**On Subinertial Response of the Sea to the Air-Pressure Forcing**

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Relationship between subinertial variability of the Adriatic sea level and planetary-scale atmospheric forcing was demonstrated by ORLIC (1983). From high values of coherence squared between sea-level and geopotential height of the 500 mb surface in the low-frequency band (0.1 - 0.01 cpd.), it was concluded that the atmosphere and sea may be approximated by a constant-parameter linear system. In most simulations of response of the Mediterranean Sea to the air-pressure forcing, the modeling area was split in two basins with variables spatially averaged within each of them (e.g. CANDELA *et al.*, 1989). In order to probe dynamics of subinertial atmosphere-sea interaction further, a model of barotropic response of the sea in a channel to travelling air-pressure waves is developed.

Linearized depth-averaged equations of motion and continuity are used to simulate frictionless flow in the f-plane flat-bottom channel. Analytical solution is found for subinertial frequencies (MALACIC and ORLIC, 1992). For the atmospheric wave travelling along the channel whose width is close to the Rossby radius of deformation, model predicts sea levels and currents organized in two coastal waves and geostrophic system in mid-channel (Fig.1). The structure is coupled to the atmospheric wave. The right-hand coastal wave is moving in the direction of the free Kelvin wave, therefore is more pronounced than the left-hand wave. The motion is resonantly driven when phase velocity of the forcing wave approaches Kelvin-wave velocity.

When the atmospheric wave is moving across the channel at a sharp angle, response of the sea is enhanced for phase velocities below those of free shallow-water waves, due to reflections at channel boundaries. For the atmospheric wave that travels at right angle across the channel, resonance is not possible, and sea level undershoots inverted-barometer response. Now, both travelling and standing waves appear in the channel. In the narrow channel limit only standing wave remains, with nodal line in the middle of the channel.

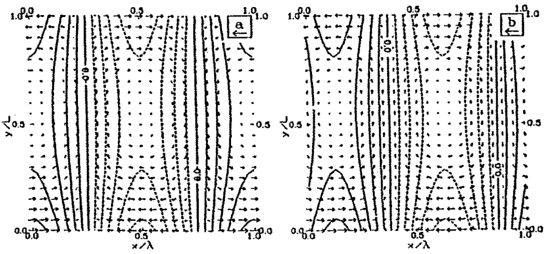


Fig. 1. Elevation contours and velocity distributions for the along channel forcing. The channel width equals $2Ro$ ($Ro$ = Rossby radius of deformation), the channel depth amounts to $10^3$m. The atmospheric wave of wavenumber $K = Ro^{-1}$ and angular frequency $\Omega = 0.1\ f$ ($f$ = Coriolis frequency) is moving from the left towards the right sides of plots. Maps are for two instants a quarter of period apart. Solid lines represent positive elevations, while dashed are negative elevations. Contouring interval is interval is $0.2\ \xi_0$ where $\xi_0$ - amplitude of the atmospheric wave in sea-level units - equals 10 cm. The velocity scale of ~ 1 cm/s is shown in the frame within each map.

## REFERENCES

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