

Magmatic degassing from active and quiescent volcanoes in the central Mediterranean

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Magmatic degassing plays a fundamental role in transferring volatiles from the Earth interior to its surface and contributes to the evolution of atmosphere over time. Furthermore, gas exsolution from magmas controls eruption dynamic and the evolution of magmas in plumbing system of volcanoes. Thus, understanding of degassing is central to monitoring and forecasting of eruptions and to the comprehension of the evolution of our planet. Even if magmatic degassing mainly occurs in active volcanic systems it has been recently highlighted that a large release of magmatic volatiles also occurs from quiescent volcanoes. Hence magmatic degassing occurs over very long time and its assessment provides important tools to evaluate the state of activity of volcanoes, whose last activity occurred far in time.

The Mediterranean region is characterized by active and quiescent volcanoes and it results a natural laboratory for studying the magmatic degassing in subaerial and in submarine volcanic systems.

Here I discuss some recent investigations of magmatic degassing from volcanoes in the central Mediterranean. For instance, long data series of He isotopes allowed to recognize the magma dynamic in volcanic plumbing system. That is the case of Mt Etna volcano, the most active in Europe, where temporal variations of He isotopes is recognized to be a valuable indicator for assessing the level of volcanic activity. It can provide key physical parameters such as the magma input rate and overpressure in the magma chamber, which until now have only been available from geodetic approaches.

Moreover, the modern views of volcano plumbing systems are moving away from the simple model of a well-shaped magma chamber connected to the surface by cylindrical conduits. Recent multidisciplinary investigations recognized that below volcanoes it exists a complex system of dikes, sills, magma chambers and networks of pathways through which fluids migrate towards the surface. The geochemical monitoring at Mt Etna is still an example of the occurring of coupling processes of multistep degassing and mixing of fluids coming from different levels of the magmatic system. Finally I briefly focus attention to the outgassing of magmatic volatiles from quiescent volcanoes and far from volcanic systems that have implication for the role of tectonic in the magma transfer and volatile cycling.

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