PETROGENESIS OF ARC PICRITES AND BASALTS FROM THE NEW GEORGIA GROUP, SOLOMON ISLANDS - A GEOCHEMICAL APPROACH

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The occurrence of picrites in island arcs is restricted to few localities (e.g. Japan, Vanuatu, Solomon Islands) and appears to be linked to the subduction of young oceanic crust. To investigate the petrogenesis of arc picrites and their possible role as parental magmas in subduction systems, we examined picrites from the New Georgia archipelago, Solomon Islands (SW Pacific). At the Solomon arc, the Australian Plate is presently subducted under the Pacific Plate. The collision of the Ontong Java Plateau (at ca. 6 Ma b.p.) caused a reversal in subduction polarity [1]. A particular feature of the Solomon arc is the subduction of an active spreading center (Woodlark Rise). Picrites only occur above the subducting Woodlark Rise. The New Georgia picrites contain between 13 and 29.7 wt.% MgO, and the most primitive basalts show MgO contents from 11.5 to 13.6 wt.%. Linear trends that are defined by Ni, Cr and other trace elements vs. MgO indicate that the picritic suite resulted from a mixing between a basaltic-picritic melt and a Mg- and Cr-rich source rather than fractional crystallisation from extremely Mg-rich magmas. Major and trace element modelling can identify mantle wedge peridotite as the most likely mixing endmember. We suggest a petrogenetic model for the Solomon arc picrites, where unusual hot basaltic magmas assimilated peridotite mechanically. Cpx and Opx were melted after assimilation, while some relict mantle olivine is still present in the picrites (Rohrbach et al, this volume). Trace element abundances (LILE, LREE, HFSE) in the Solomon Island picrites indicate a strong source enrichment by subduction components. Most incompatible trace element patterns of analyzed New Georgia picrites and basalts are
parallel, pointing to a cogenetic evolution of these rocks. $^{87}\text{Sr}/^{86}\text{Sr}$ and $\varepsilon\text{Nd}$ values in the analyzed samples range from 0.7033 to 0.7043 and +6.3 to +8, respectively. These values partially overlap with compositions of the Indian MORB field. $\varepsilon\text{Hf}$ values ranging from +12.9 to +14.5 can show in combination with the $\varepsilon\text{Nd}$ values that the picrites were most likely generated within the Indian mantle domain. Subducted sediment and fluids from altered MORB may have changed the Sr isotope composition in some samples to more radiogenic Sr.