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Are terrestrial plumes from motionless plates analogues to Martian plumes feeding the giant shield volcanoes?

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The near "one-plate" planet evolution of Mars has led to the edification of long-lasting giant shied volcanoes. Unlike the Earth, Mars would have been a transient convecting planet, where plate tectonic would have possibly acted only during the first hundreds of million years of its history. On Earth, where plate tectonic is active, most of them are regenerated and recycled through convection. However, the Nubian and Antarctic plates could be considered as poorly mobile surfaces of various thicknesses that are acting as conductive lids on top of Earth's deeper convective system. In these environments, volcanoes do not show any linear age progression at least for the last 30 Ma, but constitute the sites of persistent, focused long-term magmatic activity, rather than a chain of volcanoes as observed in fast-moving plate plume environments. Here, the near stationary absolute plate motion probably exerts a primary control on volcanic processes, and more specifically, on the melting ones. The residual depleted mantle, that is left behind by the melting processes, cannot be swept away from the melting locus. Over time, the thickening of this near-stationary depleted layer progressively forces the termination of melting to higher depths, reducing the melt production rate. Such a process gradually leads both to decreasing efficient melt extraction and increasing mantle lithospheric-melt interactions. The accumulation of this refractory material also causes long-term fluctuations of the volcanic activity, in generating long periods of quiescence. The presence of this residual mantle keel induces over time a lateral flow deflection, which translates into a shift of future melting sites around it. This process gives rise to the horseshoe-like shape of some volcanic islands on slow-moving plates (e.g. Cape Verde, Crozet). Finally, the pronounced topographic swells/bulges observed in this environments may also be supported both by large scale mantle upwelling and their residual mantle roots. Most of these processes are likely similar to those observed on Martian giant shield volcanoes. The goal of this presentation will be to describe the essential characteristics of intra-oceanic plumes on slow moving plates on the Earth and to point out their similarities with those of the large shield volcanoes from the Tharsis region.