

Geotectonic framework & mineral zones of the BS belt in Anglesey-Llyn,UK: implication to the development of an accretionary orogen

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A 560-550 Ma, 5 km x 25 km blueschist unit extends NE-SW on the island of Anglesey, Wales, UK, and continues to the southwest for more than 80 km along the northern coast of the Llyn Peninsula. This unit has a shape of shallow-dipping sheet which is less than 2 km thick. The top boundary is a normal fault above which is an accretionary complex and a unit of high-grade gneisses, whereas the bottom boundary is a thrust, below which is a unit of low-grade or unmetamorphosed rocks belonging to an olistostrome-type accretionary complex. The sandwiched assemblage was created by the tectonic insertion of the blueschists between the other two units. The sandwiched assemblage was gently folded and cut by secondary high-angle normal faults. A crossite mineral lineation on the foliation surfaces of the blueschists trends NNE-SSW; this probably indicates fluid flow during the crossite formation at depth, and is oblique to the direction of exhumation.

The blueschist unit is divided into three mineral zones by two new metamorphic isograds; Zone I sub-greenschist facies, (crossite isograd), Zone II blueschist facies, (barroisite isograd), Zone III epidote amphibolite facies. The zones and isograds dip gently to the east, and increase in metamorphic grade westwards to the structural middle of the blueschist unit, and then decrease farther westward. The sense of exhumation was to the west, as indicated by the metamorphic isograds.

A coeval, 100 km long and 30 km wide, 566-559Ma calc-alkaline volcano-plutonic belt extends parallel to the blueschist belt, in 110 km to the south-east. This belt corresponds to an island arc. Thus it is suggested that direction of the subduction of oceanic lithosphere was to the south-east at the end of the Proterozoic, and that direction of the extrusion of the thin high-pressure slab into the accretionary complex was to the north-west at a shallow crustal level on the western margin of Avalonia.