Hydrological Regime of the Black Sea Waters: Numerical Modeling

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Aim

The objective of this work is to study the hydrological regime of the Black Sea basing on climatic data arrays and using numerical modeling methods.

Data

T, S: 3D climatic arrays of monthly averaged temperature and salinity values and a massive of instrumental observations from 1950 to 1999.

Bottom topography: values obtained by digitizing a 1:1,25 mln map of the Black sea.
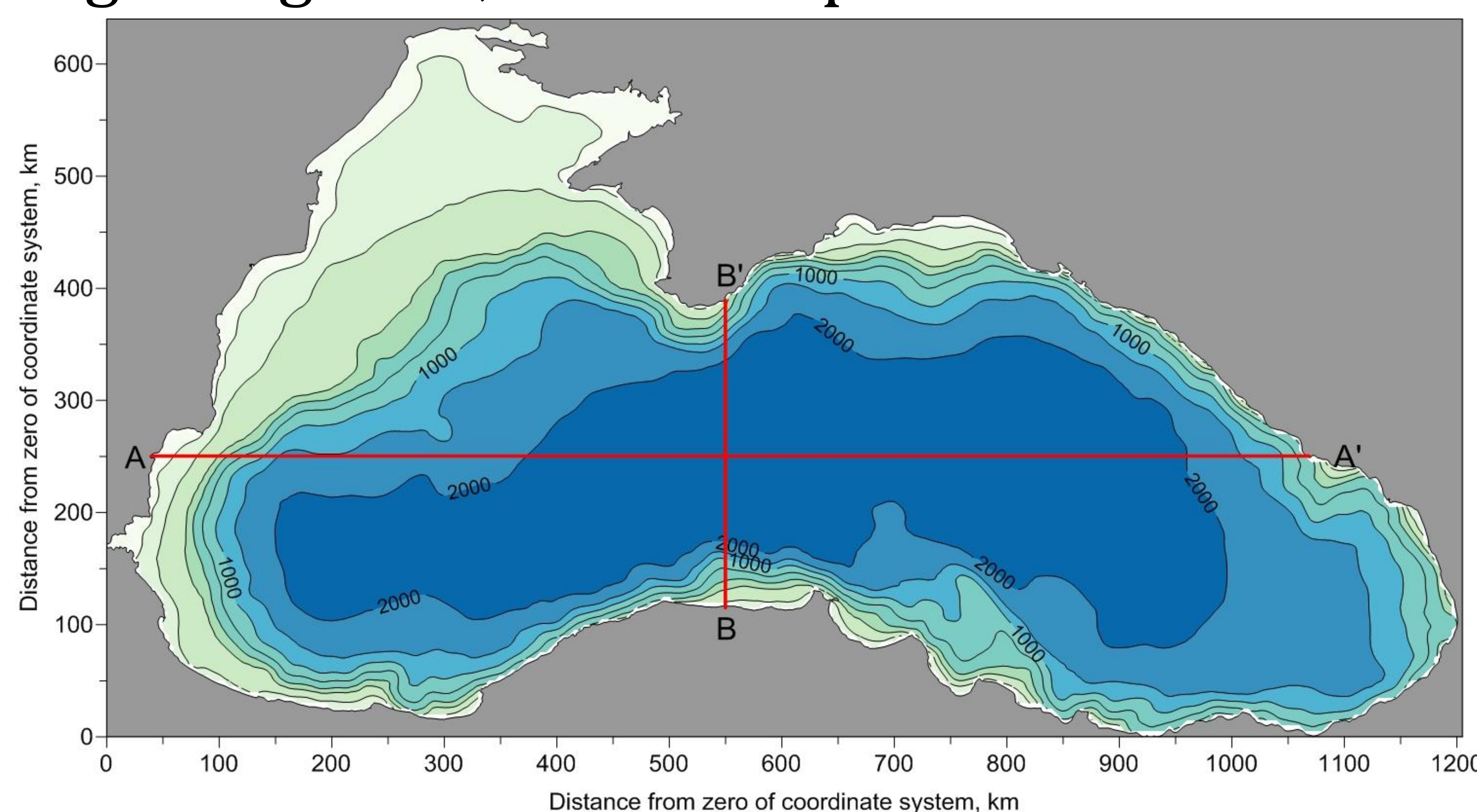

Digitized bathymetric map of the Black Sea. Red lines indicate sections.

