Towards interpreting gravity changes by means of the Truncation Filtering Methodology: Mayon volcano, Philippines, case study

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A b s t r a c t : For the first time the Truncation Filtering Methodology (TFM) is applied to interpreting real data on temporal changes of gravity, to test its applicability. Data observed at Mayon volcano, Philippines, are interpreted in terms of a point source representing the change of anomalous masses for a case of an assumed magma injection process. The source mechanisms associated with volcanism are complex processes with combined effects of pressure, heat, and mass transport. For the sake of our study we make use of two idealizations of the source: first we do not consider the effects of pressure and heat, second we approximate the source of the change of anomalous masses by a point source. Since at Mayon no data have been observed in the summit region, both the magma deflation model (*Jentzsch et al., 2001b*) and the magma inflation model (*Fernández et al., 2001*) can equally well explain the observations. We chose to assume the magma inflation model in our study. The source is found at the depth of 2.4 km (±600 m) below sea level. This result is compared to an interpretation of *Fernández et al. (2001)*, who found a source characterizing the magma inflation at the depth of 1.95 km. The TFM is found applicable to serve as a quick tool for the first "hands on data" interpretation in search for the source, yielding an estimate of the depth to the source. There are several uncertainties still associated with the method: the effect of pressure and heat, the effect of interpolation of the sparse data, and the effect of the upward continuation term. The methodology remains still under development.

Key words: gravity inversion, temporal change of gravity, point source, magma intrusion, precise gravity, TFM, dimple

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