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Block-in-matrix structures of the Franciscan Subduction Complex: Do they reflect the properties of an active subduction channel?

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Large parts of the Franciscan Subduction Complex (FSC) are chaotic block-in-matrix-structures. Blocks include epidote amphibolites, eclogites, blueschists, low grade metabasites and metacherts floating in a high-pressure (HP) metamorphic matrix of metasediments or serpentinite. So-called exotic blocks originate from different sources or differ in recorded metamorphic conditions from each other or from the surrounding matrix. The size of these blocks ranges from centimetres to about one kilometre. At first, we discuss the structural features that support a tectonic origin of the block-in-matrix structure of the FSC. Accepting a tectonic origin of the block-in-matrix structure, the reportedly different P-T-t paths of nearby blocks and matrix surrounding the blocks may provide information on the kinematics of transport and the length scale of mixing in the subduction channel.
To explore the validity of this concept, we compile available information on the FSC with the following questions in mind: What are the maximum burial depths of the blocks? What is the significance of the different shapes of the P-T paths of the tectonic blocks? What was the maximum depth of burial of the matrix? How common are nearby blocks showing differing P-T paths? Do the geochronological data of the blocks constrain the timing of metamorphism or cooling? Are there geochronological data constraining the age of high-P metamorphism in the matrix? Are there differences in the age of HP metamorphism between adjacent blocks and between blocks and the enclosing matrix? Do the microfabrics of the HP metamorphic blocks and matrix provide information on the deformation processes at depth? Which present day structures are created by late shallow processes unrelated to subduction? Based on these questions we discuss why the block-in-matrix structure of the FSC may be representative of an active subduction channel at depth.