



3D Qp models during the Mt. Etna 2001 and 2002-2003 flank eruptions:evidence for the dike intrusion

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We present the results of high resolution P-wave attenuation tomographies of Mt. Etna volcano obtained by the inversion of t^* of local earthquakes recorded during the 2001 and 2002-2003 flank eruptions. In both 3D Qp models the most intriguing feature is the high attenuation anomaly (Qp values between 30 and 50) located in the central part of the volcano, in correspondence with the fracture system active during the eruptions. This volumes coincide with the location of the intruded dikes modelled by geodetic data. A second low Qp volume is found at shallow depth beneath the northeastern flank of the volcano which may be related both to the presence of soft and heated rock and/or to the high degree of cracking. Our results also show the presence of a volume of high Qp (values between 100 and 170) beneath the eastern flank of the volcano which coincides with the region of high Qp and high Vp evidenced in almost all of the attenuation and velocity tomographic studies and has been interpreted as an intrusive body composed by high density non-erupted material, almost entirely solidified. Finally, attenuation data were combined with 3D Vp and Vp/Vs velocity models, providing powerful constraints on the physical and thermal states of the shallow crust at Mt. Etna and the relationship to seismic and volcanic activities.