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Preliminary Results from Soft-sediment Deformation of Lower Cretaceous Vigla Limestones of Kastos Island and Their Support to Basin Evolution.

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Introduction

Soft-sediment deformation structures formed during, or immediately after deposition, during the first stages of the sediment's solidification. These structures are formed mainly in shallow marine areas and in deep basins with the presence of turbiditic currents. This is because these environments have high deposition rates, which allows the sediments to pack loosely. The deformation is related mostly to the drastic decrease in shear resistance in water saturated and unconsolidated sediments.

Geological setting

The Cretaceous succession differs between the three sub-basins of the Ionian zone. The lower Cretaceous Vigla limestone in the external Ionian sub-basin, where the studied Kastos Island is situated, consist of white, light grey to yellowish micrites and radiolarian biomicrites (wackestones to packstones and rarely mudstones). Usually they are thin-bedded to platy with chert intercalations and chert nodules. (Skourtsis-Coroneou et al., 1995).

In Kastos Island, the lower Cretaceous Vigla formation outcrops on the east side of the island, and consists of, in the lower part, carbonates in restricted outcrops with estimated thickness up to 350 m, whereas the upper part with interbedded cherts and shales (Vigla shales) is up to 100 m thick. The Vigla limestones, consist of thin to medium bedded limestones, with up to three strongly deformed horizons, internally to undisturbed limestones, representing slumps. This deformation appears stronger than in the NW Peloponnesus (Bourli et al., 2019) and is interpreted as syn-sedimentary slumping.

Data analysis

According to Bourli et al., (2019) Vigla limestones in NW Peloponnesus are characterized by synsedimentary deformation. On the upper part of this deformation paleo relief filled up by breccia showing that, sedimentation was active during and after the deformation. Measurements of this deformations showed that there is a “fold” axis with E-W direction. Moreover, the steep side of this deformation dips northwards. The above introduce that slumps directed northwards and produced from transfer faults with E-W direction (Fig. 1).

