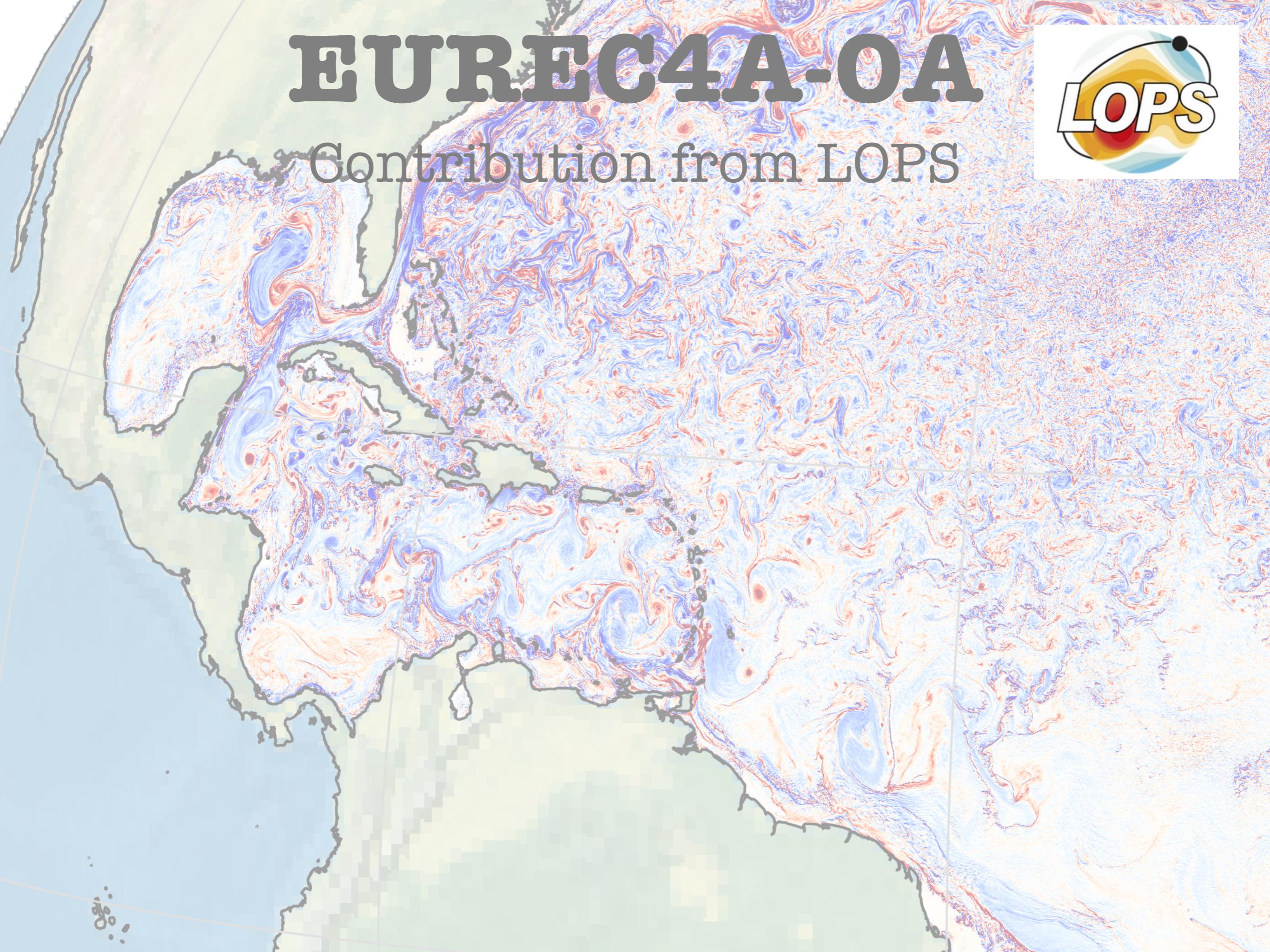


# EUREC4A-OA

Contribution from LOPS



# EUREC4A-OA

## People involved at LOPS:

X. Carton, J.-L. Redelsperger, J. Gula, P. Lhégaret, a postdoc to be hired, A. Vic (PhD - 2020-2023),

## and students:

**O. Lenoble**, M1, April - August 2021, Interactions between near-inertial waves and mesoscale eddies during the EU- REC4a campaign.

**L. Eisenring**, M2, April - August 2021, Submesoscale coherent vortices in the Northwestern Atlantic

**M. Menard**, M2, April - August 2021, Dynamics of river plumes and their interactions with vortices in the Northwestern Atlantic Ocean.

**G. Zerbini**, M2, April - August 2021, Ocean-atmosphere interaction above fronts and eddies during Eurec4a.

In collaboration with S. Speich (LMD) and J. Karstensen (GEOMAR)

# EUREC4A-OA



## Task 1.3 Quantifying the ocean heat and momentum uptake at the ocean small scale

The goal is to identify and investigate **mechanisms associated with small scale ocean structures** and their impact on horizontal and vertical fluxes of momentum, heat, and tracers.