Numerical model

The Bergen ocean model (BOM) was used in this study. It is a three-dimensional nonlinear modesplit sigma-coordinate model developed at the Institute of Marine Research at the University of Bergen, Norway.
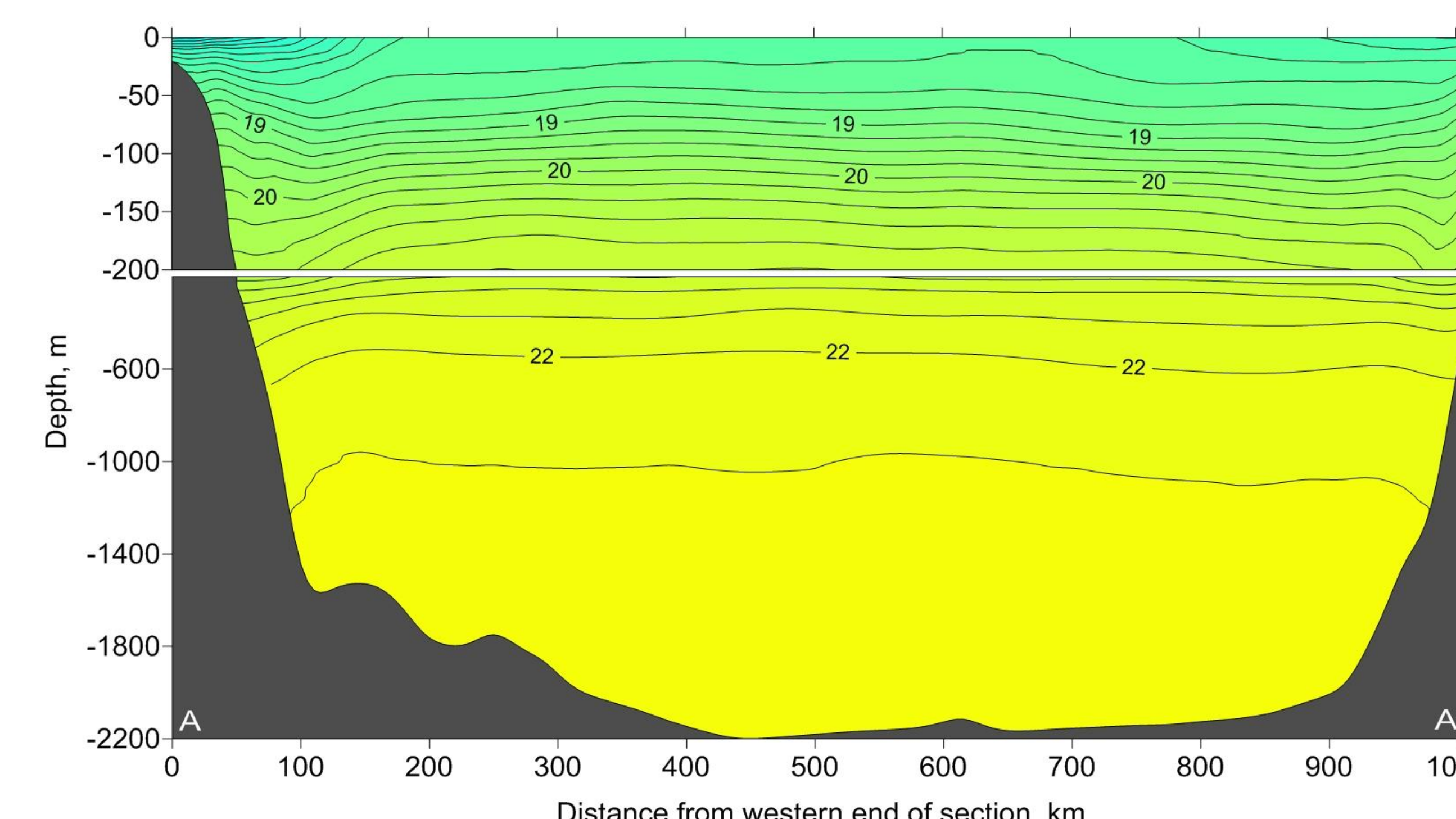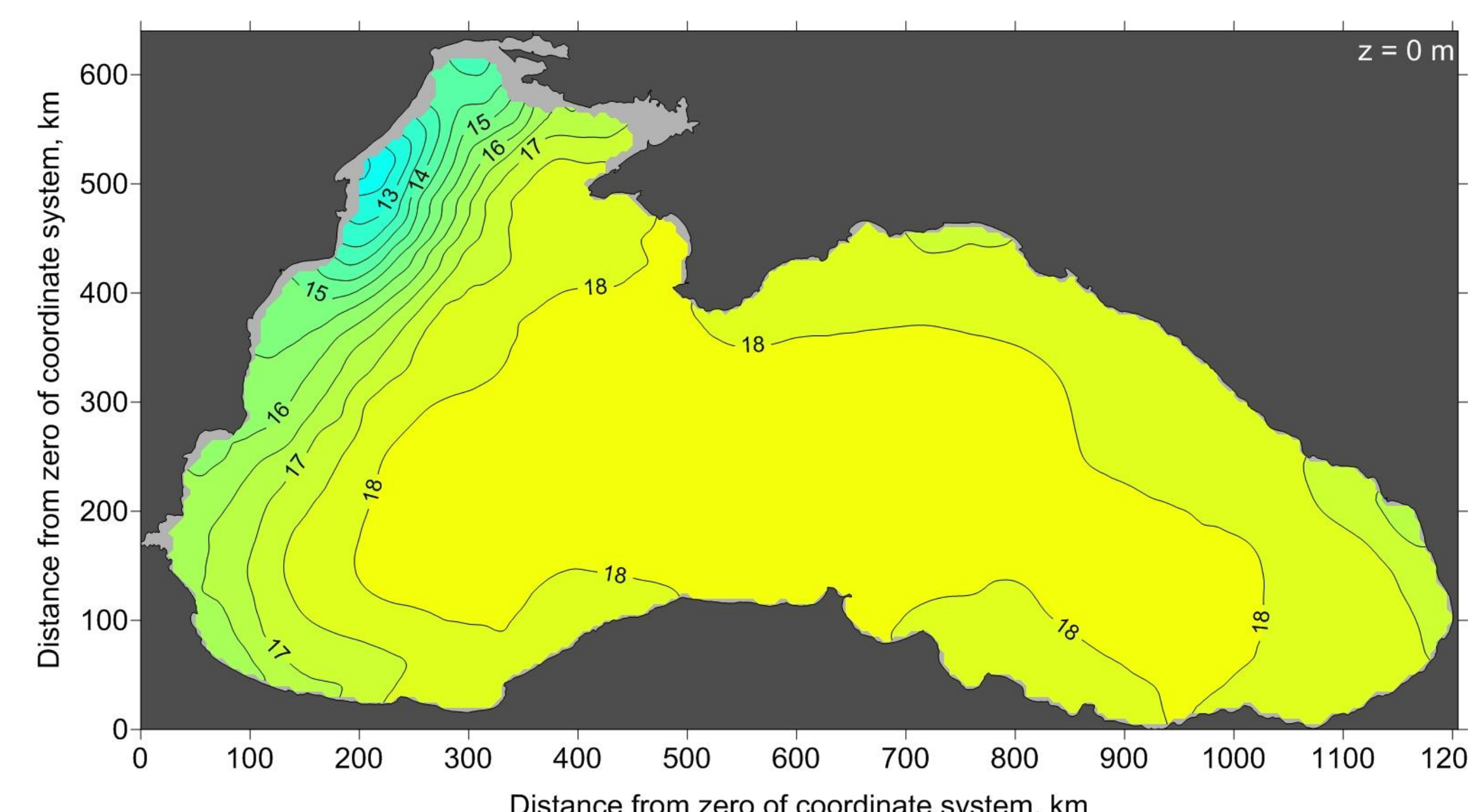
