

Implications of the Tectono-Sedimentary Soft Sediment Structures in Lower Pliensbachian Sediments of the SW Algarve Basin, Portugal

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A Lower Pliensbachian 60 metre thick succession of limestone, dolomitic limestone and dolostone containing interlayered chert beds and chert dykes was investigated in the SW of the Algarve Basin, South Portugal. The work was based on field description of the outcrops, and study of thin sections under transmitted optical microscopy, cathodoluminescence and SEM.

The transmitted light and scanning electron microscopy, as well as field structures, showed that the chert and the dolomite are products of the pre-lithification, early diagenetic evolution of the original carbonates. In a first stage the primary coarse grained calciclastic and bioclastic sediments were replaced by silica by reaction with a fluid of unknown origin, and in a second stage occurred the pervasive dolomitization of the primary fine grained limestone by the percolation of a mixture of formational and land derived fluids.

At the base of the Formation, irregular chert beds and nodules are prevalent, while at the upper 30 metres of the Formation the chert occur as well defined chert beds and spatially regular chert dykes and nodules.

The chert dykes and nodules longest axis are grossly parallel to the strike of the syn-sedimentary normal faults and the spacing of the nodules has a linear correlation with the thickness of the host limestone beds.

It is argued that after the sedimentation the deformation affected a sequence of fine grained, semilithified limestone, and unlithified, water saturated coarse grained calciclastic and bioclastic lithologies. The deformation led to the development of vertical tension joints in the fine grained more cohesive beds. The loose and water saturated coarse grained calciclastic sands were injected into the joints forming calciclastic dykes. The dykes were disrupted by a syn-sedimentary compressive episode after which the extension resumed.

All these events occurred in a time interval of approximately 2 Myr as could be demonstrated by cross-cut relationships of unconformities in the two consecutive carbonate formations well dated by ammonites.