

Discovery of a dismembered metamorphic sole in the Saga ophiolitic mélange, South Tibet: Assessing an Early Cretaceous disruption of the Neo-Tethyan supra-subduction zone and consequences on basin closing.

Carl Guilmette¹, Réjean Hébert¹, Jaroslav Dostal², Aphrodite Indares³, Émilie Bédard¹, Chengshan Wang⁴

¹ Département de géologie et de génie géologique, Université Laval, Québec, QC, Canada, e-mail : carl.guilmette.1@ulaval.ca

² Department of Geology, Saint Mary's University, Halifax, NS, Canada

³ Earth Sciences Department, Memorial University of Newfoundland, St-John's, NL, Canada,

⁴ Research Center for Tibetan Plateau Geology, China University of Geosciences, 29 Xueyuan Road, Haidian District, 100083 Beijing, China

Blocks of strongly foliated garnet- and clinopyroxene-bearing amphibolites have recently been discovered in the Saga ophiolitic mélange, South Tibet. The Saga ophiolitic mélange is a sheared serpentinite matrix mélange that crops out along the Yarlung Zangbo Suture Zone (YZSZ), South Tibet. The YZSZ is the youngest and the southernmost of all sutures stretching across the Tibetan Plateau and contains the remnants of the Neo-Tethys ocean which once separated India from the Lhasa block. The garnet- and clinopyroxene-bearing amphibolite blocks are interpreted as parts of a dismembered sub-ophiolitic metamorphic sole. They are mainly made of hornblende, diopside and garnet and were strongly metasomatized during retrogression. Thermobarometry and ⁴⁰Ar/³⁹Ar dating on hornblende indicate that they were metamorphosed to peak conditions in excess of 12 kbar and 850°C between 132 and 127 Ma. Major and trace element geochemistry suggest an N- to E-MORB nature for the protolith, which cannot rule-out a back- or inter-arc basin origin, like is seen in the East Scotia Sea. This data supports a model in which the back-arc YZSZ ophiolites (in the Xigaze area) were trapped in a fore-arc setting by the inception of a subduction at the back-/inter-arc ridge. The cause of this Early Cretaceous important tectonic event might be the presence of an oceanic plateau or hot-spot tracks in the Neo-Tethys and/or the collision of the Lhasa and Qiangtang blocks. Such a scenario provides an explanation for the absence (or rarity) of Late Cretaceous ophiolites along the YZSZ which are in majority of Late Jurassic Early Cretaceous age.