Geophysical Research Abstracts
Vol. 14, EGU2012-6597, 2012
EGU General Assembly 2012

High-resolution multi-proxy record of climatic and environmental conditions during the Holocene in the Eastern Italian Alps using a novel XRF and ICP-MS calibration method

L. Poto (1,2), J. Gabrieli (2), R. Pini (3), G, Cozzi (2), C. Turetta (2), P. Ferretti (1,2), S. Crowhurst (4), C. Ravazzi (3), C. Zaccone (5), C. Barbante (1,2,6)

(1) University Ca' Foscari of Venice, Environmental Science Department, Dorsoduro 2137, 30123 Venice, Italy (luisa.poto@unive.it), (2) Institute for Dynamics of Environmental Process, IDPA/CNR - Calle Larga Santa Marta 2137, 30123 Venice, Italy , (3) Institute for Dynamics of Environmental Process, IDPA/CNR - Via Pasubio 3/5, 24044 Dalmine (Bergamo), Italy , (4) Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge, Cambridgeshire, CB2 3EQ, UK, (5) Department of Agro-Environmental Sciences, Chemistry and Plant Protection, University of Foggia, 71122 Foggia, Italy, (6) Accademia Nazionale dei Lincei, "Centro Beniamino Segre", Via della Lungara 10, 00165 Rome, Italy

Ombrotrophic peatlands are a valuable repository of high-quality climatic signals because their only source of water is precipitation. For this reason, they constitute an authentic and detailed archive of information about past and present patterns in climate change and allow us to infer the impact of natural and human activities causing trace element contamination. In the province of Belluno (Northeastern Alps, Italy), bogs of major interest are located in Danta di Cadore, 46°34'16" N 12°29'58" E, and Coltrondo, 46°39'28" N 12°26'59" E. This study aims to provide a detailed reconstruction of past climate and environmental conditions by a novel multi-proxy method characterized by high-resolution geochemical (trace elements, rare earth elements, Pb isotopes, organic carbon, humification), and pollen analysis using the Danta di Cadore and Coltrondo peat bogs.
Major and trace elements in the peat profiles were measured using the non-destructive X-Ray Fluorescence (XRF) core scanner. Moreover, lightness and colour parameters were measured on the images recorded by a digital colour line scan camera connected to the XRF core scanner. This method provides high-resolution geochemical data (0.25 cm) and sediment reflectance spectra (0.1 cm) that document the down-core distribution of major and trace elements, the changes in sediment colour, and help to infer the natural geochemical processes which affect the peat profiles. Conversion of element intensities measured by XRF core scanner to element concentrations is essential for quantitative applications involving mass-balance and flux calculations. We calibrate the of measured intensities of our XRF results with control specimens taken from the same core at strata corresponding exactly to core-scanner measurements. The control specimen compositions are quantified using an Inductively Coupled Plasma Mass Spectrometer (ICP-MS) which is a well-established method of geochemical analysis. Our measurements of specific element concentrations describe the trophic status of the peat profile and, together with a reliable age model, allow the reconstruction of the changing rates and the predominant sources of a wide variety of atmospheric trace elements. To our knowledge, this is the first attempt to provide quantitative geochemical interpretation of XRF core scanner data for this type of deposit. The results of this type of analysis provide environmental information which is currently lacking in the Northeastern Italian Alps.