.57
15/05/2012	-0.154	15/05/2012	0.31

16/05/2012	-0.058
17/05/2012	-0.127
18/05/2012	-0.091
19/05/2012	0.009
20/05/2012	-0.076
21/05/2012	-0.224
22/05/2012	-0.067
23/05/2012	0.378
24/05/2012	0.621
25/05/2012	0.414
26/05/2012	0.16
27/05/2012	-0.548
28/05/2012	-1.379
29/05/2012	-1.703
30/05/2012	-1.707
31/05/2012	-1.59
01/06/2012	-1.714
02/06/2012	-1.969
03/06/2012	-2.144
04/06/2012	-2.2
05/06/2012	-2.025
06/06/2012	-1.82
07/06/2012	-1.357
08/06/2012	-1.165
09/06/2012	-1.254
10/06/2012	-1.313
11/06/2012	-1.192
12/06/2012	-0.744
13/06/2012	-0.737
14/06/2012	-1.085
15/06/2012	-1.08
16/06/2012	-0.855
17/06/2012	-0.752
18/06/2012	-0.859
19/06/2012	-0.82
20/06/2012	-0.663
21/06/2012	-0.54
22/06/2012	-0.581
23/06/2012	-0.803
24/06/2012	-0.987
25/06/2012	-1.285
26/06/2012	-1.588
27/06/2012	-1.763
28/06/2012	-1.531
29/06/2012	-1.053
30/06/2012	-0.547
01/07/2012	-0.41
02/07/2012	-0.514
03/07/2012	-0.696
04/07/2012	-0.731
05/07/2012	-0.616

16/05/2012	-0.25
17/05/2012	-1.31
18/05/2012	-1.18
19/05/2012	-0.64
20/05/2012	0.31
21/05/2012	2.57
22/05/2012	1.77
23/05/2012	0.45
24/05/2012	-0.49
25/05/2012	-0.69
26/05/2012	-0.29
27/05/2012	-0.39
28/05/2012	-0.53
29/05/2012	-0.26
30/05/2012	-0.86
31/05/2012	-1.26
01/06/2012	-0.64
02/06/2012	-0.01
03/06/2012	0.30
04/06/2012	0.79
05/06/2012	0.34
06/06/2012	-0.27
07/06/2012	-0.72
08/06/2012	0.29
09/06/2012	1.02
10/06/2012	1.13
11/06/2012	1.26
12/06/2012	1.36
13/06/2012	-0.51
14/06/2012	-0.77
15/06/2012	-0.53
16/06/2012	-0.35
17/06/2012	-0.62
18/06/2012	-0.94
19/06/2012	-0.87
20/06/2012	-0.08
21/06/2012	0.79
22/06/2012	0.12
23/06/2012	-0.25
24/06/2012	-0.26
25/06/2012	0.25
26/06/2012	-0.18
27/06/2012	-0.35
28/06/2012	-0.56
29/06/2012	-0.44
30/06/2012	0.09

06/07/2012	-0.557
07/07/2012	-0.622
08/07/2012	-0.92
09/07/2012	-0.997
10/07/2012	-0.886
11/07/2012	-0.803
12/07/2012	-1.016
13/07/2012	-1.154
14/07/2012	-1.346
15/07/2012	-1.729
16/07/2012	-1.751
17/07/2012	-1.597
18/07/2012	-1.467
19/07/2012	-1.124
20/07/2012	-0.697
21/07/2012	-0.317
22/07/2012	-0.023
23/07/2012	0.384
24/07/2012	0.308
25/07/2012	-0.115
26/07/2012	-0.27
27/07/2012	-0.341
28/07/2012	0.026
29/07/2012	0.013
30/07/2012	-0.41
31/07/2012	-0.849
01/08/2012	-1.114
02/08/2012	-1.175
03/08/2012	-1.207
04/08/2012	-1.019
05/08/2012	-0.479
06/08/2012	-0.455
07/08/2012	-0.442
08/08/2012	-0.304
09/08/2012	-0.201
10/08/2012	0.032
11/08/2012	0.204
12/08/2012	0.126
13/08/2012	-0.216
14/08/2012	-0.503
15/08/2012	-0.692
16/08/2012	-1.044
17/08/2012	-1.283
18/08/2012	-1.432
19/08/2012	-1.558
20/08/2012	-1.244
21/08/2012	-0.68
22/08/2012	-0.272
23/08/2012	-0.279
24/08/2012	-0.412
25/08/2012	-0.459

