



Giant turbidite systems off La Reunion Island – Indian Ocean

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The growth and the dismantling of island volcanoes modify the pre-existing seafloor topography and produce numerous submarine avalanches. However, in spite of numerous studies led around volcanic archipelagos like Canary or Hawaii, no giant turbidite system was ever observed around such islands.

Three cruises were recently carried out around the oceanic intraplate island of La Reunion: FOREVER and ERODER1 in 2006 and ERODER 2 in 2008. These cruises provided a complete data set including multibeam bathymetry and backscatter imagery, magnetism, gravimetry, seismic reflection lines, echosounder profiles and gravity cores.

These new data led to the discovery, for the first time on the flanks of a major volcanic island, of four volcaniclastic deep-sea fans, whose sources are four big erosional features located in the inner part of the island.

The wider fan, named the Cilaos fan, extends over an area of more than 15000 km², i.e. 6 times the island area of 2500 km² and 40 times the watershed surface. This system is recent and seems relatively complex in term of sedimentary architecture, probably due to its immaturity. It has been strongly influenced by the morphology of the submarine slopes of the volcanic edifice and of the surrounding seafloor.

Our results suggest that the geometry of the discovered turbidite systems mainly depends both on the topography of the abyssal plain and the renewal of sediment supply allowed by the volcanic activity. They show many similarities with other continental turbidite systems. They are as long and wide as classical sandy siliciclastic systems. The relatively small area of the sediment source is compensated by the fast renewal of potential sediments. This effect does not exist in classical continental systems.

These results suggest that the impact of volcaniclastic sedimentation on deep-sea basins could have been underestimated. Volcanic islands produce large amount of sediment related to giant landslides, but they are rarely observed from the point of view of epiclastic sedimentology.

Formed in an intraplate context, these four turbidite systems are singular and represent excellent quaternary examples to study the large-scale impact of volcaniclastic sedimentation on an abyssal plain.