Abstract content:

**Pattern classification: a promising tool for the characterization of volcanic products at Mt. Etna**

Active basaltic volcanoes furnish a large quantity of information on changes in the composition and magma transport, improving our understanding of on-going magmatic and eruptive processes. Pattern classification tools allow to handle efficiently compositional data of volcanic products, complying with their multivariate nature. In the framework of the European MED-SUV project, we explore the application of various data mining methods to volcanic products erupted at Mt. Etna, Italy. Considering 13 major and trace elements for each sample, groups with similar geochemical composition were identified. The set of samples analyzed covers the time span from 2006 to 2012, during which there were two major episodes of effusive activity (2006, 2008-2009) and 25 lava fountains (2011-12). Our approach allows a convenient visualization of the multi-component characteristics of magma in just a single picture, using a color code and cluster membership values. This result offers an important advantage with respect to classical analyses, which require many low-dimensional diagrams (78 possible combinations in conventional 2D graphs). The synoptic information provided by pattern classification easily allows us i) to identify trends of evolution with time even within each eruptive center, and ii) the immediate comparison of the compositional features with all products analyzed in the past.

**Author(s):**

R.A. Corsaro¹, S. Falsaperla¹, H. Langer².

¹Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Catania-Osservatorio Etneo, Catania, Italy.

**Keywords:** geochemical composition, volcanic products, pattern classification, data mining methods, Etna