26/08/2012	-0.393
27/08/2012	-0.258
28/08/2012	0.038
29/08/2012	-0.045
30/08/2012	0.015
31/08/2012	0.467
01/09/2012	0.8
02/09/2012	0.709
03/09/2012	0.697
04/09/2012	0.621
05/09/2012	0.406
06/09/2012	0.133
07/09/2012	-0.155
08/09/2012	-0.276
09/09/2012	-0.276
10/09/2012	-0.199
11/09/2012	0.133
12/09/2012	0.27
13/09/2012	0.582
14/09/2012	0.578
15/09/2012	0.258
16/09/2012	-0.16
17/09/2012	-0.858
18/09/2012	-1.169
19/09/2012	-1.135
20/09/2012	-0.612
21/09/2012	-0.506
22/09/2012	-0.988
23/09/2012	-1.313
24/09/2012	-1.875
25/09/2012	-1.618
26/09/2012	-0.799
27/09/2012	-0.222
28/09/2012	-0.439
29/09/2012	-0.208
30/09/2012	-0.272

Calculating effective precipitation

t	effective precipitation
1	8.5
2	1.1
3	12.1
4	1.7
5	3.1
6	11
7	3.8
8	5.5
9	10
10	2.9
11	8
12	9.8
13	3
14	13.3
15	2.1
16	3
17	1.7
18	2.3
19	1.5
20	2
21	1.7
22	1.5
23	1.5
24	9
25	9
26	1.1
27	1.1
28	9
29	9
30	19.5
31	19.5
32	12.3
33	17.5
34	3.6
35	1.7
36	1.4
37	2.3
38	1.1
39	2.3
40	4.5
41	2.5
42	1.7
43	1.2
44	3.5
45	2.6
46	1.9
47	9.3
48	2

d18O rainfall data

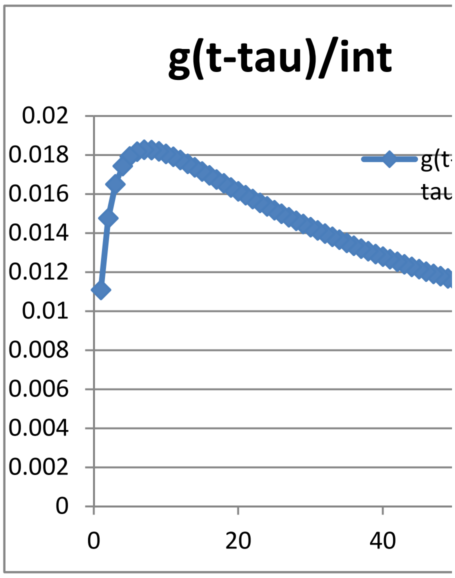
	t	d18O rainfall (weighted)
	1	-89.48231161
	2	-12.47178174
	3	-105.0740237
	4	-14.61263039
	5	-27.06207236
	6	-118.171168
	7	-20.98892407
	8	-17.2547591
	9	-97.18846072
	10	-20.21036558
	11	-98.33719484
	12	-43.9444348
	13	-22.888179
	14	-117.7577744
	15	-18.3117249
	16	-25.724916
	17	-4.4945654
	18	-3.3326793
	19	-5.6038335
	20	-7.997208
	21	-6.26178
	22	-7.4860965
	23	-6.907737
real t	24	-52.876224
10	25	-52.611219
12	26	-5.4421532
13	27	-8.736211
15	28	-26.966961
16	29	-49.114899
31	30	-85.1713005
32	31	-87.0669345
34	32	-150.7025889
35	33	-166.06359
60	34	-25.6042368
70	35	-19.8822412
74	36	-14.9670346
84	37	-27.3328182
92	38	-7.150165
105	39	-36.2027222
106	40	-71.3282265
141	41	-26.0287175
159	42	-12.6260122
164	43	-8.2475784
166	44	-24.2709145
176	45	-24.8979432
177	46	-26.5165995
185	47	-137.5044246
186	48	-17.02685

