



## **Analysis of off-axis volcanic ridges on the flank of the Pacific-Antarctic Ridge. Results from the Pacantarctic 2 cruise.**

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During the Pacantarctic 2 cruise of the R/V L'Atalante in December 2004 and January 2005, we mapped and dredged large off-axis volcanic structures on the flanks of the Pacific-Antarctic ridge. Two of them form ridges on either side of the Menard transform fault (TF) near 50°S, and other ridges are oriented E-W near 42°S. These volcanic constructions are part of numerous structures revealed as gravity highs on the western ridge flank between 40°S and 55°S by the gravity grids derived from satellite altimetry measurements. One objective of the cruise was to understand how these structures relate to axial dynamics and to recent kinematics, and in particular to test the hypothesis that the ridges on either side of the Menard TF mark the limits of an incipient microplate. South of the Menard TF, 9 large off-axis volcanoes, 12 km diameter on average and 500 m to 2000 m high, show two types of morphology. One type exhibits conical shapes with a summit caldera, and low backscattering in the EM12 imagery, probably due to the presence of sediments. They are located on 2-5 My-old lithosphere. Dredges recovered altered and porphyric basalts and coarse-grained rocks. The other type is represented by N70 or EW-elongated structures, and associated to narrow, EW-trending volcanic ridges, some of them showing strong backscattering on the EM12 imagery. They are located on 0-3 My-old lithosphere. Plagioclase-bearing pillows, aphyric fresh, and altered pillows have been dredged near their tops. Unspiked K-Ar datings are in progress. Preliminary determinations yield ages between 500 and 900 ka for samples on two volcanoes located on seafloor aged 0.7 to 3 Ma. North of

the Menard TF, the volcanoes have an average diameter of 6 km, and heights of 100 to 1600 m. They are elongated and linked by N100 to EW-trending narrow ridges. All volcanoes show calderas opened to the east. They are located on lithosphere aged 1-5 Ma. The volcanoes closest to the axis show the strongest EM12 backscattering. Dredges brought back altered basalts and pillows. Two EW-trending ridges have been surveyed near 42°S. One ridge, from 111°40'W to 112°30'W at 41°55'S, appears to be very linear and narrow, and probably did not form by the coalescence of individual volcanoes. Fresh pillows with basaltic glass have been dredged there. Near 41°15'S, a ridge extends between 112°10'W and 113°55'W. It is composed of elongated volcanoes linked by volcanic ridges. Both ridges are also located on 1 to 5 My-old lithosphere. All volcanic ridges appear to have formed on lithosphere younger than 5 Ma. Most are located on the traces of large ridge discontinuities. The volcanic activity, as suggested by the young K/Ar ages of some samples and by the strong backscatter in sonar images, appears to be limited to areas of seafloor younger than about 3 Ma. The major volcanic structures on the flanks of the Pacific-Antarctic ridge might result from intraplate deformation near the axis, following recent kinematic changes.