



Dike propagation in volcanic edifices: overview and possible developments

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Eruptions are fed by dikes. Therefore, to improve our understanding of how magma is transferred and extruded at volcanoes, it is fundamental to advance our knowledge of dike propagation. This study is focused on an original overview of dike patterns and of the factors controlling dike propagation within volcanic edifices. Largely based on published data, three main types of dikes (regional, tangential and radial) are illustrated and discussed. Subsequently, dike pattern data from 22 selected volcanic edifices in different settings are compared, to derive semi-quantitative relationships between the topography (relief, shape, height, presence of sector collapses) of the volcano, its structural setting (presence and intensity of a regional stress field) and mean composition (SiO₂ content). The overview demonstrates how dike propagation in a volcano is not a random process; rather, it depends from the following factors, listed in order of importance: the presence of relief, the shape of the edifice, the regional tectonic control. In addition, higher volcanoes develop longer and radial dikes, whose (mainly lateral) propagation is independent from the composition of magma or the aspect ratio of the edifice. Future research, starting from these preliminary evaluations, should be devoted to define the possible propagation path of dikes, as well as the related possibility of opening of vents, at specific volcanoes, to minimize the hazard.