49	6		187	49	-39.662388
50	11.3	4.051278114	188	50	-54.253447
51	69	4.73821695	189	51	-1049.205168
52	4.2	5.016199803	195	52	-25.0753608
53	2	5.012383408	203	53	-11.153436
54	17	5.230254271	226	54	-130.973644
55	11	5.387125247	227	55	-80.758953
56	4.2	5.363040344	228	56	-35.4432624
57	2.2	5.366746193	229	57	-16.063091
58	1.5	5.318477393	232	58	-8.247285
59	3.4	5.223524533	234	59	-14.21302
60	2.7	5.200251905	235	60	-6.4113255
61	3.8	5.125506258	239	61	-8.1500614
62	8.8	5.086913492	241	62	-47.8962264
63	3.5	5.086517714	248	63	-10.6940155
64	2.1	4.941618736	261	64	-9.4970715
65	51	5.457981113	264	65	-371.592885
66	1.2	5.586970296	267	66	-4.52955
67	5.8	5.681532748	271	67	-27.444411
68	7.4	5.760447348	286	68	-30.3292774
69	2.8	5.788896306	287	69	0.4046784
70	3.9	5.800935281	307	70	-18.4540005
71	2	5.787329949	314	71	-11.914986
72	1.9	5.762703906	338	72	2.640782133
73	33.6	6.082197177	423	73	-212.9461824
74	1.5	6.072461858	424	74	-17.4339735
75	16.7	6.166837691	433	75	-120.8877493
76	32	6.549656502	439	76	-273.6951699
77	6	6.712397815	440	77	-73.1973772
78	24.4	6.925237139	441	78	-293.1576653
79	4	6.951731687	450	79	-37.53024862
80	8.4	6.848937826	464	80	-80.13217627
81	4	6.687397258	495	81	-37.362082
82	3	6.574890539	511	82	-27.0593685
83	4.5	6.403621861	515	83	-52.7541465
84	4.4	6.387921069	543	84	-21.9240662
85	24.5	6.613085298	559	85	-243.3639487
86	3.7	6.682489719	560	86	-36.60888234
87	8	6.746075582	572	87	-56.85643483
88	8.9	6.830305714	574	88	-40.56594019
89	3.4	6.840592792	575	89	-26.70342316
90	1.5	6.784236059	576	90	-15.45585767
91	3.6	6.757248522	582	91	-40.63326899
92	4.8	6.751511884	584	92	-57.08863537
93	4.2	6.747816734	589	93	-33.95757063
94	8.5	6.764251289	600	94	-79.85217668
95	5.4	6.772139763	620	95	-38.83646071

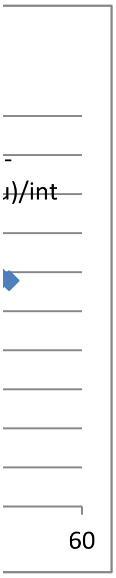
Hydrological time series model

tau	tmax-tau	g(t-tau)	g(t-tau)/int
1	50	0.002313336	0.011566679
2	49	0.002335665	0.011678324
3	48	0.002358428	0.011792141
4	47	0.002381639	0.011908194
5	46	0.002405309	0.012026545
6	45	0.002429452	0.012147262
7	44	0.002454083	0.012270413
8	43	0.002479213	0.012396067
9	42	0.002504859	0.012524297
10	41	0.002531035	0.012655176
11	40	0.002557756	0.01278878
12	39	0.002585037	0.012925186
13	38	0.002612894	0.013064471
14	37	0.002641343	0.013206715
15	36	0.002670399	0.013351997
16	35	0.002700079	0.013500396
17	34	0.002730398	0.013651992
18	33	0.002761372	0.013806861
19	32	0.002793016	0.013965078
20	31	0.002825343	0.014126713
21	30	0.002858366	0.014291832
22	29	0.002892098	0.014460492
23	28	0.002926548	0.014632738
24	27	0.002961721	0.014808604
25	26	0.00299762	0.014988101
26	25	0.003034244	0.01517122
27	24	0.003071583	0.015357917
28	23	0.003109622	0.01554811
29	22	0.003148332	0.015741661
30	21	0.003187673	0.015938365
31	20	0.003227585	0.016137926
32	19	0.003267986	0.016339931
33	18	0.003308763	0.016543814
34	17	0.003349761	0.016748805
35	16	0.003390773	0.016953865
36	15	0.003431518	0.017157589
37	14	0.003471616	0.017358082
38	13	0.003510553	0.017552765
39	12	0.003547623	0.017738114
40	11	0.00358185	0.017909251
41	10	0.003611867	0.018059336
42	9	0.003635721	0.018178604
43	8	0.00365056	0.018252802
44	7	0.003652106	0.018260528
45	6	0.003633691	0.018168457
46	5	0.00358444	0.017922199
47	4	0.003485426	0.017427129
48	3	0.003300609	0.016503047

