Investigating the variability of the upper ocean biogeochemical content of the tropical Atlantic

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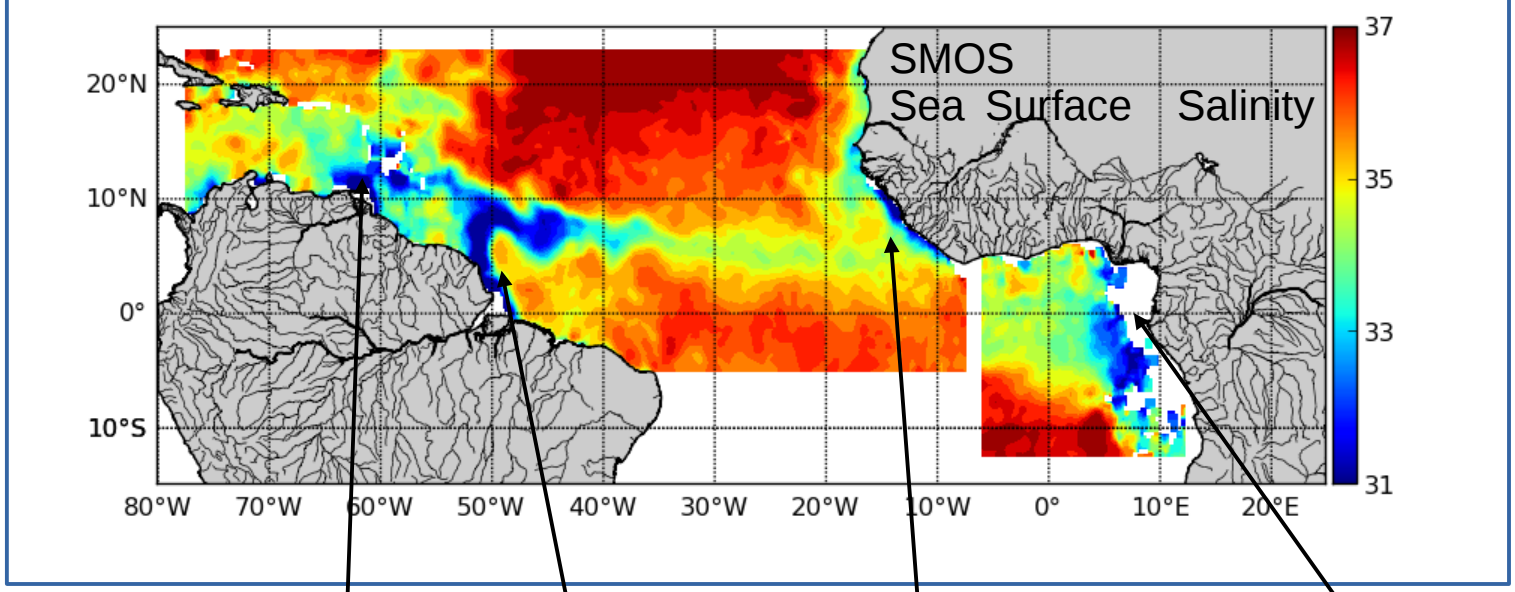
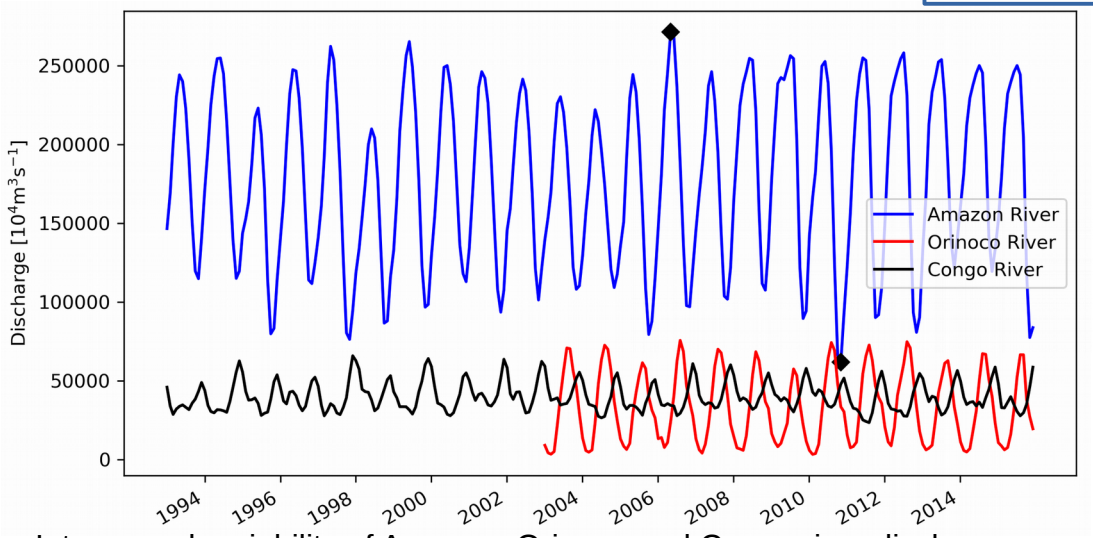


