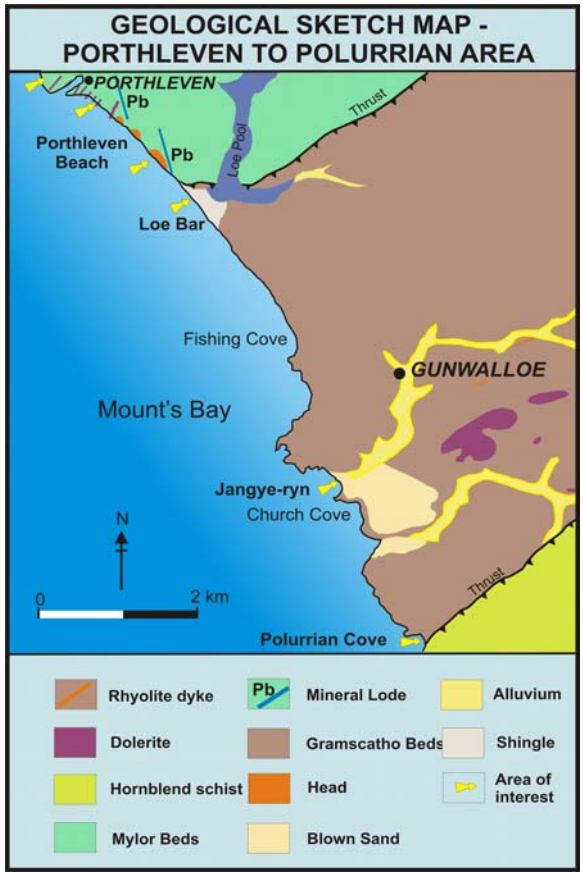
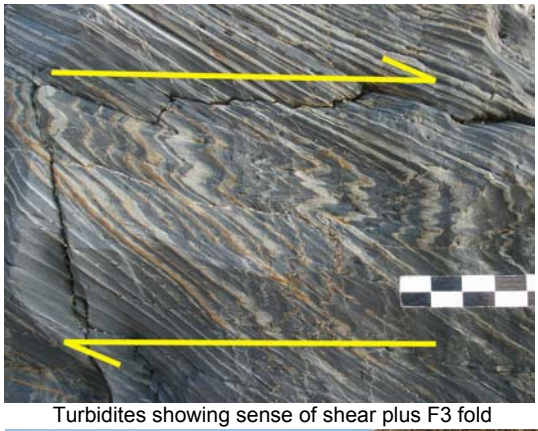
PORTHLEVEN TO POLURRIAN

The section from Porthleven to Polurrian provides examples of Upper Devonian deep marine sedimentation and magmatism, deformation (folds and cleavage) and low grade metamorphism during NNW-SSE crustal shortening during continental collision in the Carboniferous; deformation associated with NNW-SSE late Carboniferous-early Permian crustal extension with reactivation of earlier thrust zones and formation of new faults; base metal mineralization associated with E-W regional extension and formation in the Triassic of cross-course-veins.



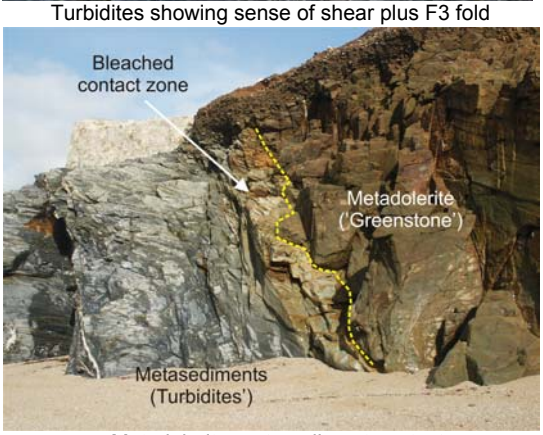
Porthleven

View looking NW to Porthleven Harbour



Turbidites showing sense of shear plus F3 fold

Dolerite sill intruding soft sediments



Metadolerite-metasediment contact

At Porthleven the rocks consist mainly of Devonian sedimentary rocks, which have been intruded by basaltic sills when the turbidite sediments were still wet and unconsolidated. Turbidites are formed by sediment-gravity (turbidity) flows from the shelf to the continental slope and have certain characteristic features such as normal grading (a gradual change in particle size from coarse to fine as one goes up through the deposit), and grain orientation. The turbidites were deposited in the Gramscatho Basin. Turbidity flows can be triggered by seismic activity. Subsequently, the rocks have undergone folding and intense deformation during the Variscan Orogeny (crustal shortening) and have been subjected to low grade regional metamorphism.

