

INTERACTIONS BETWEEN SOMALI CURRENT EDDIES DURING THE SUMMER MONSOON: INSIGHTS FROM A NUMERICAL STUDY

Dr. Bernard Barnier

IGE - Institut des Géosciences de l'Environnement, Grenoble
SIO - Shirshov Institute of Oceanology, Moscow

During the summer monsoon, the ocean circulation of the northeastern Indian Ocean is characterized by large anticyclonic circulation features that are part of the Somali Current system. In the vicinity of the equator is the Southern Gyre (SG), a large retroreflection loop of the East African Coastal Current, generated after this current (pushed by the southwesterly winds) has crossed the equator. North of it is the Great Whirl (GW), a large anticyclone which exhibits intense swirling currents. Several eddy-resolving hindcast simulations of the global ocean circulation, differing by some key numerical parameters, are used to study the fast interactions between these large anticyclonic eddies. The present investigation identifies the origin and the subsequent development of the cyclones flanked upon the Great Whirl (GW) previously identified by in satellite observations and establishes that similar cyclones are also flanked upon the Southern Gyre (SG). These cyclones are identified as major actors in mixing water masses within the large eddies and offshore the coast of Somali. All simulations bring to light that during the period when the Southwest Monsoon is well established, the SG moves northward along the Somali coast and encounters the GW. Most frequently, the interaction between the SG and the GW is a collision without merging, collision during which the GW is pushed to the east of Socotra Island, sheds several smaller patches of anticyclonic vorticity, and often reforms into the Socotra Eddy, thus proposing a formation mechanism for the Socotra Eddy. During this process, the GW gives up its place to the SG which in turn becomes a new Great Whirl. This process is robust throughout most simulations, but other type of interactions occurs in the simulations. The dependence of the eddy interaction scenario to numerical parameters is discussed.