Orinoco

Amazon

Sierra Leone rivers

Congo+Niger

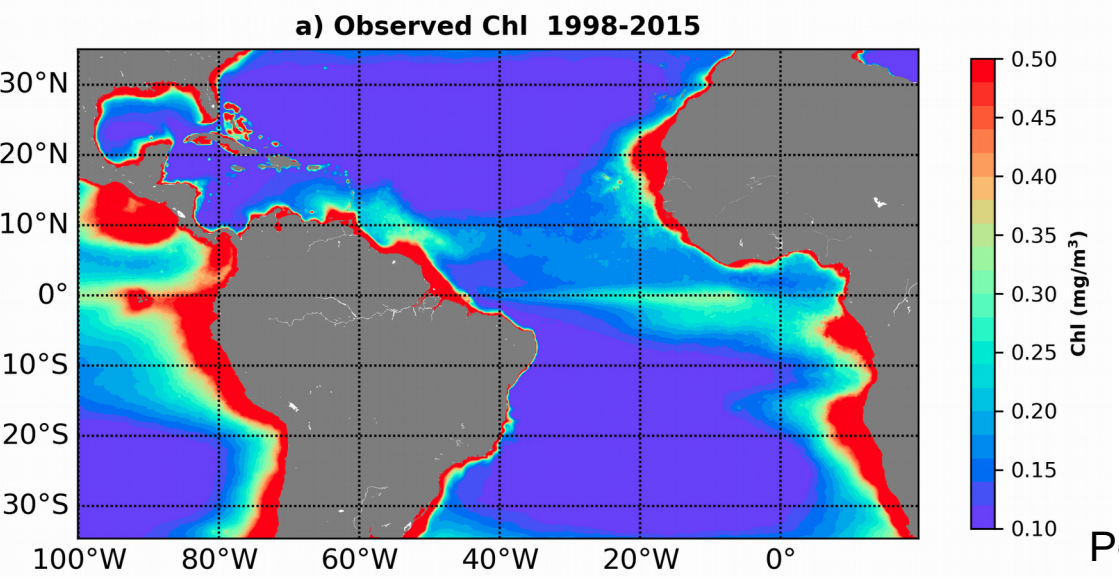


Interannual variability of Amazon, Orinoco and Congo river discharges obtained from in-situ measurements (Hybam)

The tropical Atlantic ocean:

-Characterized by permanent oligotrophic waters (da Cunha et Buitenuis 2013)

-Receives the three world's largest rivers, 20% of the worldwide runoff (Dai and Trenberth, 2002)



Annual mean sea surface Chl from globcolour dataset

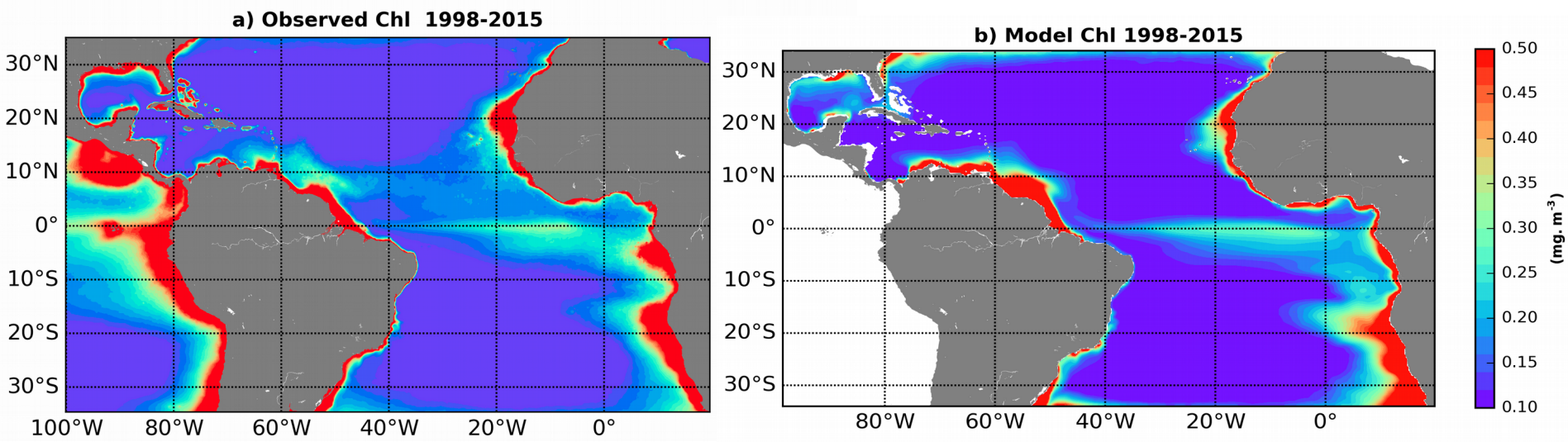
River inputs influence the biogeochemical properties (da Cunha et al., 2013; Araujo et al., 2018)