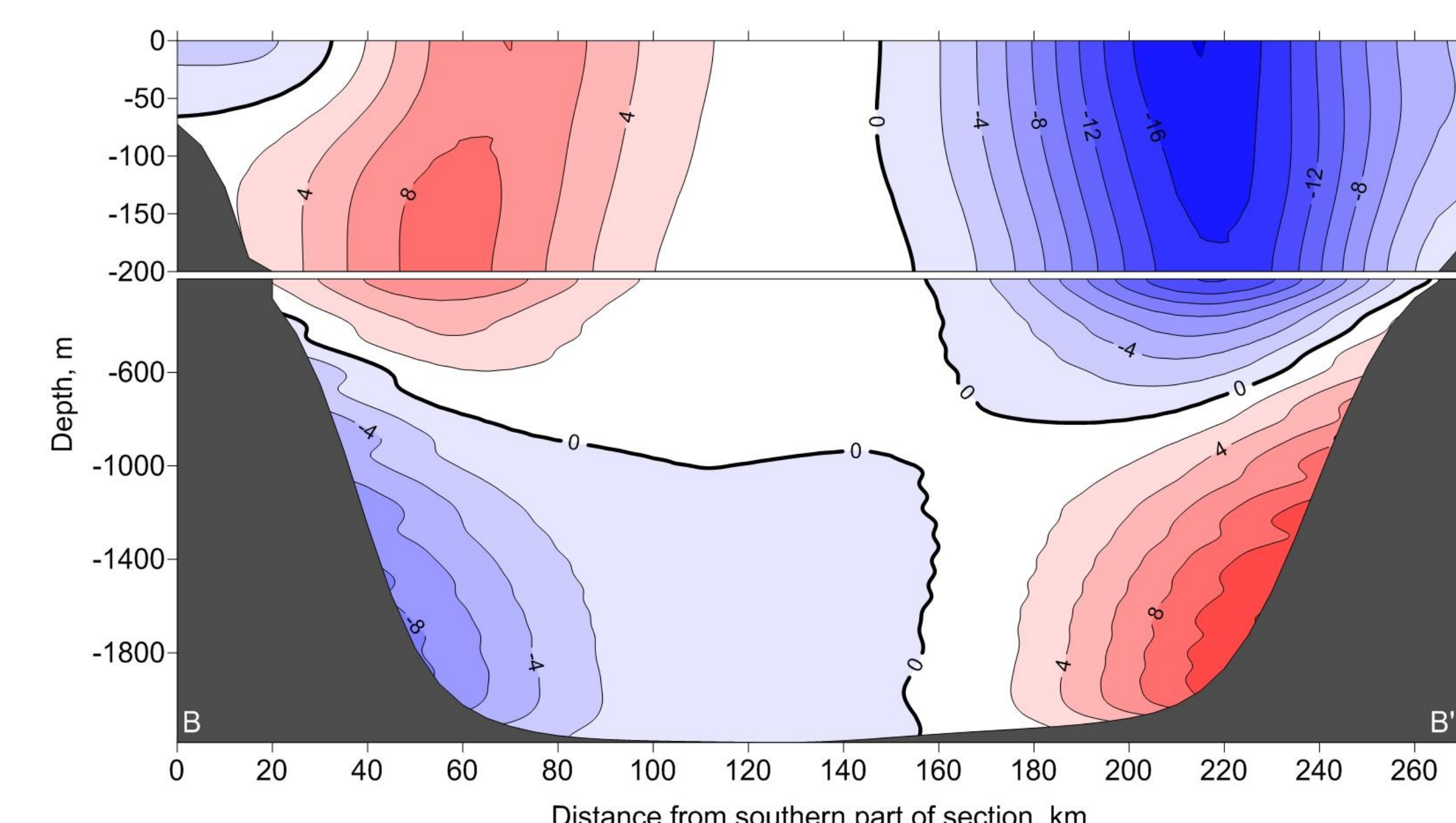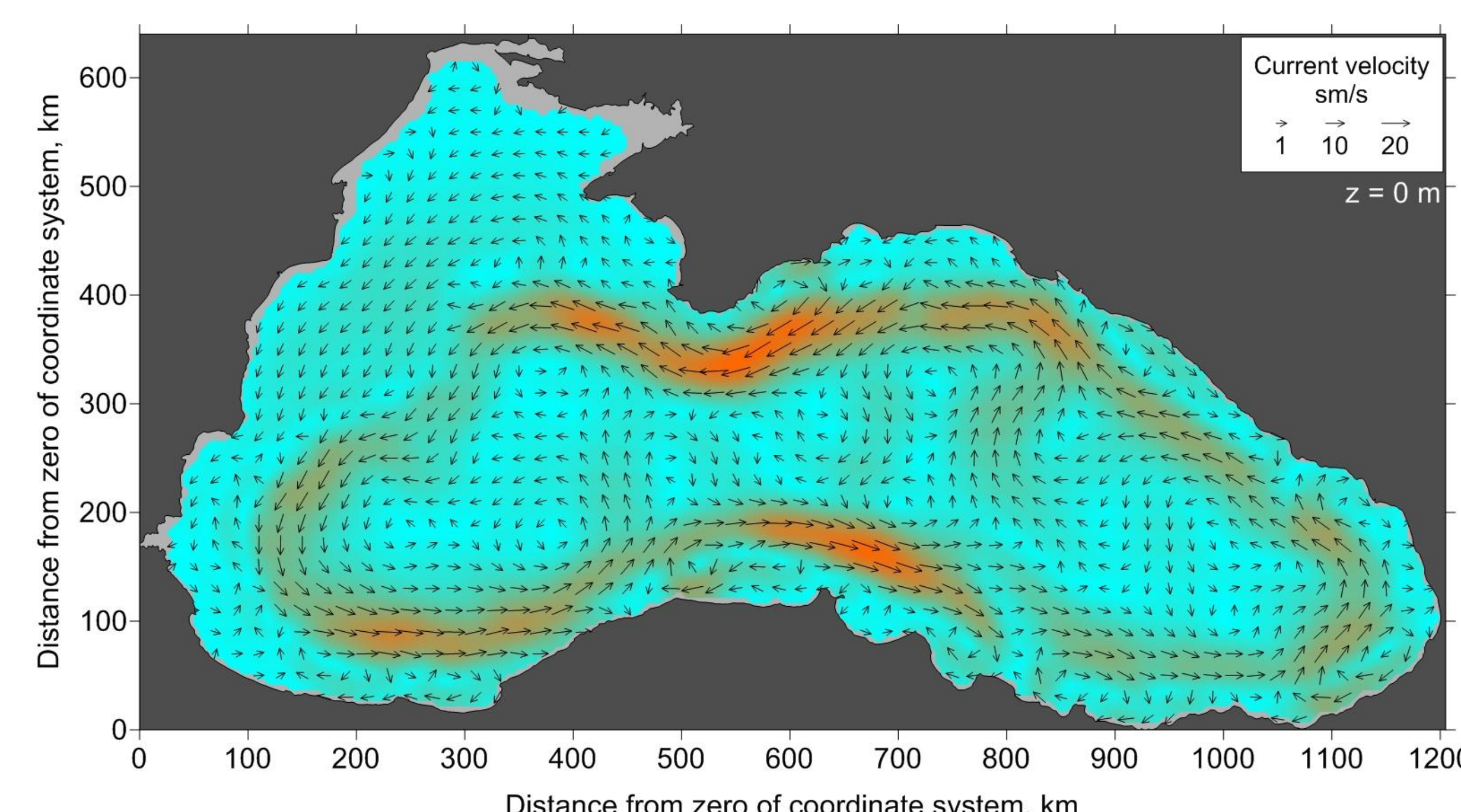A rectangular 5x5 km horizontal grid and 32 sigma-layers were used.

