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Recent developments in environmental numerical modeling of the oceans

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In Oceanography, numerical modeling makes use of measurements and theories about the behavior of the ocean, in order to enable simulations and forecasts of the processes occurring in it, such as ocean circulation, sediment transport, food chain, etc. In particular, the hydrodynamic numerical models use measurements of sea levels, currents and physical - chemical properties of seawater to solve the basic hydrodynamic equations, in order to reproduce and predict ocean circulation and properties distribution. In fact, the modeling of the circulation is the basis of other models in Oceanography, since its results are used in the modeling of waves, sediments, pollutants, etc. Recent researches at the University of Sao Paulo led to the development of a system able to represent the processes that determine the oceanic circulation from large to coastal scale, the BRAZCOAST System, starting from a basin-scale domain, covering the whole Tropical and South Atlantic, with about 50 km spatial resolution, and ending with several nested grids for different parts of the Brazilian shelf, with resolutions up to 100 m. The large scale model runs since 1950's and has provided information about long term tendencies of sea surface elevation, and three-dimensional currents, temperature and salinity, in the Tropical and South Atlantic. Trends of sea surface rising have been compared to those detected by satellite altimetry. Coastal grids have been used to represent the effects of waves and currents in environmental monitoring, water quality control and support to coastal engineering projects, such as ports building and dredging operations.

Biography

Joseph Harari has completed his MSc in Physical Oceanography in 1978, PhD in Meteorology in 1985 and Postdoctoral studies in Physical Oceanography in 1991, at the University of Sao Paulo (SP, Brazil). His researches are on Numerical Modeling applied to the ocean dynamics and related processes, and he is an Associate Professor in the Postgraduate Program in Oceanography and in the Postgraduate Program in Environmental Sciences, at the University of Sao Paulo (SP, Brazil).

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