Ground based sensing of volcanic gas

Giuseppe Salerno, INGV, Catania, Italy

Chemical composition and emission rates of volcanic gases exert a strong control on the evolution of the magma in the crust. Gas exsolution and segregation can have a profound effect on the physical proprieties of magma, hence in the dynamic, style and timing of eruption. Furthermore, volcanic gas and aerosol may seriously alter climate, society and human health at different temporal and spatial scale. Hence, asses volcanic degassing is fundamental to better constrain the global geochemical cycle, and then defining the state of atmosphere and climate. Geochemical surveillance is a vital part of volcano observatories worldwide attempting to decrypt how volcano works and eruption forecast. Over the past few decades, thanks to the optical remote sensing techniques, geochemical observational capability is progressively improved. Noteworthy, has been the role of COSPEC - the workhorse of observatories - to document volcanic sulphur dioxide emission and serving in numerous volcanic crises. After thirteen years, ground-based sensing has undergone a rapid technology progression with a radical step forward in volcanic gas observation. A new generation of devices has offered new opportunities to remotely observe gases, imaging SO_2 volcanic clouds and comparison of gas records with geophysical data stream at high temporal resolution. Their capability has opened up a window in volcanology, moving ahead the understanding of eruptive mechanism and degassing dynamics.