Results
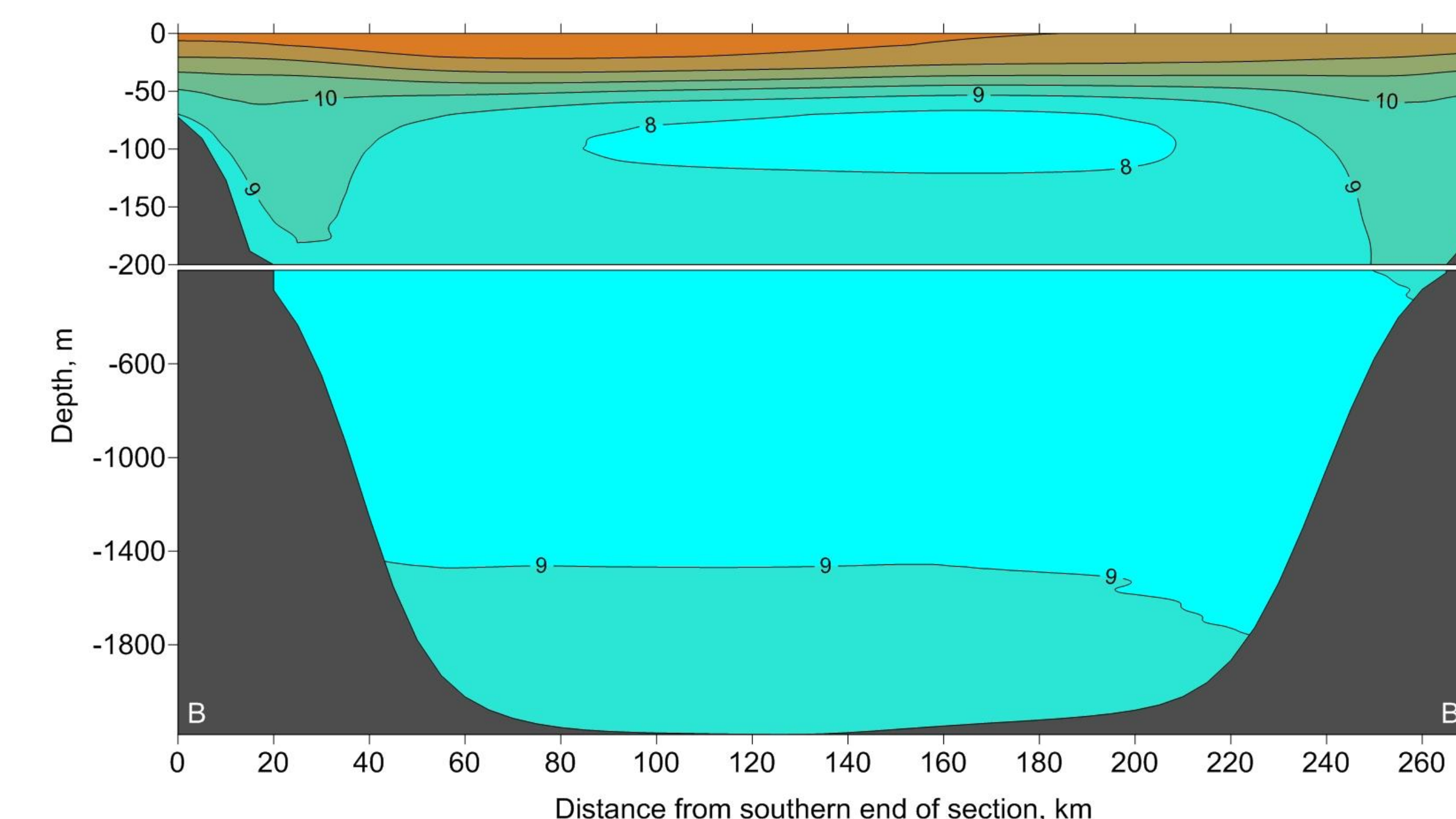