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The VUELCO project consortium: new interdisciplinary research for improved risk mitigation and management during volcanic unrest

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Volcanic unrest is a complex multi-hazard phenomenon of volcanism. The fact that unrest may, but not necessarily must lead to an imminent eruption contributes significant uncertainty to short-term hazard assessment of volcanic activity world-wide. Although it is reasonable to assume that all eruptions are associated with precursory activity of some sort, the knowledge of the causative links between subsurface processes, resulting unrest signals and imminent eruption is, today, inadequate to deal effectively with crises of volcanic unrest. This results predominantly from the uncertainties in identifying the causative processes of unrest and as a consequence in forecasting its short-term evolution. However, key for effective risk mitigation and management during unrest is the early and reliable identification of changes in the subsurface dynamics of a volcano and their assessment as precursors to an impending eruption.

The VUELCO project consortium has come together for a multi-disciplinary attack on the origin, nature and significance of volcanic unrest from the scientific contributions generated by collaboration of ten partners in Europe and Latin America. Dissecting the science of monitoring data from unrest periods at six type volcanoes in Italy, Spain, the West Indies, Mexico and Ecuador the consortium will create global strategies for 1) enhanced monitoring capacity and value, 2) mechanistic data interpretation and 3) identification of reliable eruption precursors; all from the geophysical, geochemical and geodetic fingerprints of unrest episodes. Experiments will establish a mechanistic understanding of subsurface processes capable of inducing unrest and aid in identifying key volcano monitoring parameters indicative of the nature of unrest processes. Numerical models will help establish a link between the processes and volcano monitoring data to inform on the causes of unrest and its short-term evolution. Using uncertainty assessment and new short-term probabilistic hazard forecasting tools the scientific knowledge base will provide the crucial parameters for a comprehensive and best-practice approach to 1) risk mitigation, 2) communication, 3) decision-making and 4) crisis management during unrest periods.

The VUELCO project consortium efforts will generate guidance in the definition and implementation of strategic options for effective risk mitigation, management and governance during unrest episodes. Such a mechanistic platform of understanding, impacting on the synergy of scientists, policy-makers, civil protection authorities, decision-makers, and the public, will place volcanic unrest management on a new basis, with European expertise at its peak.

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