Preservation of framboidal pyrite and its role in trace element transfer in subduction zones

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Framboidal pyrite, an important carrier of trace elements, is preserved in rocks from high pressure, low temperature terrains. Knowledge of the distribution of these trace elements, in particular Cu, and how they behave within the subduction zone environment may have implications for movement of ore-forming elements within subduction zones.

Here, energy-dispersive X-ray spectroscopy, electron backscatter detection (EBSD) and microprobe observations of framboids and their recrystallisation products from blueschist facies metasediments of the *Schistes Lustrés* in Alpine Corsica are reported.

EBSD analysis shows that undeformed framboids were randomly orientated and showed little internal deformation whereas with increasing recrystallisation crystals internal deformation increased. This lack of deformation is unexpected at blueschist facies but may be linked to deformation being accomodated for by weaker host minerals or a lack of fluid availability. Fluid flow drives recrystallisation and is closely linked to deformation and recrystallisation.

Despite the presence of framboids of both pyrite and it's precursor mineral greigite there is evidence of fluid flow within these rocks. As pyrites recrystallise, interstitial pore spaces are filled by chalcopyrite crystals which are subsequently lost in the latter stages of recrystallisation. Evidence for transport of elements during different stages of recrystallisation is also observed in arsenic and lead data. Arsenic concentration is highest within the recrystallising framboids indicating either a late influx of arsenic or dissolution of an arsenic-bearing mineral or loss of sulphur from the system. Conversely Pb is progressively lost from the system or enters another phase as recrystallisation occurs.

Preservation of framboids in high P/low T environments records the transport of Cu, Pb and As deep into the subduction zone. Trace element movement acts as a proxy for fluid flow within the subduction zone and may provide further insight into fluid migration and element transfer within subduction zones.