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A regional model of the 3-D circulation of the Indonesian Seas

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The developed regional numerical model with high spatial resolution is based on the Princeton Ocean Model. The horizontal resolution of approximately 10km allows for proper resolution of flows within straits such as Lombok, Ombai, the narrowest part of the Makassar Strait, and others. The vertical resolution has been chosen to properly resolve the surface and bottom Ekman boundary layers and the salinity maximum usually located at 150-200m. The adaptation of the bottom topography based on ETOPO5 has been done by using carefully chosen smoothing. The motion in the whole Indonesian Seas area was assumed to be forced by the inflow and outflow of water due to well pronounced currents such as the Mindanao Current, New Guinea Coastal Surface Current and New Guinea Coastal Undercurrent, North Equatorial Countercurrent, and the major outflow through an appropriately chosen section in the Indian Ocean. So the model has 4 ports simulating these inflows and outflows. The total transports through these ports have been taken from observations. Simple distributions of the transport velocities across the ports have been assumed to provide the open boundary conditions for the barotropic velocities. Typical vertical distributions of velocities within the ports, known from observations, have been incorporated into the model. At the entrance to the ports we used linearized momentum equations with nudging to observed velocities and modified friction. Such equations provide us with values for the baroclinic velocities at the open boundaries. The standard boundary conditions for temperature and salinity have been applied. Technically it appeared convenient to introduce the so-called port channels for tapering off the nudging and additional friction. Such a technique made it possible to do all needed adaptation outside the main region of interest thus not modifying any of the basic equations within this region. It is shown that

the model reasonably reproduces the basic features of the Indonesian Seas circulation. The role of the bottom form stress in the overall momentum balance is discussed.