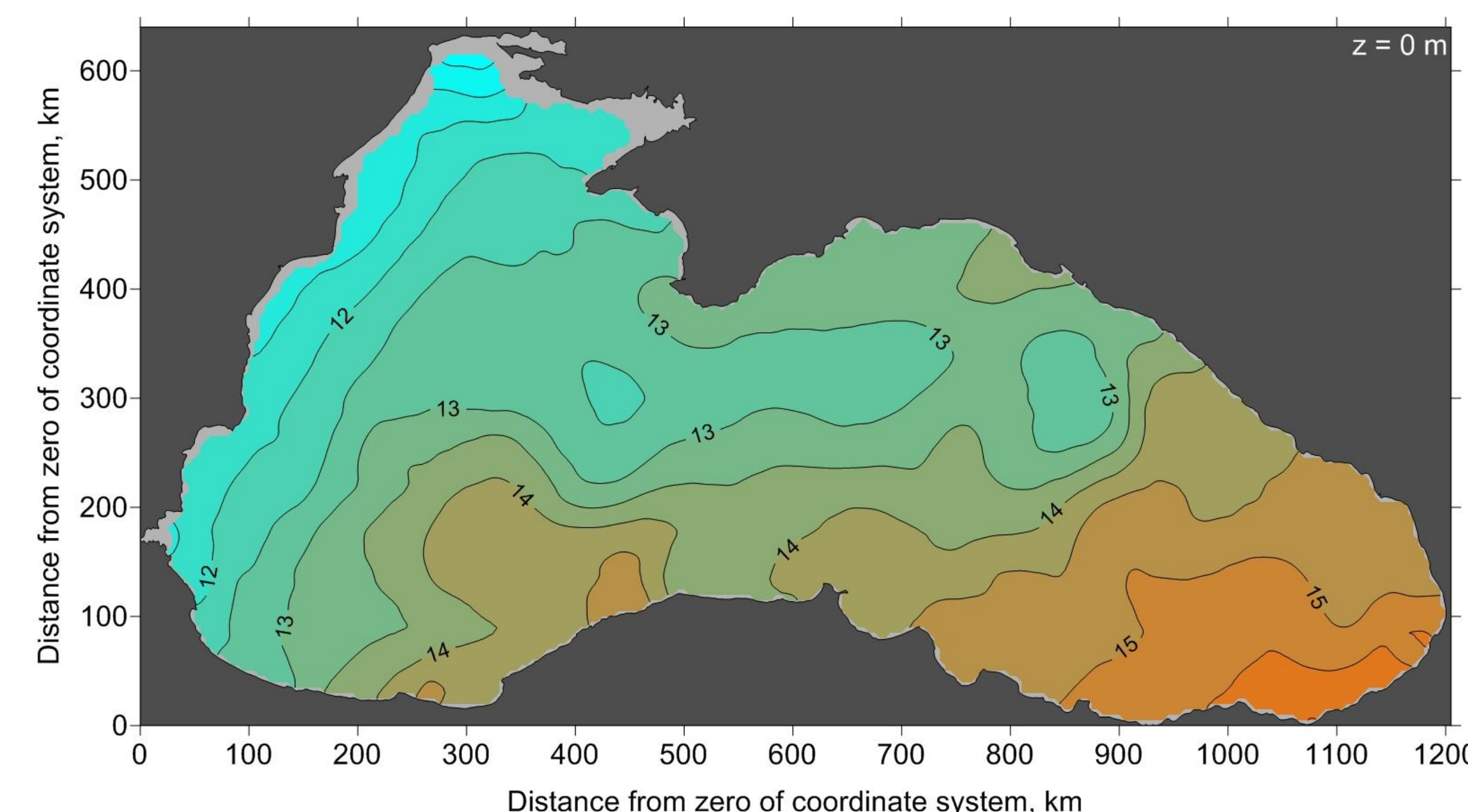
Temperature (°C), November