mu t	2
sig	2
fac	0.199471
sig^2	4
mu-sig^2/2	4



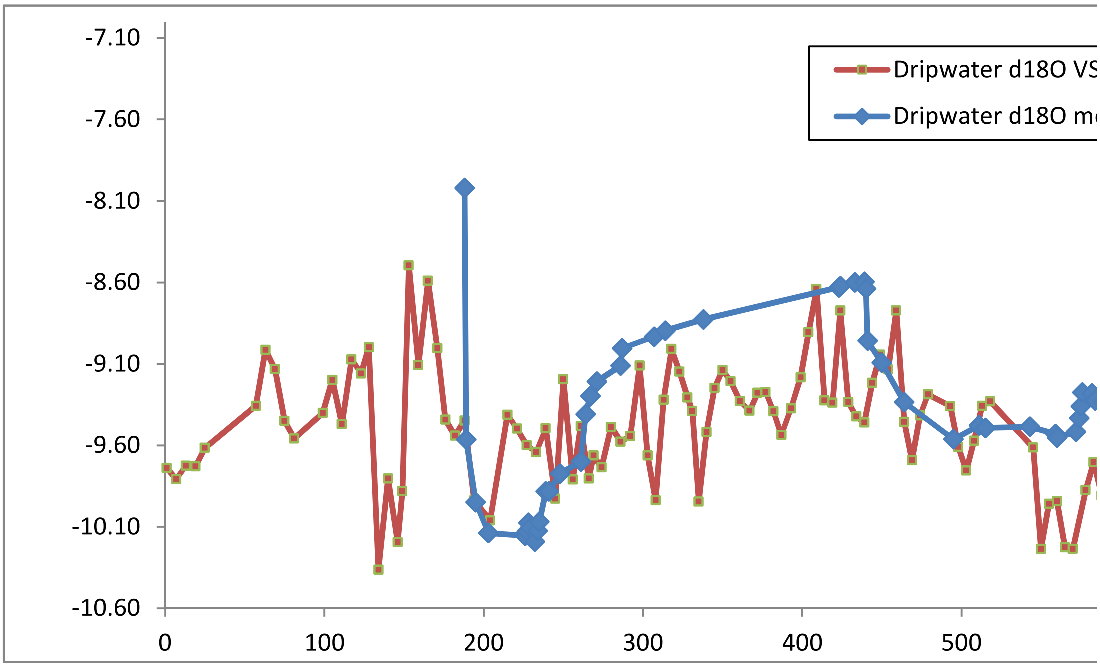
49	2	0.002951125	0.014755626
50	1	0.002215924	0.011079621
51	0	0.2	



