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Electrical conductivity of intermediate magmas from Uturuncu Volcano (Bolivia)

Mickael LAUMONIER (1,2), Fabrice GAILLARD (2), and David SIFRE (2)
(1) Bayerisches Geoinstitute, BGI, Bayreuth, Germany (mickael.laumonier@uni-bayreuth.de), (2) CNRS ISTO - Univ Orleans

Magmas erupted at Uturuncu volcano (South Bolivia) comes from the Altiplano-Puna Magma Body (APMB, Chile-Bolivia), a crustal massive body of 80 km long by 10 km thick located at $\sim$ 35 km depth named. Recent magneto telluric surveys reveal a resistivity lower than 1 ohm.m due to the presence of melt which could result in the reactivation of the volcano. In order to better constrain the resistivity profiles and thus the conditions of magma storage of the APMB, we have performed in situ electrical measurements on natural dacites and andesites from Uturuncu with a 4-wire set up in a piston cylinder and internally heated pressure vessel. The range of temperature (500 to 1300°C), pressure (0.3 to 2 Gpa), and the various water contents covers the respective ranges occurring at natural conditions. The results show that the conductivity increases with the temperature and the water content but slightly decreases with the pressure. Then a model was built from these results so as to help in (i) interpreting the electrical signature of natural magmas, (ii) constraining their conditions (chemical composition, temperature, pressure, water content, melt fraction) from the source to the storage location and (iii) providing information on the interior structure of a volcano and its reservoir.