Geophysical Research Abstracts
Vol. 15, EGU2013-2537, 2013
EGU General Assembly 2013


# Dynamics of an Equatorial river plume : numerical experiments applied to the Congo plume case.

Clément Vic, Anne-Marie Tréguier, and Henrick Berger
Laboratoire de Physique des Océans, Brest, France (clement.vic.29@gmail.com)

[a4paper,11pt]article [utf8]inputenc [T1]fontenc [english]babel [scale=0.75]geometry setspace

# Dynamics of an Equatorial river plume : numerical experiments applied to the Congo plume case.


Clément Vic　　Anne-Marie Tréguier　　Henrick Berger

Laboratoire de Physique des Océans


January 6, 2013


**Abstract**

The Congo river is the second largest river in the world with a mean flow rate of $42000\ \mathrm{m}^3/\mathrm{s}$. Observing the salinity in the Gulf of Guinea (SMOS data, GlobColour data, *in situ* data, realistic numerical simulations), a large tongue of desalinated water is revealed off the Congo river mouth with a horizontal scale of about $1000\ \mathrm{km}$. Therefore, it seems clear that the Congo plume plays an important role in the mean salinity of the region as well as in its variability.

Many theoretical and numerical studies have described the dynamics of mid-latitude river plumes and associated mechanisms of advection and diffusion of fresh water. However, no study can be applied to the Congo case, because of its low latitude location ($6^\circ$S) and its huge rate of flow, which generates its proper dynamics. Moreover, analysing the observed datasets and the realistic numerical simulations, it seems difficult to separate these proper dynamics from the external forcings in the region, with steady trade winds blowing to the North-West all year long, and the ambient circulation which could advect fresh water offshore.

The aim of this study is to clarify the dynamics of an Equatorial river plume, using the characteristics of the Congo river in idealized numerical simulations based on the primitive equations NEMO code. We remark that the surface-trapped anticyclonic bulge of the plume reaches a critical size before becoming strongly turbulent and transporting lenses of fresh water in the cross-shore direction. A strong steady current to the West is generated and appears trapped by the Equator. Surprinsingly, the coastal current developing in the direction of the Kelvin waves propagation (which has been highlighted in mid-latitude cases) has a negligible impact on the fresh water transport. Another striking feature is the lack of sensitivity of the plume to the bottom topography. Sensitivity experiments reveal that the bottom topography has no impact on the shape of the surface-trapped bulge in the parameter range relevant to the Congo. We conclude that the near Equatorial position and the massive rate of flow are the key parameters controlling the dynamics of the Congo plume.