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# Metamorphism of the Chugach Metamorphic Complex, (Alaska). New pressure estimates question the ridge subduction context.

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The Chugach Metamorphic Complex (CMC, Alaska) is a 200 km long and 10-50 km wide complex and is part of an active accretionary prism. According to the sparse existing literature, the complex is believed to be a low-pressure high-temperature terrain (400-650°C and ∼3kb) with a migmatitic inner core (∼5-10 km) and schist rims surrounded by phyllite (Sisson et al., 1988). Such low pressure conditions are not common in a subduction zone setting and the formation of the complex is thus attributed to the subduction of a ridge during the Eocene (∼ 50 my).

This contribution presents detailed petrological work from the region to show that the metamorphism occurred at much higher pressures than previously believed. We focus on the petrology of calcareous metapelites from 4 different N-S transects across the complex from west to east (each being 10 to 30 km wide). Several PT thermobarometric tools are used including average PT determination using THERMOCALC, garnet-biotite thermometry and RSCM (graphite) thermometers using Raman spectroscopy. In addition to these methods, several thermodynamic pseudosections were calculated. Our calculations show that the metamorphic conditions vary between 550°C and 3-4 kbar in the north of the complex to >700°C and 7-9 kbar in the south. In the central part of the complex these conditions appear to be attributable to a single metamorphic event that occurred around 50 my. However, in some locations near major granitic intrusions that penetrate the regions two events are observed: 1) a first one characterised by temperatures around 550°C followed by 2) a hotter contact metamorphism (>640°C).

Earlier studies have interpreted the supposed low-pressure conditions of the CMC (considered to be no more than 3 kbar) to be connected to a ridge subduction geodynamic context. Within our interpretation, the hypothesis of a ridge subduction context is not needed and indeed appears questionable. In fact, a simple subduction context following by a rapid exhumation could explain the presence of high temperature – medium pressure metamorphism in the accretionary prism of the Southern-east part of Alaska much easier. This interpretation is also consistent with a recent study by Zumsteg et al., (2003) who describes also two heating events and pressure for metamorphism peak comparable to our present results. Indeed, this recent work from the most extreme southeastern part of the complex was so far the only one showing pressure estimates higher than about 3 kbar and its connection with the rest of the CMC that was not understood is nowadays coherent with this present study.