A regional-wide geochemical project based on soil and stream sediments to unveil historical anthropogenic signals and natural fingerprints: an experiment from southern Italy.

STEFANO ALBANESE, ANTONIO IANNONE, LUCIA RITA PACIFICO AND ANNALISE GUARINO

University of Naples Federico II

Presenting Author: stefano.albanese@unina.it

In 2020, in the framework of a contract jointly signed by the Department of Earth, Environment and Resources Sciences (DiSTAR) of the University of Naples Federico II (UniNa) and Eni S.p.A. Southern District (DIME), as the contracting authority, a geochemical prospecting project was carried out in Basilicata region (Southern Italy). The project aimed at assessing the environmental conditions of the drainage basins of two regional water courses, the Cavone and Basento rivers. Within the basins anthropic settlements and a complex geological setting coexist.

The Environmental Geochemistry Working Group (EGWG) at DiSTAR was in charge of the activities related with solid media. Specifically, during the spring-summer period in 2021, 190 topsoil samples (in a depth range between 10-15 cm from the ground level) and 185 stream sediments were collected in an area of about 1200 sqkm. In addition, in June 2022, 10 bottom soil samples (in a depth range between 80-100 cm from the ground level) were collected, as well.

All samples were analysed at OMAC Laboratories Ltd (Loughrea, Ireland) and, partly at Life Analytics Srl (Battipaglia, Italy) by ICP-MS following an aqua regia digestion. The concentration of 53 elements (Au, Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Ge, Hf, Hg, In, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Pd, Pt, Rb, Re, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn, Zr) were determined in each media type. Sulfate (SO_4) was also determined on soil eluate.

The datasets for both media were analyzed using univariate and multivariate statistical processing techniques and geochemical maps were generated using the sample catchment basin (SCB) techniques (for stream sediments) and discrete point distribution and multifractal interpolation (for soil). Geochemical background for PTEs and SO_4 were determined for soil using both a data driven and a "geologically" based technique. Diluition-corrected residual were estimated for stream sediments to discriminate anomalous sub-basins. the results were compared and integrated for a better understanding of the natural and anthropic processes active in the study area.