

## **Phase relationships at pumpellyite-actinolite facies conditions within fossil frontal accretionary prisms in southern Chile**

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Several very low grade metamorphic complexes in southern Chile, such as the Madre de Dios Metamorphic Complex and the Eastern Belt of the Chonos Metamorphic Complex, represent frontal accretionary wedges formed during Triassic times. We studied the metamorphic conditions bound to such type of accretionary wedge formed in relatively shallow depth ranges. Characteristic assemblages in metabasites represent conditions of the pumpellyite-actinolite facies: pumpellyite – epidote – phengite – albite – quartz – titanite, grandite – pumpellyite – epidote – chlorite – albite – quartz – titanite and actinolite - pumpellyite – chlorite – albite – quartz – titanite – phengite and/or stilpnomelane.

Thermodynamic calculations of multivariant mineral equilibria show that the late prograde PT-conditions were within the range of 200-330°C, 3.0-5.8 kbar and, thus, around a metamorphic geotherm of 15°C/km. The same range of PT-conditions were obtained by calculating pseudosections in the system Na-Ca-K-Fe-Mg-Al-Si-Ti-H-O using the thermodynamic dataset of Holland & Powell (2002) and newly derived compatible data and activity models for pumpellyite, stilpnomelane, Na-Ca-amphibole and acmite-bearing clinopyroxene. The sequence of PT-data and stability fields of assemblages prove that local equilibria were obtained during a nearly isobaric late prograde PT-path.

The deduced relatively high metamorphic geotherm at maximum temperature appears to be typical for frontal accretionary prisms, where particle paths are horizontal for a long time after reaching maximum depth. Long residence at maximum depth results in thermal reequilibration.

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