Loe Bar

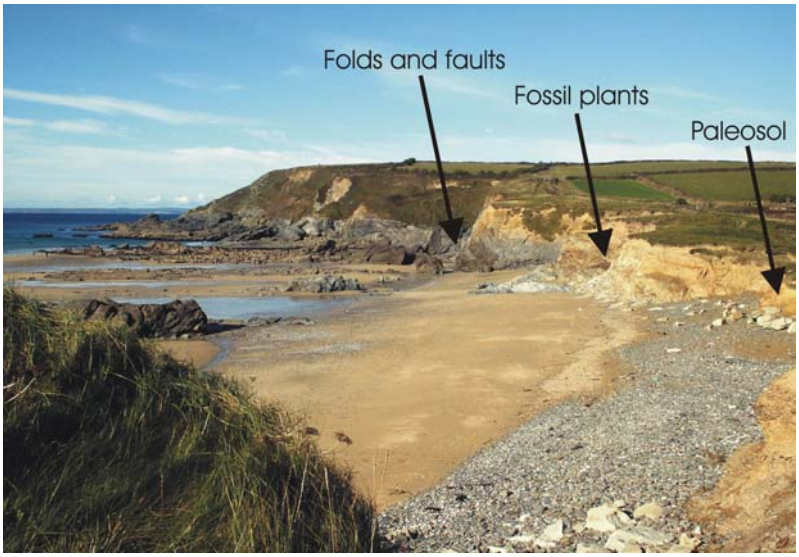
Loe Bar looking southeast

Along the coast to the southeast lies Loe Bar of the Cober River Estuary, a drowned river valley or ria, now terminated by a sand and shingle bar impounding a fresh water lake(Loe Pool). The valley system can be traced out into Mount's Bay for several kilometres and was drowned in the recent rise in sea level since the Devensian some 10,000 years ago.

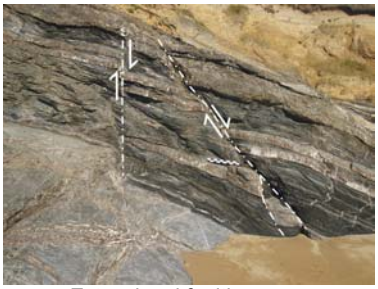
View looking northwest towards Loe Bar and Porthleven

Jangye-ryn

Further to the southeast lies Jangye-ryn where there are superb examples of folding and tension gash veins due to crustal shortening, faulting due to crustal extension and rare Devonian plant fossils. Sediments range from black shales, sandstones to mud or siltstones (turbidites), which were deposited in the Gramscatho Sedimentary Basin.