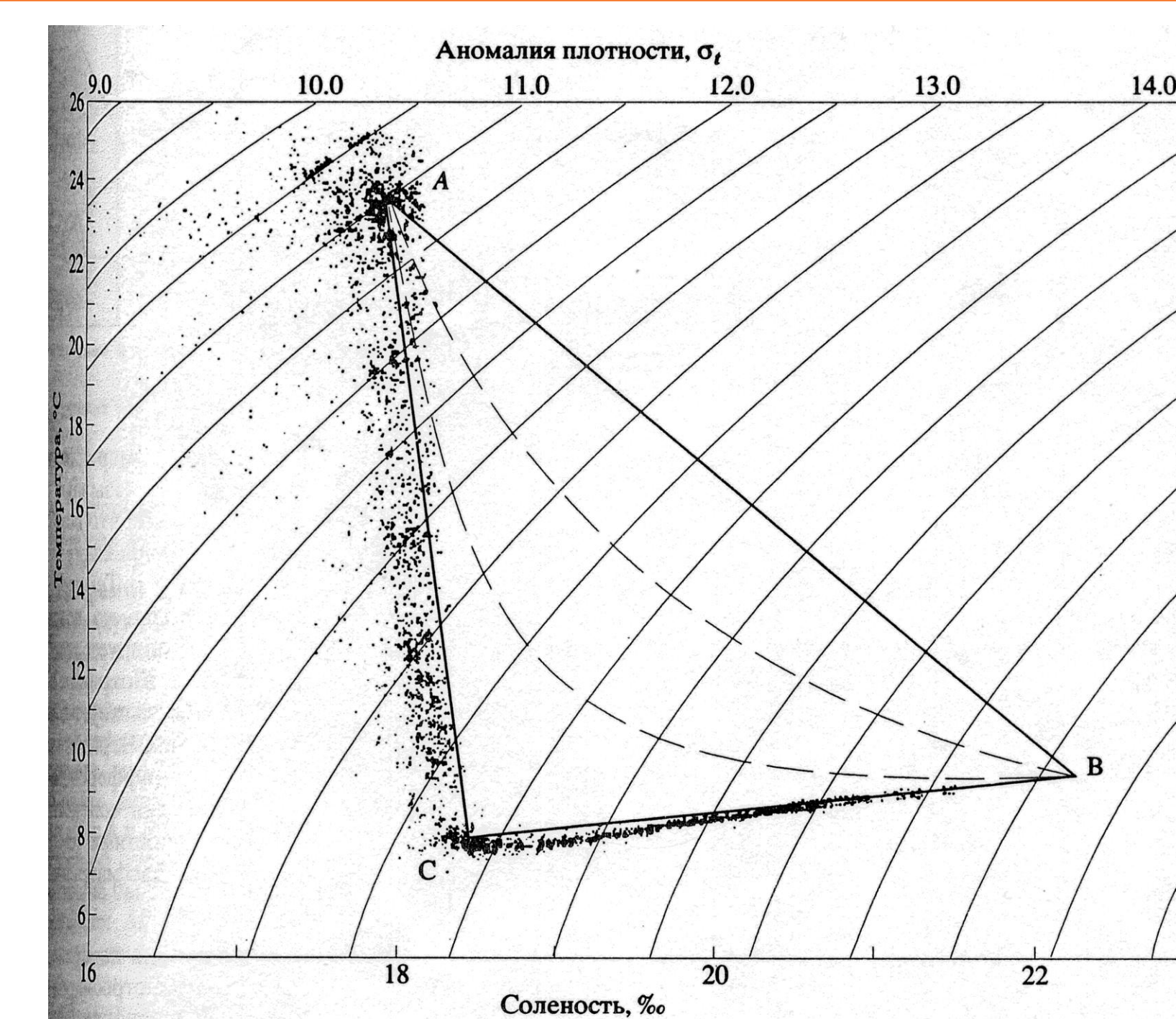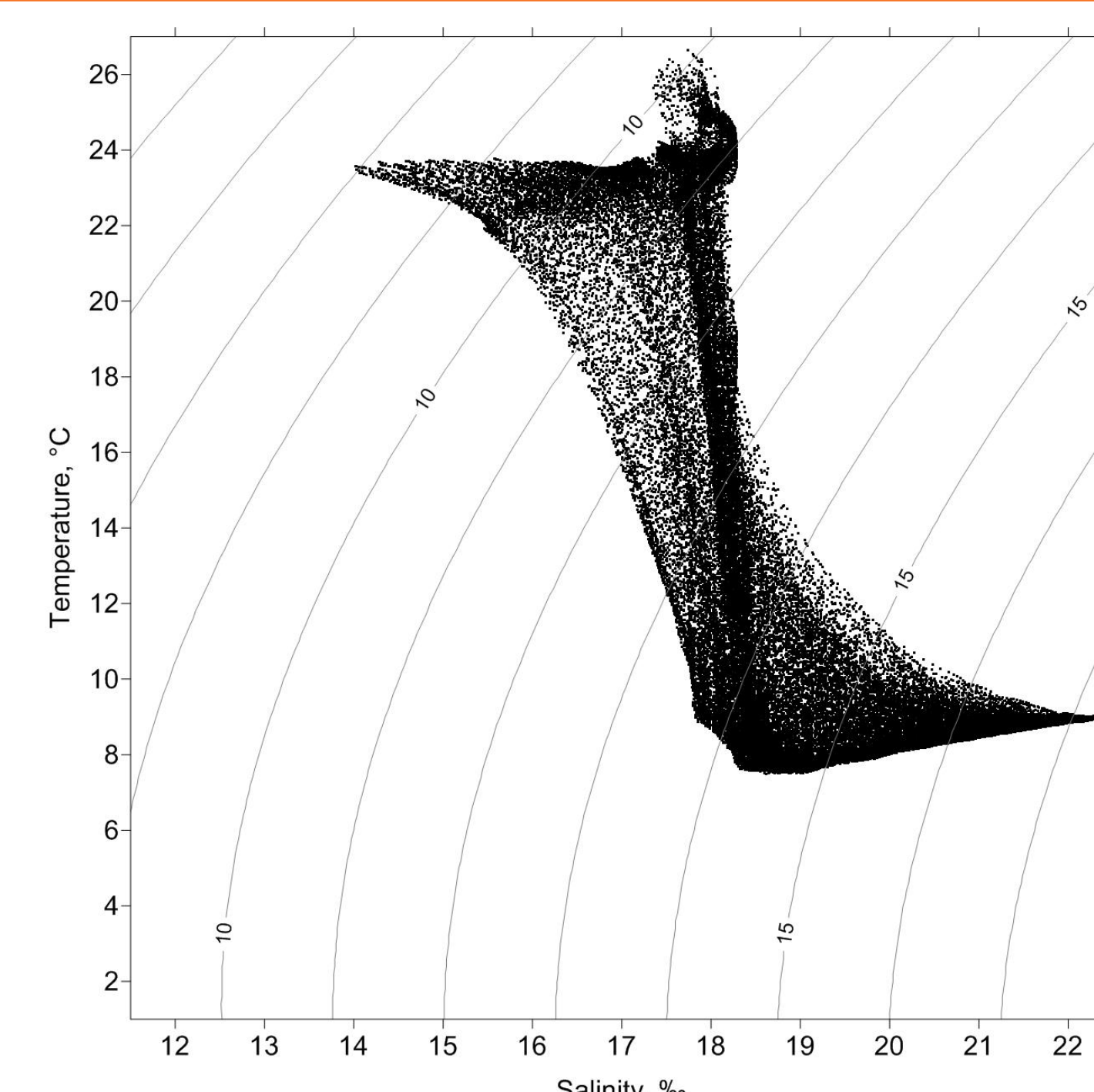The cold intermediate layer (T<8°C) is clearly observed

Salinity (‰), May

Note the enormous Danube freshwater runoff effect

Current velocity (cm/s), February

Positive values of velocity on the section corresponds to currents going eastwards

T,S-diagram of the Black Sea waters based on modeling data (left) compared with statistical data by [Mamaev et al., 1994] (right)

Conclusions

The modeling results obtained in this study show a quite good correlation with instrumental measurements data. It allows the further use of BOM for operative reasons (e.g. for marine reanalysis or forecasts).

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