EGU22-10443
https://doi.org/10.5194/egusphere-egu22-10443
EGU General Assembly 2022

Magmatic and mud volcanism in East Java investigated with passive seismic methods.

Matteo Lupi[1], Pasquale De Gori[2], Luisa Valoroso[2], Paola Baccheschi[2], Riccardo Minetto[3], and Adriano Mazzini[4]

[1]University of Geneva, Department of Earth Sciences, Geneva, Switzerland (matteo.lupi@unige.ch)
[2]Instituto Nazionale di Geofisica e Vulcanologia, Roma, Italy
[3]Univ. Grenoble Alps, Univ. Savoie Mont Blanc, CNRS, IRD, Univ. Gustave Eiffel, ISTerre, Grenoble, France
[4]Centre for Earth Evolution and Dynamics, University of Oslo, Norway

East Java features a transition from magmatic to sedimentary volcanism. In addition, the back arc basins are characterised by the presence of surface piercements structures that reveal the migration of mantle derived fluids. Despite a clear connection between the local tectonics and the distribution of the eruptive centrs, the mechanisms of driving fluid migration in East Java remain unclear. In 2006 a large sediment hosted geothermal system named Lusi, pierced the Kendeng basin in East Java and since then it continues to erupt relentlessly. This large-scale eruption represent the most recent manifestation of hydrothermal and mantle derived fluids in the sedimentary basin. We deployed a temporary seismic network from 2015 to 2016 to investigate the velocity structure of a large portion of the East Java region. Specifically, we studied the spatial and structural relationships between the volcanic arc and the back-arc domains, by performing a local earthquake tomography. We inverted the phase arrivals released by regional earthquakes to show sharp V_p and V_p/V_s transitions. We observe a marked reduction of P-wave velocities and a high V_p/V_s ratio in the back-arc basins. Our study point out a clear connection between the plumbing system of the volcanic arc and the back arc basins. By combining geochemical, geological and geophysical data we propose a conceptual model suggesting that magmas and hydrothermal fluids may migrate from the middle to the upper crust into the sedimentary basins capitalising on existing thrust faults. According to our proposed model, Lusi is located at the intersection of low-angle thrust faults and steep-dip strike slip faults, in region where the hydraulic transmissivity of the upper crust is enhanced.