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Isotopic composition of precipitation of Friuli-Venezia Giulia (Northeastern Italy)

Marzia Michelini, Franco Cucchi, Onelio Flora, Barbara Stenni, Francesco Treu, and Luca Zini
Department of Geosciences, University of Trieste, Trieste, Italy (marzia.michelini@phd.units.it)

The water oxygen and hydrogen isotope compositions, being natural tracers of the hydrological cycle, have been extensively used as tools to characterize precipitation and regional aquifers. Particularly, the knowledge of the mean weighted annual isotopic composition of precipitation is a very important tool to determine the origins of the waters that feeds aquifers and rivers, their recharge area and its mean altitude, thanks to the definition of the vertical isotope gradient. The knowledge of the relationship between isotopic composition of local precipitation and local environmental conditions is also essential for hydrological studies.

Here we present the isotopic data obtained from the precipitation collected during several years in the northeastern part of Italy (Friuli - Venezia Giulia). A rain gauge network has been installed by the Department of Geosciences at the University of Trieste and implemented over the years. The active rain gauges are 20, mostly situated in the northeasternmost part of Friuli, and the sampling has been carried out from 2004 (for the older ones) to 2010 except for Trieste and Basovizza sites whose sampling has already started in 1994 and 1986 respectively.

The samples were collected monthly and all of them have been measured for their $^{18}\text{O}/^{16}\text{O}$ ratio. Whenever possible the D/H ratio has been determined allowing the calculation of the deuterium excess. The samples were analyzed through IRMS techniques by means of a Thermo – Finnigan mass spectrometer Delta Plus Advantage coupled with an HDO equilibration device and through CRDS techniques by means of a laser spectroscopy from PICARRO.

For all the samples the weighted mean values, the vertical isotopic gradients, the winter/summer amplitudes have been calculated. All isotopic data have been compared with the global meteoric water line and with temperature data made available from the Meteorological Regional Observatory (OSMER) and the Environmental Regional Agency (ARPA-FVG) weather stations.

The most negative values have been observed in the high-elevation sites of Tarvisio (794 m) and Monte Lussari (1739 m), with some isotopic anomalies in the case of the Tarvisio site, and less negative values for the coastal site of Trieste.

The amount of obtained data provides a good overview of isotopic composition of rainwater of this region being a good starting point for other hydrogeological studies in the area. Furthermore analyses are underway at the moment of the writing of the abstract.