Geophysical Research Abstracts
Vol. 16, EGU2014-9072-2, 2014
EGU General Assembly 2014

What can we learn about the history of oceanic shield volcanoes from deep marine sediments? Example from La Reunion volcanoes.

Patrick BACHELERY (1), Nathalie BABONNEAU (2), Stephan JORRY (3), and Aude MAZUEL (2)

(1) Laboratoire Magmas & Volcans, OPGC, University Blaise Pascal, Clermont-Ferrand, France (p.bachelery@opgc.univ-bpclermont.fr), (2) Laboratoire Domaines Oceaniques, IUEM, University of Brest, IUEM, Plouzane, France, (3) Laboratoire Environnements Sédimentaires, Géosciences Marines, IFREMER, Plouzane, France

The discovery in 2006, during the oceanographic survey FOREVER, of large volcaniclastic sedimentary systems off La Réunion Island (western Indian ocean) revealed a new image of the evolution of oceanic shield volcanoes and their dismantling.
Marine data obtained from 2006 to 2011 during the oceanographic surveys ERODER 1 to ERODER 4 included bathymetry, acoustic imagery, echosounding profiles, dredging and coring. Six major turbidite systems were mapped and described on the submarine flanks of La Reunion volcanic edifice and the surrounding oceanic plate.
The interpretation of sediment cores enable us to characterise the processes of gravity-driven sediment transfer from land to deep sea and also to revisit the history of the volcanoes of La Réunion Island. Turbidite systems constitute a major component of the transfer of volcanic materials to the abyssal plain (Saint-Ange et al., 2011; 2013; Sisavath et al., 2011; 2012; Babonneau et al., 2013). These systems are superimposed on other dismantling processes (slow deformation such as sliding or spreading, and huge landslides causing debris avalanches).
Turbidite systems mainly develop in connection with the hydrographic network of the island, and especially at the mouths of large rivers. They show varying degrees of maturity, with canyons incising the submarine slope of the island and feeding depositional areas, channels and lobes extending over 150 km from the coast. The cores collected in turbidite systems show successions of thin and thick turbidites alternating with hemipelagic sedimentation. Sedimentological and stratigraphic analysis of sediment cores yielded a chronology of submarine gravity events. First-order information was obtained on the explosive activity of these volcanoes by identifying tephra layers in the cores (glass shards and pumice). In addition, major events of the volcanic and tectonic history of the island can be identified and dated.
In this contribution, we focus most attention on the southernmost turbidite system (St-Joseph system). Sedimentary records allow us to establish a link between two major landslides affecting the flanks of Piton de la Fournaise volcano and the triggering of major turbidity currents. Thus, the age of these events could be obtained; their chronology being far too difficult to establish otherwise.
In short: a beautiful example of the contribution of sedimentology to the study of the structural evolution of the volcanoes.

References

Babonneau N., Delacourt C., Cancouet R., Sisavath E., Bachelery P., Deschamps A., Mazuel A., Ammann J., Jorry S.J., Villeneuve N., 2013, Marine Geology, 346, 47-57.

Saint-Ange F., Bachèlery P., Babonneau N., Michon, L., Jorry S.J., 2013, Marine Geology. 337, 35-52.

Saint-Ange, F., Savoye, B., Michon, L., Bachelery, P., Deplus, C., De Voogd, B., Dyment, J., Le Drezen, E., Voisset, M., Le Friant, A., and Boudon, G., 2011. Geology, 39, 271-274, doi: 10.1130/G31478.1.

Sisavath, E., Mazuel, A., Jorry, S., Babonneau, N., Bachèlery P., De Voogd, B., Salpin, M., Emmanuel, L., Beaufort, L., Toucanne, S., 2012, Sedimentary Geology, 281, p. 180-193, doi :10.1016/j.sedgeo.2012.09.010.

Sisavath, E., Babonneau N., Saint-Ange F., Bachèlery P., Jorry S., Deplus C., De Voogd B., Savoye B., 2011, Marine Geology, v. 288, p. 1-17, doi:10.1016/j.margeo.2011.06.011.