Evidence for Holocene bottom-currents erosion in the Western Gulf of Corinth, Greece

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INTRODUCTION

The Gulf of Corinth is a 860 m deep basin in central Greece, connected to the Ionian Sea to the west through the 62 m deep Rio sill. Because of the presence of the sill, the Gulf was disconnected from the World Ocean during Quaternary lowstands (Collier et al., 2000). Consequently, hydrodynamic circulation should have changed dramatically between lowstand and highstand conditions, and these changes could have been recorded in the offshore sedimentation. Periodic changes in the sediments properties in relation with the eustatic level. These features highlight the possible occurrence of strong bottom-currents since the last sea level rise.

RESULTS AND DISCUSSION

Present-day seafloor erosion is observed in the whole Nafpaktos Basin, between 40 and 100 m water depth, indicating widespread action of bottom-currents coming from the Rion sill. In the center of this basin, a 10 m deep, 400 m wide channel is eroded into what we interpreted as early Holocene deposits. This feature is reminiscent, at a smaller scale, to mega-flood channels described in the English Channel (Gupta et al., 2007) and could indicate that a similar flood event occurred in the Gulf of Corinth during the Holocene transgression, 11.5 ka ago. However, improving the Nafpaktos Basin stratigraphy is needed to better date this erosional event.

METHODS

To test this hypothesis, seismic reflexion lines have been acquired with RCMG’s “Centipede” multi-electrode sparker. They allowed us to image at least 130 ka of sedimentation according to a previously developed chronostratigraphic model (Bell et al., 2009). Isopach map for the Holocene has been built and morphological features and deposits associated with bottom-currents have been mapped.

FIGURE 1. Seismic profile showing present seafloor erosion and Holocene mega-flood (?) channel in the centre of the Nafpaktos Basin, Gulf of Corinth, Greece.

More to the east, no seafloor erosion is observed, indicating that today, bottom-currents erosion stops around 12 km east of the sill. Instead, depositional reliefs develop on the flanks of the basin floor. These morphologies could be formed by bottom-currents...
(“contourites”) or could result from the cloud settling of turbidity currents originating from the surrounding deltas.

In the northern depositional relief, 200 to 300 m below sea level, an erosional unconformity is observed below 30 m of Holocene sediments. It may indicate in this area the occurrence of erosive bottom-currents occurring only during the post-glacial rapid sea level rise in this gulf. Identification of erosional unconformities associated with older Quaternary highstands and associated transgressions, e.g. the marine isotopic stage 5, is in progress.

CONCLUSION

As expected by the strong tidal currents measured at the outlet of the Gulf of Corinth, seafloor erosion is highlighted in a wide area at the western tip of the Gulf. This erosion stops around 12 km east of the sill where large depositional relief develop. Two older phases of bottom-currents erosion are observed. The first one is associated to the post-glacial sea level rise, and the second one occured during the early Holocene.

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REFERENCES


