Estimation of magma production rate using satellite altimetry data: A case study over hotspot tracks on Pacific plate

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Vogt (1972) reported the discharge rate of the Hawaiian hot spot based on the sea floor topography for the Hawaii-Emperor chain. He divided the volcanic ridge into 50 km wide swaths and calculated their volume against the distance measured from Kilauea. Using the age scale (distance vs. K-Ar age of the rocks) complied by Jackson et al. (1972), Vogt (1972) calculated changing volcanic production rate of the Hawaiian hot spot. As this has been done only based on data accumulated until 1972, the result is not described with sufficient accuracy both in volume of lava and age of each island. Ever since, a digital bathymetric map of the oceans with a horizontal resolution of 1 to 12 kilometers was derived by combining available depth soundings with high-resolution marine gravity information from the Geosat and ERS-1 spacecrafts (Smith & Sandwell, 1997). Using the newly acquired satellite based sea floor map, we have estimated the volcanic production rate of the Hawaiian hot spot in the last 70Ma with 50km width resolution. Hawaii was chosen because it is associated with well-defined narrow island chains and reliable age data are available. This method is being applied to several other hot spots on the Pacific plate and the results will be shown at the conference.