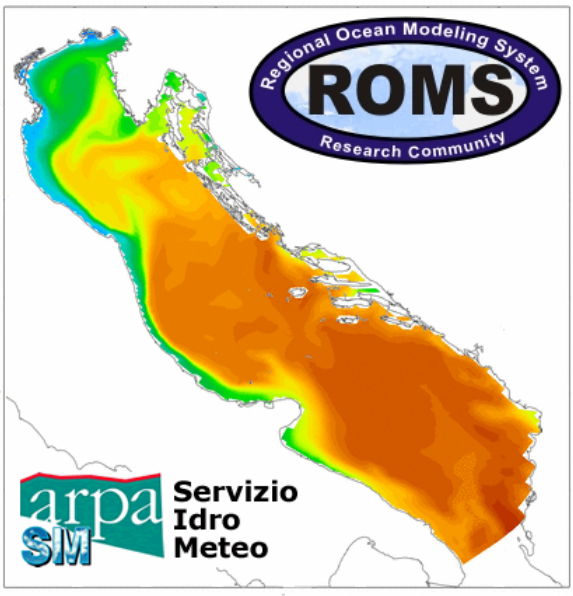
AdriaROMS 3.0



AdriaROMS is the operational ocean forecast system for the Adriatic Sea running at ARPA-SIM. It is based on the ocean model Regional Ocean Modeling System (ROMS, version 3.0). The system is operational since June 2005 (Chiggiato and Oddo, 2008). The current version, 3.0, is operational since April 2008.

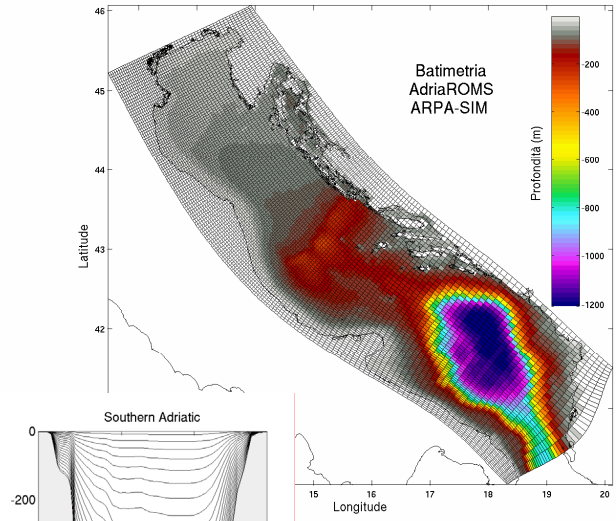
This Adriatic configuration has a variable horizontal resolution, ranging from 3 Km to the north Adriatic to ~10 Km to the south, with 20 vertical non-linear terrain-following s-coordinates. The spatial resolution of the original bathymetry, collected during the project ADRIA02, is some 300m.

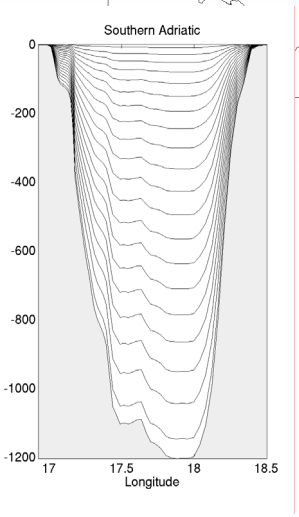
Initial conditions were provided by optimal interpolation mapping of CTD casts collected during the August 2006 oceanographic cruise DART06b *Dynamics of the Adriatic in Real Time* (NR/V Alliance).

Surface forcing is guaranteed by the atmospheric limited area model COSMO-I7 (formerly LAMI), non hydrostatic with 7 Km horizontal resolution, that provides tri-hourly shortwave radiation, 10 m wind, 2m temperature, relative humidity, total cloud cover, mean sea level pressure and precipitation. All of them are used to compute momentum, heat and freshwater fluxes and the effect on sea level of the atmospheric pressure.

Boundary conditions, to the south, are radiation/relaxation of mean daily forecast of temperature, salinity, currents from the general circulation model of the full Mediterranean MFS, managed by INGV, with superimposed 4 major tidal harmonics (S2, M2, O1, K1).

Fourthy-eight rivers (and springs) are included as well, using monthly climatological values from Raicich (1996). For the Po river, the biggest, it is used the persistence throughout the forecast.





The set-up of AdriaROMS has been possible also thanks to insightful suggestions and various contributions of several researchers: Richard Signell, John Warner (USGS), Hernan Arango, John Wilkin (Rutgers University), Nadia Pinardi (INGV).

The implementation of the system has been carried out within the framework of the European projects FP V MFSTEP, INTERREG IIIB CADSES – CADSELAND and the national MODMET.

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Technical notes on AdriaROMS 2.0 configuration

- ROMS is a 3D, free surface, hydrostatic, primitive equations, finite difference, fully non linear model that solves the Reynolds-averaged Navier-Stokes equation. (for more info about ROMS kernel see Shchepetkin and McWilliams, 2005 or Haidvogel et al., 2007).
- Non linear terrain-following vertical s-coordinates
- Orthogonal curvilinear horizontal coordinated, staggered on a Arakawa C grid

- MPDATA family advection scheme (Margolin and Smolarkiewicz, 1998).
- Density based laplacian with spline reconstruction of vertical profiles for the accurate representation of the baroclinic pressure gradient (Shchepetkin and McWilliams, 2003).
- No horizontal viscosity, while a weak horizontal diffusivity, grid-size dependent, is applied by a laplacian operator. Mixing of tracers is along geopotential surfaces while momentum along s-surfaces.
- GLS generic for vertical turbulence closure, as coded in Warner et al. 2005.
- Radiation-relaxation boundary condition for momentum-temperature-salinity from MFS model. Tidal elevation and currents are applied as well, following Flather (1976).
- The shortwave radiation is imposed (LAMI output), the longwave radiation is estimated via Berliand and Berliand formula (Budiko, 1974), turbulent fluxes via Fairall et al. (2003). No relaxation nor correction is applied to the fluxes. The effect of the mean sea level pressure on sea level is considered too.
- Rivers are treated as sources of mass and momentum flux. The evaporation-precipitation flux is treated as salinity flux.

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