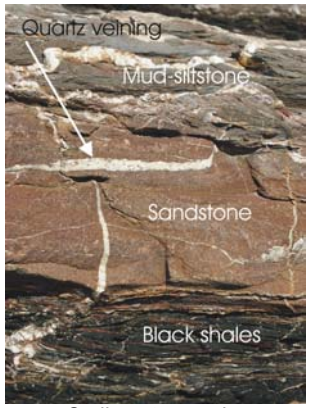


Jangye-ryn Cove

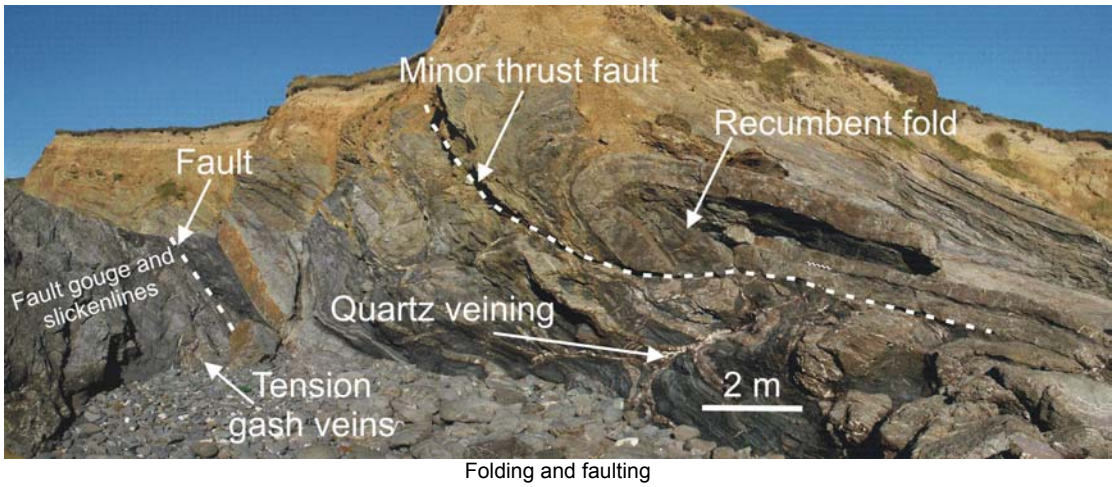


Extensional faulting

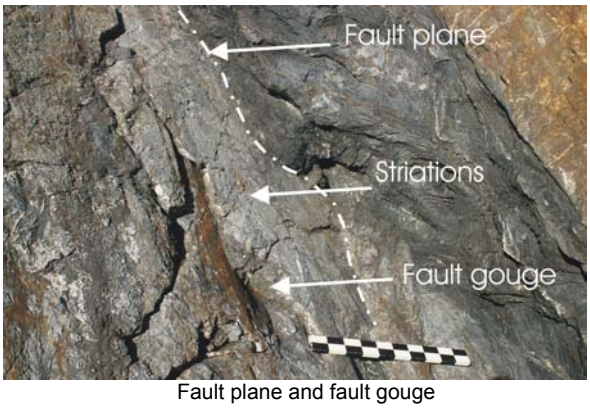
Fossil plants



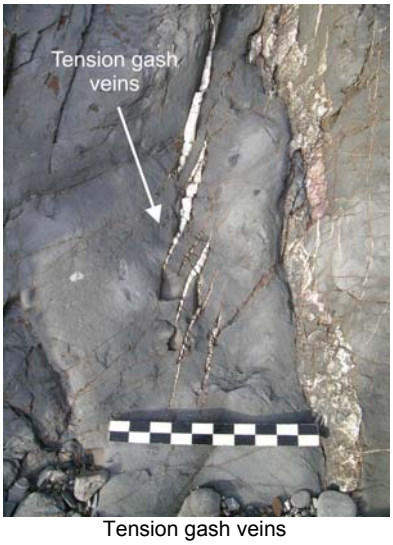
Sedimentary rocks



Folding and faulting



Fault plane and fault gouge



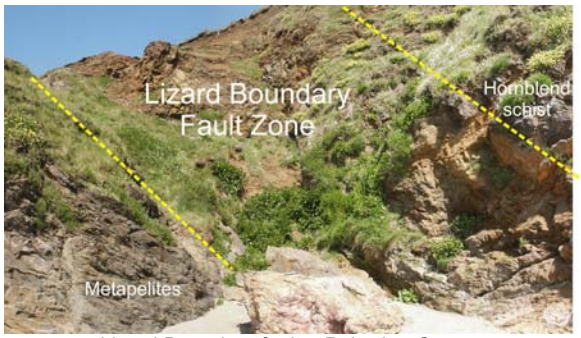
Tension gash veins

At the entrance to the cove is a possible paleosol, or fossil soil horizon, with a characteristic mottled appearance. The age of this has not been determined but is assumed to represent a possible warm stage associated with an interstadial during the Pleistocene.