Guadeloupe. Sargassum algae cut off two islands of the archipelago
https://www.ouest-france.fr/region-guadeloupe/guadeloupe-les-algues-sargasses-coupent-du-monde-deux-iles-de-l-archipel-5739710

Potential link between the Amazon nutrients inputs and the recent mass strandings of the Sargassum (Djakoure et al., 2017)

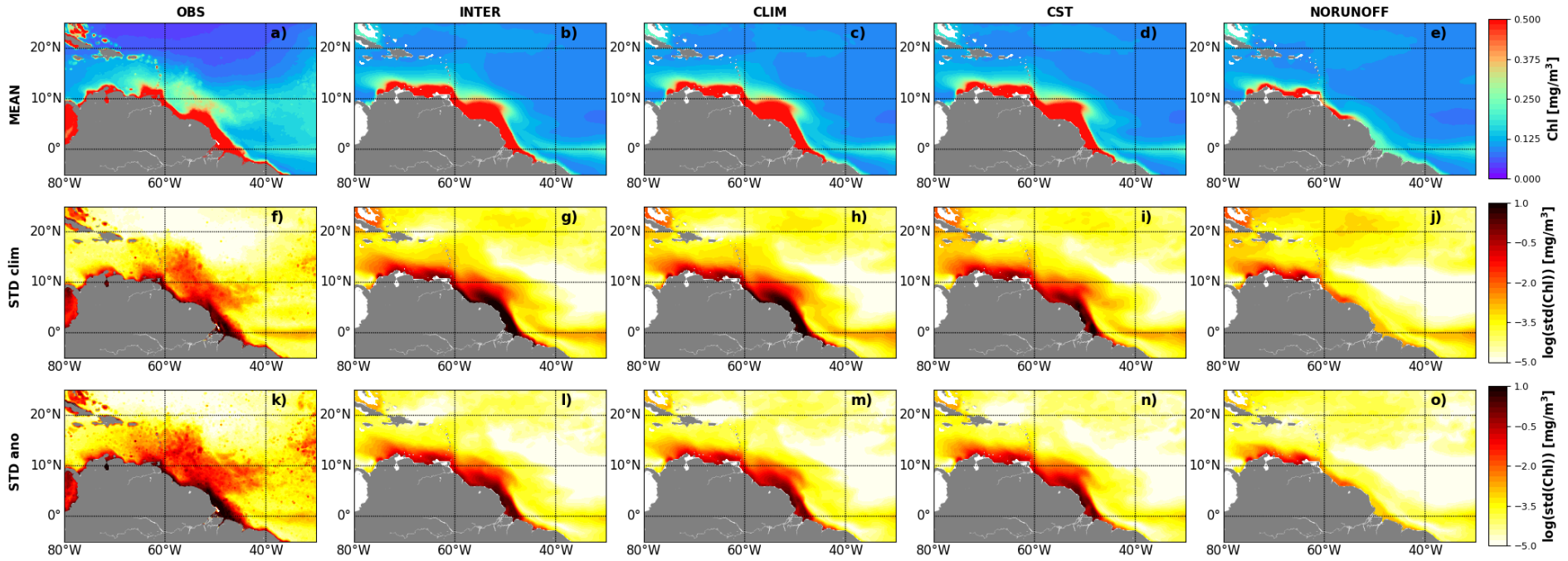
Goal: Set up a regional coupled physical-biogeochemical simulation to investigate the processes responsible for the biogeochemical variability of tropical Atlantic, with a focus on the influence of the Amazon-Orinoco freshwater and nutrient flux.

Four simulations with different freshwater and nutrient flux variability :
- **INTER** : interannual
- **CLIM** : seasonal
- **CST** : constant
-**NORUNOFF**: no Amazon/Orinoco input



Annual mean sea surface Chl from a) globcolour dataset and b) simulation.

Main features of Chl well reproduced by the model;
but misrepresentation in Guinea Dome
-High [Chl] in river plumes, coastal and equatorial upwellings
-Low [Chl] in subtropical gyres



Annual mean [Chl] (top), climatology (middle) and inter-annual (bottom) STD of Chl from observations (a, f and k), INTER (b, g and i), CLIM (c, h and m), CST (d, I and n) and NORUNOFF (e, j and o) simulations

Very large climatological / inter-annual variabilities of observed [Chl] near the American coast with an extension east (Amazon-E) and north (Amazon-N)
-Weak inter-annual variability of [chl] in the model compared to observations
-No significant influence of nutrients flux input variability on [Chl] changes in the Amazon-E

In NORUNOFF some productivity subsists along the western boundary probably due to coastal upwelling