



## **The influence of the river inflow on the circulation and dynamics of the Adriatic and Northern Ionian Sea**

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The aim of this study is to understand and to assess the effects of the river runoff on the circulation and dynamics of the Central Mediterranean Sea in particular regarding to the Adriatic Sea, which is known to be a dilution basin, and the Northern Ionian Sea.

River mouths are sources of both momentum and buoyancy produced by the release of light fluid into a denser ambient. River inflow strongly affects the shelf area near estuaries called Regions Of Freshwater Influence, ROFIs, but it is often also a significant forcing of the large scale thermohaline circulation.

The first objective is to understand how the riverine freshwater inflow affects the estuarine/antiestuarine character and the strength of the Adriatic general circulation in the meridional direction involving both the surface and the basin interior, called Meridional Overturning Circulation, MOC.

A second objective is to assess how well-known processes of the Adriatic and Northern Ionian dynamics are conditioned by the river runoff (dense water formation processes, inflow/outflow boundary currents and Northern Ionian Spreading).

In order to achieve our goal a three dimensional, finite difference model based on the Nucleus for European Modeling of the Ocean (NEMO) code has been implemented in the Central Mediterranean covering both the Adriatic and the Ionian Seas. Two twin experiments, respectively with and without the river inflow, have been performed spanning the period from the beginning of 1999 to the end of 2012.

As far as it concerns the river runoff contribution, the model considers the estimate (via hydrological modeling and available observations) of the runoff of the major rivers flowing into the Adriatic and the Ionian Seas available from several datasets. River discharge consists of monthly climatologies for all rivers except Po, for which daily observed data have been adopted.

All the rivers included in the model, 52 flowing into the Adriatic Sea and 15 into the Ionian Sea, have been parameterized as "surface sources" of discharge and salinity.

The inclusion of rivers input as lateral open boundary conditions (considering both momentum and mass fluxes) is under development.

The twin experiments revealed that river affect the qualitative character and the strength of the Adriatic MOC. River influence on Adriatic cyclonic circulation, dense water formation processes and Otranto Strait water exchange have been also demonstrated.