



Transitional crust in the Newfoundland-Iberia rift and associated magnetic anomalies

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Transitional zones located between Iberia and North America formed during continental rifting and mostly consist of exhumed mantle. The inversion of magnetic data (Euler deconvolution) shows that magnetic sources are N-S trending horizontal cylindrical bodies located within the highly serpentinized upper crust. We show that ages of exhumed mantle at ODP Sites 1067, 1068 and 1070 in the Iberia Abyssal Plain are similar to ages determined from magnetic lineations created by serpentinization during mantle exhumation. Based on paleomagnetic and geological data and a comparison with the Alps, we envisage a first episode of mantle serpentinization during which a strong component of magnetization was acquired followed by a second episode occurring at the contact with cold seawater, and which only affects the upper tens of meters of the exhumed mantle. Therefore, the serpentinization process is able to produce magnetic lineations formed in a similar way to those formed by seafloor spreading. Within transition zones, sequences of magnetic anomalies can provide information concerning the timing of the emplacement of crust, but not on its nature (oceanic versus exhumed mantle). This discovery enables to date the exhumation of mantle rocks in transition zones and allows kinematic reconstructions of the final stages of continental rifting. During rifting occurrence on continental margins, transitional zones in the Newfoundland-Iberia rift were formed by ultraslow extension from Berriasian to Hauterivian and by slow extension from Hauterivian to the Late Aptian/Early Albian boundary. Therefore, transitional zones may share many similarities with slow and ultraslow spreading mid-oceanic regions.