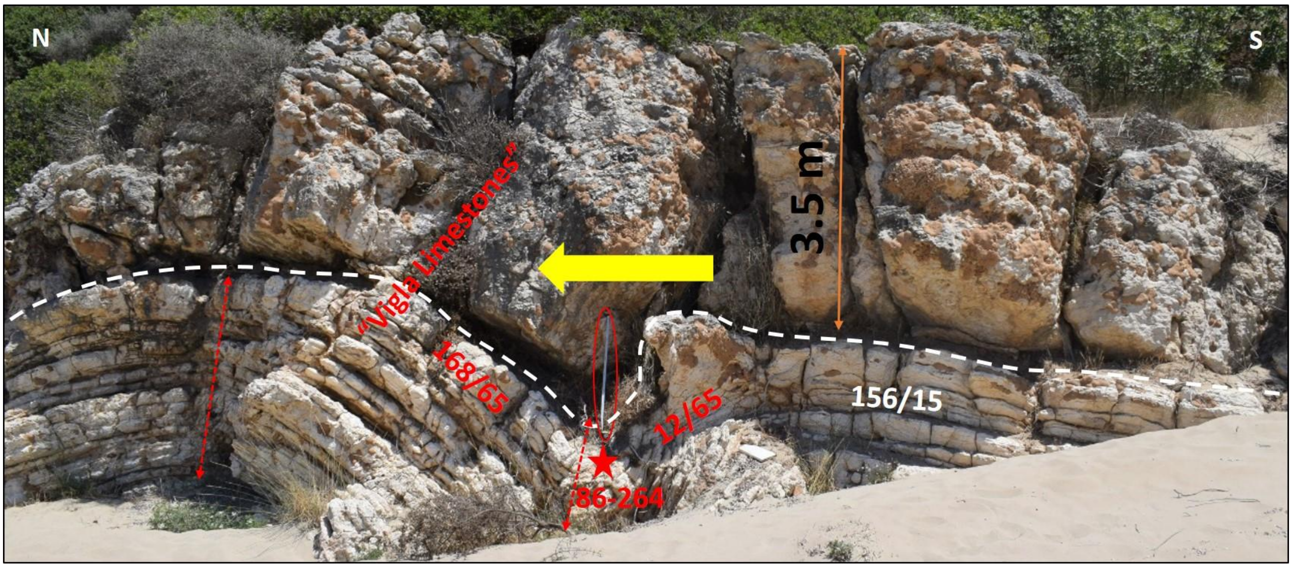

Figure 1. Vigla limestones with intense synsedimentary deformation. The red lines show the axes, the yellow arrow marks the kinematic direction of deformation, the white line shows the different lithologies, and the star indicates the fold axis.

In Kastos island and although the estimated thickness for Vigla limestones is about 350m only 30m are outcropped along the eastern cost of the island. Vigla limestones are unconformably underlines Vigla shales and this contact is characterized by strong deformation. This deformation has different laterally thickness ranging from 1 to 3m thick. Such horizons also were recognized internally to Vigla limestones.

In two studied sections with NW-SE and SW-SE directions (Figs 2, 3), two different directed slump horizons were recognized. In the NW-SE section, an E-W deformation axis was recognized, probably related with a transfer fault activity; whereas in the SW-NE section deformation is stronger with two or three different directed axes (either N-S or E-W) introducing slump development from both normal and transfer faults activity. It seems that the slumps produced from the normal fault activity are thicker and strongly deformed in contrast to these that produced from transfer faults.

Figure 2. A slump horizon 1m thickness on the top of Vigla limestones and in contact with the undeformed Vigla shales. The star shows the fold axis and the white line marks the above contact.

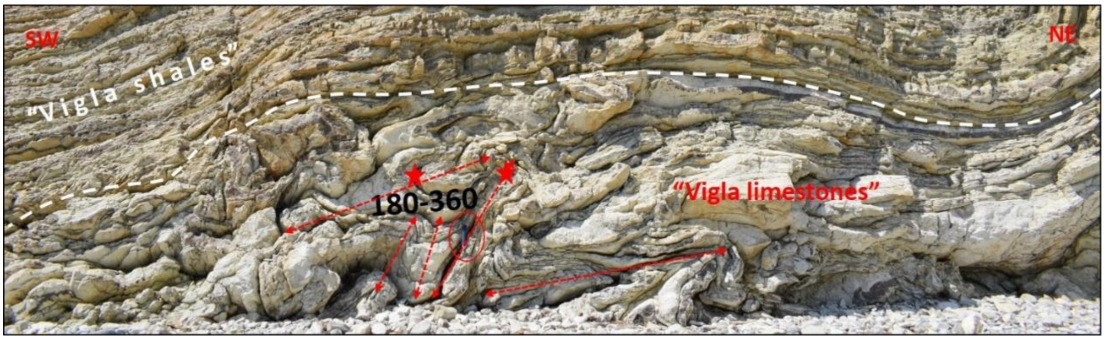

Figure 3. A slump horizon 3m thickness on the top of Vigla limestones and in contact with the undeformed Vigla shales. The stars show the fold axes and the white line marks the above contact. See the intensive deformation within slump horizon with different axes directions.

Except of Vigla limestones also within Vigla shales slump horizons were recognized. In these horizons paleo relief produced from slumping is up to 40cm (Gianniskari Vigla shales in Bourli et al., 2019); whereas in Kastos Island this paleo relief is up to 1m? or more (Fig. 4).

Figure 4. Vigla shales with lower deformation in Kastos Island.

Results

From the above we conclude that in both areas (NW Peloponnesus and Kastos island) Vigla limestones are characterized by intensive deformation during sedimentation due to both normal and transfer faults activity. Further study is needed in order to show how and when this deformation took place.

It is obvious that deformations of Vigla shales is lower and the reasons for the above is under investigation.

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