

SEISMIC STRATIGRAPHY, SEA LEVEL CHANGE AND SUBSIDENCE ON THE SOUTHWESTERN BLACK SEA SHELF

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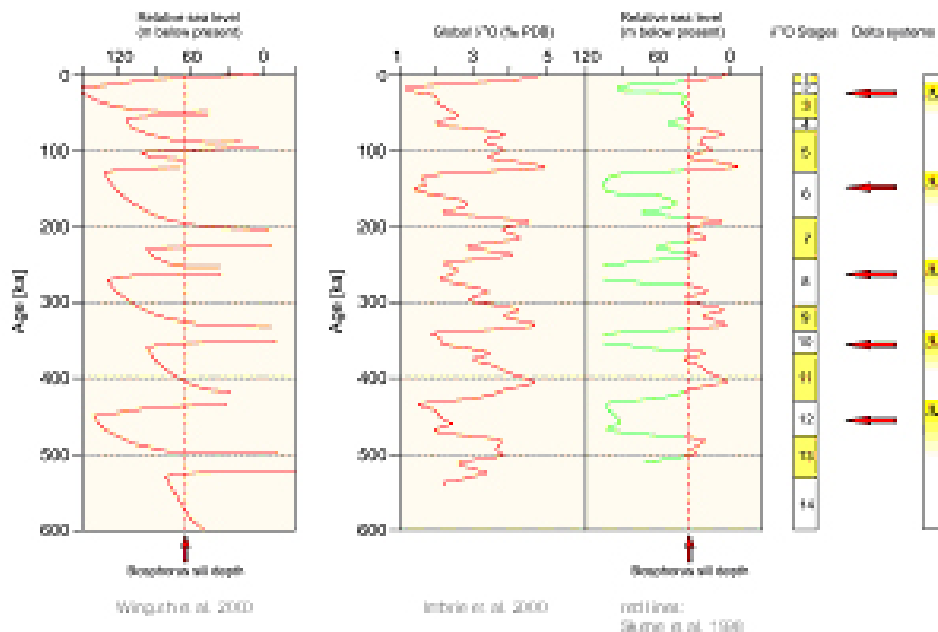
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The sea level of the global oceans varied during the Quaternary between approximately -125 m and $+10$ m, following the increase and retreat of continental ice covers (Imbrie et al., 1984; van Andel and Lianos, 1984; Martinson et al., 1987; Shackleton, 1987). The global sea level, however, cannot be automatically assigned to the Black Sea, since connection of the Black Sea to the global oceans through the Bosphorus is disrupted when the global sea level falls below the sill depth (today at -32 m).

A seismo-stratigraphic analysis of reflection seismic lines recorded during the BLASON 2 cruise in 2002 in the southwestern the Black Sea shows the development of at least five stacked prograding delta successions separated by major unconformities (A-E, in chronological order). These deltaic systems are interpreted to be constructed during phases of relative sea level lowstand of fourth order sea level cycles. Similar observations have been made in the eastern Mediterranean, Aegean and Marmara seas (Aksu et al., 1987; Piper and Perissoratis, 1991; Aksu et al. 1992 a, b; Piper and Aksu, 1992; Aksu et al. 1999).

Past sea levels can be deduced from changing elevations of the topset-to-foreset transition of these delta systems. In order to obtain a regional sea level curve, these measurements (corrected for isostatic subsidence due to post-glacial sea level rise and the present-day depositional depth of topset-to-foreset transitions in delta systems) have been combined with a global sea level curve that provides sea level values during times in which the Black Sea was connected to the global oceans.

The resulting sea level for the youngest lowstand (E) of around -90 m agrees well with recently published data for the northwestern Black Sea (Popescu et al., 2004), while that especially for the older lowstand C seems to be unreasonably high. This is probably because tectonic subsidence of the shelf must be taken into account. If the shelf would not be affected by tectonic subsidence, deltaic sedimentation would form a single, though interrupted seaward prograding succession. The sediment architecture together with major normal faults mapped on the southwestern Black Sea shelf clearly indicate the influence of tectonic subsidence that apparently varied temporally as well as spatially along the shelf, with the middle shelf undergoing the largest changes. The subsidence rate reached a maximum during the time of development of the delta systems C and D. Thereafter, subsidence slowed significantly to values of about 0.16 m per 1000 years (derived from a comparison of the youngest delta systems D and E).



To obtain a detailed, regional sea level history, the sedimentary features found on the shelf must be linked to the climate anomalies in the source areas of the sediments in the western Black Sea. Sümege & Krollop (2002) reconstructed paleotemperatures during the Würm ice age in the Carpathian Basin, from which general sea level trends could be derived. The delta system E, which is assumed to be deposited during the Würm glacial, reflects these predicted changes when looked at in detail, even though the reflection seismic data available probably do not have a resolution high enough to reproduce all the subtle changes.



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