

# HIGH-FREQUENCY VARIABILITY OF CURRENT FIELD IN THE NORTHERN ADRIATIC

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## Abstract

A large set of ADCP-measured currents in the Northern Adriatic is analysed. At diurnal and shorter periods, the data document a number of physical phenomena which are spatially and seasonally variable. In winter the Adriatic-wide seiches are induced, while in summer baroclinic tides and energetic inertial oscillations are present.

*Keywords: Currents, North Adriatic Sea, Stratification, Waves, Tides*

An extensive set of data was gathered at the eastern side of Northern Adriatic within the Northern Adriatic Experiment. The currents were measured with Acoustic Doppler Current Profiler (ADCP) at eight stations during a 8-month interval from Dec 2014 to Aug 2015, with sampling at 10-minute/15-minute time step and 10-meter/15-meter vertical resolution.

currents in the top and bottom layer, and a 180 deg phase shift between the two layers [2]. Further, baroclinic tides are observed at several locations; at the southernmost station, which is positioned in a long channel between two chains of islands and where tidal currents are strong, baroclinic nonlinear tidal harmonics at the periods of 8 hours and 6 hours are induced as well.

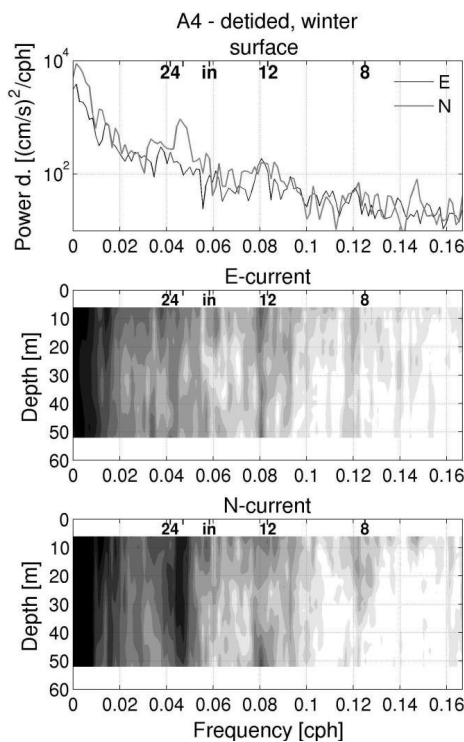


Fig. 1. Winter power density spectra of detided current (E – eastward, N – northward), near surface (top) and along the water column (bottom), at a station in the southern part of Northern Adriatic.

The high-frequency part of the current spectra is dominated by tides, with prevailing semidiurnal tides. Tidal currents are largely polarized along the basin, except south of the tip of Istria where tidal flow is in the east-west direction.

The oscillations in the current field at diurnal and shorter periods are spatially and seasonally variable. The Adriatic-wide seiches, with the principal-mode period at 21.2 h and the second-mode period at 10.9 hours [1], are recorded further from the head of the basin, the latter being significant only at the southernmost station. The seiche activity is strong during winter season when meteorological forcing is more energetic (Fig. 1). In summer (Fig. 2), during stratified season, inertial oscillations are very energetic at offshore stations positioned in the entrance to the Kvarner Bay. They have a pronounced baroclinic structure, with anticyclonically rotating

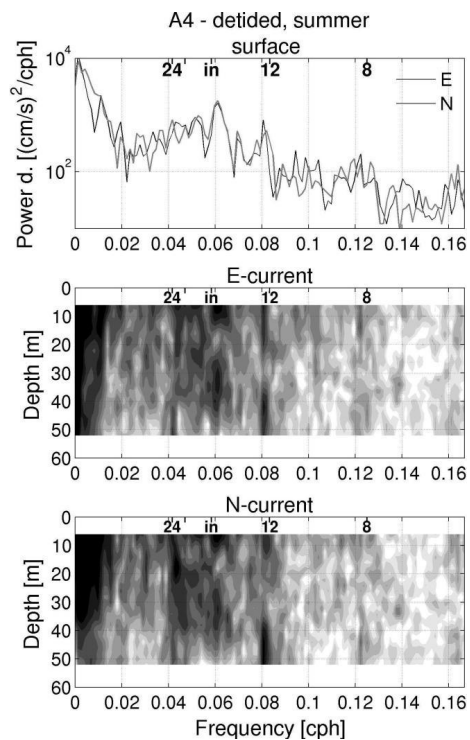


Fig. 2. The same as in Fig. 1, but for summer.

## Acknowledgements

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## References

- 1 - Cerovecki I., Orlic M. and Hendershott M. C., 1997. Adriatic seiche decay and energy loss to the Mediterranean. *Deep-Sea Res. I*, 44: 2007-2029.
- 2 - Orlic M., 1987. Oscillations of the inertia period on the Adriatic Sea shelf. *Cont. Shelf Res.*, 7: 577-598.