Paleosol?

Polurrian Cove

Areas of interest cover the whole area on the south side of the cove. The Lizard Boundary Fault is exposed in the cliffside with metapelites (continental provenance) on one side and hornblende schist which marks the start of the Lizard complex (oceanic rocks) on the other. This fault zone runs across the Lizard from Polurrian on the south-west to Porthallow on the north-eastern side of the peninsula. This marks the approximate position of one of the thrust faults that obducted the Lizard ophiolite in the Carboniferous convergence. These faults have subsequently been reactivated in the Permian.The hornblende schists were once basaltic lavas on the sea floor, which have been metamorphosed, whereas the metapelites were originally Devonian mudstones.



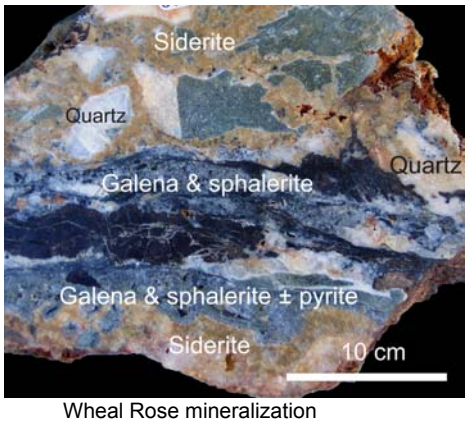
Lizard Boundary fault – Polurrian Cove


Hornblende schist

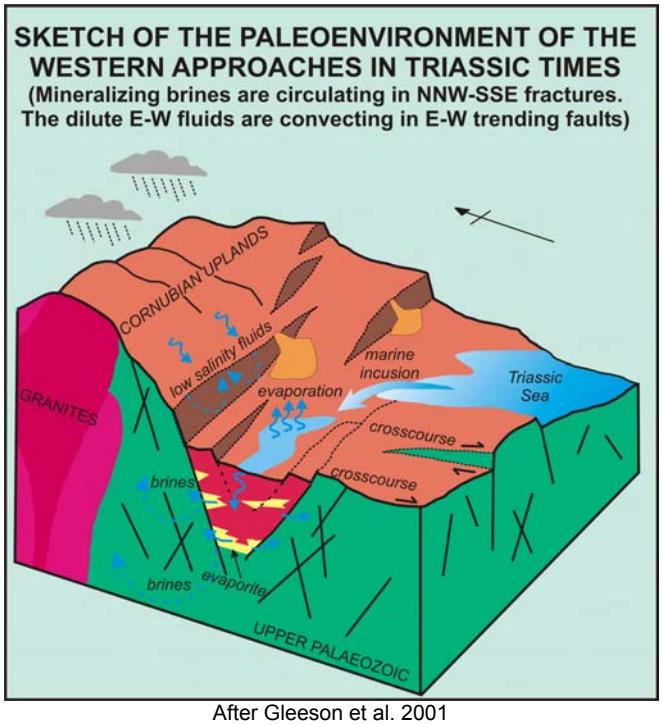
Mineralization

To the southeast of Porthleven a series of NNW-SSE cross-courses have been mined for base metals, predominantly lead. The major mine was Wheal Penrose that is reported to have been mined since Roman times. The mineralogy of the veins comprises quartz, chalcedonic quartz, siderite, minor arsenopyrite, chalcopyrite, dominant sphalerite and galena plus or minus minor pyrite. The texture of some of some of the chalcedonic quartz would suggest low temperature epithermal mineralization. Studies on this type of mineralization both here and elsewhere in Cornwall, indicate that during Permo-Triassic extensional rift faulting produced basins that were subjected to sea water ingress which evaporated to form evaporitic brines and then was buried and chemically modified. Basinal brines from these buried sediments leached metals from the sediments and were transported in faults by seismic pumping to depositional sites. These base metals were deposited from fluid brines at c. 130^{0}C and may well have been mixed with other circulating hydrothermal fluids derived from around the granite near the point of deposition.

Wheal Rose mine shaft



Wheal Rose mineralization



After Gleeson et al. 2001