



Pathways of the upwelling water in the Benguela Current

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The Benguela Current is one of the most productive regions of the world oceans because of the upwelling of cold, nutrient rich water. The properties of the upwelling water depend on its origin. We analyze the origin and the pathways of the upwelling water in a $1/30^\circ$ nested ocean general circulation model. The mean meridional currents in the upwelling system are geostrophic and given by the pressure difference from the sea surface height gradient and the density gradient by the colder upwelling water. To study how they feed the upwelling, we seed Lagrangian particles near the surface and calculate their trajectory backward. We find that north of 23°S most particles come from the tropical Atlantic Ocean through the poleward undercurrent in 150m depth. South of 23°S most of the particles come from the South from about 250m depth, mainly from the Indian Ocean and some from the South Atlantic gyre. These two upwelling water masses have almost the same density, but the southern water is fresher and colder. Overall, the relatively cool and fresh Indian Ocean Central Water is the largest source of the upwelling water, contributing around half of the upwelling transport.