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The Chenaillet Ophiolite in the Western Alps: an analogue for oceanic core complexes ?

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The Chenaillet Ophiolite exposed in the Franco-Italian Alps represents a well-preserved ocean-floor sequence that was only weakly affected by later Alpine convergence. Based on the similarity between rock types and structures reported from ultra to slow spreading ridges and those observed in the Chenaillet Ophiolite, it may represent a field analogue for a slow to ultraslow spreading ridge such as the Mid-Atlantic or the Southwest Indian Ridges.

Mapping of the Chenaillet Ophiolite enabled to identify an oceanic detachment fault that extends over a surface of about 16 km^2 capping exhumed mantle and gabbros onto which clastic sediments have been deposited. The footwall of the detachment is formed by strongly serpentinized lherzolites and subordinate harzburgites and dunites. Mafic basement rocks are gabbros, which range in composition from troctolite and olivine-gabbros to Fe-Ti gabbros and show clear evidence of syn-magmatic deformation, partially obliterated by retrograde amphibolite and low-grade metamorphic conditions. Near the detachment fault, the syn-tectonic gabbros and serpentinized peridotites are tectonize and consist of cataclasites and gouges. Clasts of dolerite within the fault zone suggest that detachment faulting was accompanied by magmatic activity. Gabbro and serpentinized peridotite occur as clasts in tectono-sedimentary breccias overlying directly the detachment fault. Basalt clasts are not found in these brec-

cias.

Throughout the Chenaillet Ophiolite, volcanic rocks, especially pillow basalts, directly overlie either the detachment fault or the sediments. In several places, N160 trending high-angle normal faults have been mapped. These faults truncate and displace the detachment fault leading to small domino-like structures. The basins are some hundreds meters wide and few tens to some hundreds of meters deep. Because the high-angle faults are sealed locally by basalts and obliterated by volcanic structures, we interpret them as oceanic structures that formed before or during the emplacement of the basalts. Moreover, the alignment of doleritic dykes parallel to, and their increasing abundance towards high-angle faults suggest that the high-angle faults may have served as feeder channels for the overlying volcanic rocks.

The complex poly-phase tectonic and magmatic processes observed in the Chenaillet Ophiolite are reminiscent of those reported from oceanic core complexes at slow to ultraslow spreading ridges. The key result from our study is that mantle exhumation along detachment faults is followed by syn-magmatic normal faulting resulting in the emplacement of laterally variable, up to 300 meters thick massive lavas and pillow basalts covering the exhumed detachment fault. This implies that off-axis processes are important and that large-scale detachment faults may be buried under massive volcanic sequences. This suggests that detachment faulting is more common as indicated by dredging or morpho-structural investigations of current ultra- to slow-spreading oceanic crust.