Geophysical Research Abstracts
Vol. 12, EGU2010-7151, 2010
EGU General Assembly 2010

Subduction of the South-Chile active spreading ridge: a 17 Ma to 3 Ma magmatic record in central Patagonia (western edge of Meseta del Lago Buenos Aires, Argentina)

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The Chile Triple Junction is a natural laboratory to study the interactions between magmatism and tectonics during the subduction of an active spreading ridge beneath a continent. The MLBA plateau (Meseta del Lago Buenos Aires) is one of the Neogene alkali basaltic plateaus located in the back-arc region of the Andean Cordillera at the latitude of the current Chile Triple Junction. The genesis of MLBA can be related with successive opening of slabs windows beneath Patagonia: within the subducting Nazca Plate itself and between the Nazca and Antarctic plates. Detailed 40Ar/39Ar dating and geochemical analysis of bimodal magmatism from the western flank of the MLBA show major changes in the back-arc magmatism which occurred between 14.5 Ma and 12.5 Ma with the transition from calc-alkaline lavas (Cerro Plomo) to alkaline lavas (MLBA) in relation with slab window opening. In a second step, at 4- 3 Ma, alkaline felsic intrusions were emplaced in the western flank of the MLBA coevally with the MLBA basalts with which they are genetically related. These late OIB-like alkaline to transitional basalts were generated by partial melting of the subslab asthenosphere of the subducting Nazca plate during the opening of the South Chile spreading ridge-related slab window. These basalts differentiated with small amounts of assimilation in shallow magma chambers emplaced along transtensional to extensional zones. The close association of bimodal magmatism with extensional tectonic features in the western MLBA is a strong support to the model of Patagonian collapse event proposed to have taken place between 5 and 3 Ma as a consequence of the presence of the asthenospheric window (SCR-1 segment of South Chile Ridge) below the MLBA area.