Petrogenesis for extra back-arc volcanics in Somuncura region, northern Patagonia

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Oligocene to Mid-Miocene Somuncura basaltic plateau widely covers an area of over 20,000 km2, northern Patagonia, which is one of the largest Cenozoic basaltic field in extra-back arc province (e.g., Ardolino et al., 1999). Previous studies suggested three contrasting models for the magamatism in extra-back arc region from 34 to 52 S, so-called extra-Andean domain (Ramos et al., 1982); 1) upwelling of either small-scale hot spot (Kay et al., 1992; 1993), 2) asthenospheric upwelling resulted by the slab roll-back of the Farallon plate (Ignacio et al., 2001) or by opening of slab window beneath the region, that followed ridge subduction (e.g., Ramos and Kay, 1992; Gorring et al., 1997) and 3) partial melting of continental lithosphere (and/or asthenosphere) due to thermal and mechanical events of the mantle related to subducted slab beneath the western margin of the continent (Stern et al., 1990). With much discordant models, however, there is still repetition of controversy and further discussion supported by concrete evidence is required to specify magmatism of the Patagonian basalts. In this study, we focused on the Somuncura province, and preliminarily determined both major & trace element compositions and K-Ar ages of 45 basaltic samples collected from northern Somuncura plateau and surrounding area (Aguada de Guerra, Cerro Colorado, Comalto, El Cuy, Esperanza, Las Bayes, Manuel Choique, Quetlequile and Pilcaniyou) to understand spatiotemporal magmatic evolution of the region.

Our K-Ar ages indicate that the activity of Somuncura basalts started in Oligocene (36 Ma) and shifted eastward, were most active at 22-23 Ma, and attenuated toward Mid-Miocene (18-10 Ma) in the Somuncura region, but is traceable in surrounding area down to 5.6-0.34 Ma. As for whole rock chemistry, variation in major elements is likely to result from different degree of partial melting of hydrous peridotite. The alkalinicity increased and concentration patterns of fluid-favor elements (e.g., K, Rb, Sr, Ba and Pb) seemed to change with time, which is here attributed to either multiple upwelling of fluid-rich deeper mantles such as wet plume proposed by Iwamori (1992) and/or to degree of contamination of different lithospheric mantles in each volcanic event.