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Late Triassic Intraoceanic Arc Aystem within Neotethys: Evidence from Cumulate Hornblende Gabbro in Gangdese Belt, South Tibet

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1 Abstract

The Neotethys plays an important role in shaping the Gangdese magmatic belt, southern Tibet. However, the initial time of spreading and subduction of the Neotethys remains contentious.

In this study, a suite of late Triassic cumulate hornblende gabbro was identified in the southern margin of the Gangdese magmatic belt. The gabbro exhibits cumulate structure, with hornblende and plagioclase as the primary mineral phases. Isotopic data indicate a hydrous magma source derived from a depleted mantle wedge that has been modified by slab dehydration. Geochemical discriminations suggest that the gabbro was formed in an intraoceanic arc setting, with crystallization ages of ca. 220-213 Ma. Hornblende, hornblende-lagioclase and ilmenite thermometers reveal that the crystallization temperature of 900-750 °C for the gabbro. Hornblende and hornblende-plagioclase geobarometers yield an emplacement depth at ca. 14.5-19.5 km. This gabbro constitutes a line of evidence for an intraoceanic arc magmatism that is coeval with the counterparts in the southern Turkey, revealing an intraoceanic subduction system within the Neotethys from west to east in the Late Triassic and that the oceanization of the Neotethys was much earlier than previous expectation.

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