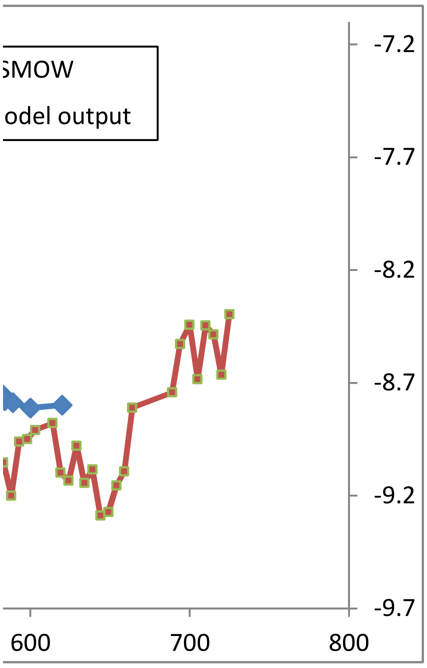
model output		d18O dripwater data	
Dripwater d18C	real t	real t (days)	Dripwater $d^{18}O$ VSMOW
		1	-9.74
		7	-9.81
		13	-9.73
		19	-9.73
		25	-9.62
		57	-9.36
		63	-9.01
		69	-9.13
		75	-9.45
		81	-9.56
		99	-9.40
		105	-9.20
		111	-9.47
		117	-9.07
		123	-9.16
		128	-9.00
		134	-10.36
		140	-9.80
		146	-10.20
		149	-9.88
		153	-8.49
		159	-9.11
		165	-8.59
		171	-9.00
	10	176	-9.44
	12	182	-9.54
	13	188	-9.45
	15	194	-9.94
	16	204	-10.06
	31	215	-9.41
	32	221	-9.50
	34	227	-9.60
	35	233	-9.64
	60	239	-9.50
	70	245	-9.93
	74	250	-9.19
	84	256	-9.81
	92	261	-9.48
	105	266	-9.80
	106	269	-9.66
	141	274	-9.74
	159	280	-9.49
	164	286	-9.58
	166	292	-9.54
	176	298	-9.11
	177	303	-9.66
	185	308	-9.94
	186	313	-9.32

	187	318	-9.01
-7.836550395	188	323	-9.15
-8.951806892	189	328	-9.31
-9.229980645	195	331	-9.39
-9.366394637	203	335	-9.94
-9.378252116	226	340	-9.52
-9.358556953	227	345	-9.25
-9.320021217	228	350	-9.14
-9.343995933	229	355	-9.21
-9.40489065	232	361	-9.33
-9.356011205	234	367	-9.39
-9.316166307	235	372	-9.28
-9.182109677	239	377	-9.27
-9.182125793	241	382	-9.39
-9.103453488	248	387	-9.54
-9.049116905	261	393	-9.37
-8.840187649	264	399	-9.18
-8.759655333	267	404	-8.91
-8.695060735	271	409	-8.64
-8.624295476	286	414	-9.32
-8.547554467	287	419	-9.34
-8.496142195	307	424	-8.77
-8.469136708	314	429	-9.33
-8.420010409	338	434	-9.42
-8.277801605	423	439	-9.46
-8.272189852	424	444	-9.22
-8.255356414	433	449	-9.04
-8.252734622	439	454	-9.13
-8.283406624	440	459	-8.77
-8.51403471	441	464	-9.46
-8.611420453	450	469	-9.69
-8.786328372	464	474	-9.42
-8.950611415	495	479	-9.29
-8.890104496	511	493	-9.36
-8.900775254	515	498	-9.61
-8.895207737	543	503	-9.75
-8.927274834	559	508	-9.57
-8.943173153	560	513	-9.36
-8.917378724	572	518	-9.33
-8.857164711	574	545	-9.61
-8.804655988	575	550	-10.23
-8.743735621	576	555	-9.96
-8.747534299	582	560	-9.94
-8.779008131	584	565	-10.23
-8.787912675	589	570	-10.24
-8.810931769	600	578	-9.87
-8.798542481	620	583	-9.70
		588	-9.91
		593	-9.58
		598	-9.56

603	-9.50
614	-9.46
619	-9.77
624	-9.82
629	-9.60
634	-9.83
639	-9.75
644	-10.03
649	-10.01
654	-9.85
659	-9.76
664	-9.37
689	-9.27
694	-8.98
700	-8.86
705	-9.19
710	-8.86
715	-8.92
720	-9.17
725	-8.79



This graph reflects the comparison among dripwater d180 data (site nº 3 at Molinos cave) (red curve)



and modelled dripwater d180 output (blue)