April 2008, thus accompanying the recharge of the volcano. The second cycle lasted from late April 2008 to mid-May 2009, thus preceding and accompanying the first phase of the 13 May 2008 – 5 July 2009 flank eruption. The third cycle started in mid-July 2009 and it's still ongoing. It marked a new recharge of the volcano that culminated in the opening of the new summit degassing vent in early November 2009. Therefore, continuous monitoring of soil radon and soil temperature near the summit of Mt. Etna has proven helpful in determining states of volcanic unrest related to recharge and/or pre-eruptive magma ascent.

1.3-P-14

Carbon Dioxide Diffuse Emission from the Soil at Vesuvio and Campi Flegrei (Pozzuoli): Ten Years of Observations

GRANIERI, Domenico[1]; AVINO, Rosario[2]; CHIODINI, Giovanni[2]
1. Istituto Nazionale di Geofisica e Vulcanologia, INGV, Sezione di Pisa, Pisa, Italy
2. Istituto Nazionale di Geofisica e Vulcanologia, INGV, Osservatorio Vesuviano, Napoli, Italy
granieri@pi.ingv.it

Carbon dioxide flux from the soil is regularly monitored in selected areas of Vesuvio and Solfatara (Campi Flegrei, Pozzuoli) with the main aim of investigating if the surface phenomena could provide information about the processes occurring at depth. Surveyed areas include 15 fixed points around the rim of Vesuvio and 71 fixed points in the floor of Solfatara crater, where soil CO_2 flux is measured since 1998, at least once a month. In addition, two automatic permanent stations, located at Vesuvio and Solfatara, continually measure the CO_2 flux and some environmental parameters that can potentially influence the CO_2 diffuse degassing.

We analysed, with statistical procedures, the feature of the acquired signals, evaluating the spatial and temporal variations of the CO_2 degassing process.

Series acquired by continuous stations are characterized by an annual periodicity that is related to the typical periodicities of some meteorological parameters (e.g., air temperature, air humidity, etc.). Such a kind of signal permits to define the "reference" level of the CO_2 degassing process that diffusely affects the flanks and the base of the volcanoes.

Conversely, series of CO_2 flux data arising from periodic measurements over the arrays of Vesuvio and Solfatara, are less dependent on external factors such as meteorological parameters, local soil properties (porosity, hydraulic conductivity) and topographic effects (high or low ground). Therefore we argue that the long-term trend of this signal contains the "best" possible representation of the endogenous signal related to the upflow of deep hydrothermal fluids. At Vesuvio and Solfatara, the variations of these series have shown some correspondence with other physical changes of the volcanic systems.

1.3-P-15

Volcano webcams allow strain monitoring

WALTER, Thomas R.[1]
GeoForschungsZentrum (GFZ), Potsdam, Germany
twalter@gfz-potsdam.de

A photo sequence taken by photographer Gary Rosenquist during the 1980 Mount St Helens eruption allowed investigation of the first seconds of the flank collapse and lateral blast at high detail. The same photo set I now used, digitized and analyzed by modern processing methods. Herein I present first results of a digital image correlation technique applied to study textured image objects. The images, i.e. textured objects, are converted into the frequency domain using a fast Fourier transform. Correlation functions calculated in the frequency domain allow transformation parameters to be estimated. To achieve sub-pixel accuracy I employ correlation algorithms based on B-Splines gray value interpolation. The image correlation technique finally provides the displacement field for the first seconds of the Mount St Helens collapse. The results hence show localizations of shear zones, development of fault planes and a more complex evolution of the structural architecture of the 1980 St Helens lateral slide than thought previously. The analysis shows the high potential of optical images in structural and dynamic analysis, and provides strong arguments for systematic web cam installations at active volcanoes worldwide.

1.3-P-16

Seismic Events and Anisotropy beneath Mount Ontake, Japan, before a Small Phreatic Eruption in 2007

NAKAMICHI, Haruhisa[1]; HASHIDA, Yu[1]; MINIFIE, Daniel[2]
1. Nagoya University, Nagoya/Japan
2. University of Bristol, Bristol/United Kingdom
nakamiti@nagoya-u.jp

We present recent seismological studies on Mt. Ontake volcano related to its small phreatic eruption in late March of 2007. Hashida and Nakamichi (2010) determined that volcano-tectonic earthquakes beneath the summit of Mt. Ontake had focal depths of 0.5 to 2.0 km below sea level and these focal depths did not change with time. Although reverse-faulting focal mechanisms with a NE–SW compressional axis were dominant, the polarities of P-wave first motions were dilatational for stations close to the summit; therefore, it is possible that focal mechanisms might contain non-double-couple components. Nakamichi et al. (2009) conducted a moment tensor inversion to characterize a very-long-period (VLP) event on 25 January 2007, locating its source at 600 m above sea level beneath the summit and explaining it by volumetric changes in an inclined crack at the source. Minifie et al. (2010) used S-wave splitting measurements to estimate spatial and temporal changes of seismic anisotropy associated with the 2007 eruption. Fast S-waves of local shallow earthquakes had average polarization azimuths of N78ºE, which differs from the WNW–ESE orientation of regional principal stress by 35º and is nearly perpendicular to the strike of the VLP crack source. The polarization azimuths showed no significant change before or after the eruption, perhaps because the eruption was too small to influence the anisotropy. An alternative explanation is that the measuring period was too short to allow detection of temporal changes. References: Nakamichi et