We will use observational data and numerical simulations to investigate

- the **dynamics of eddies** (stability and interactions) under atmospheric forcing modified by the ocean mesoscale activity,
- the **effect of eddies on heat and momentum uptake**, on their horizontal and vertical transport,
- the **effect of sub-mesoscale fronts and instabilities** (the intense vertical flows in frontal structures versus the re-stratification by mixing layer instabilities)
- the **effect of rivers** through the generation of fronts and changes in the properties of the mixed-layer.

# Existing Simulations

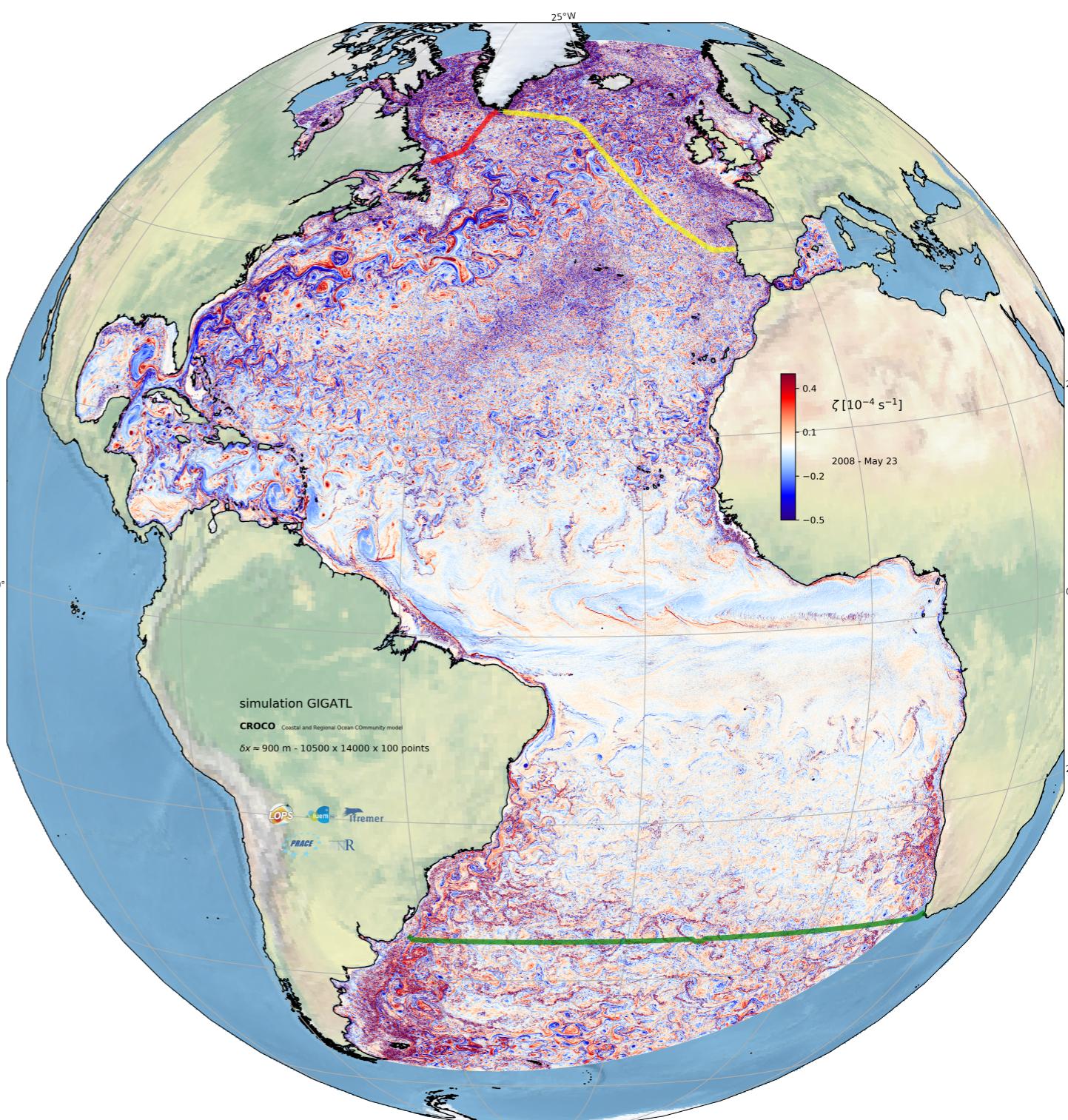
Hierarchy of Fully realistic simulations of the Atlantic Ocean with the terrain-following model CROCO

Including **tides**,  
**hourly atmospheric forcings**  
and **river outflows**

Horizontal resolutions 6 km / 3 km and **1 km** with 100 topography following levels (refined at the bottom)

=  $10500 \times 14000 \times 100$  points

## Simulation GIGATL



# Existing Simulations

## Status of simulations [on 2020-11-09]:

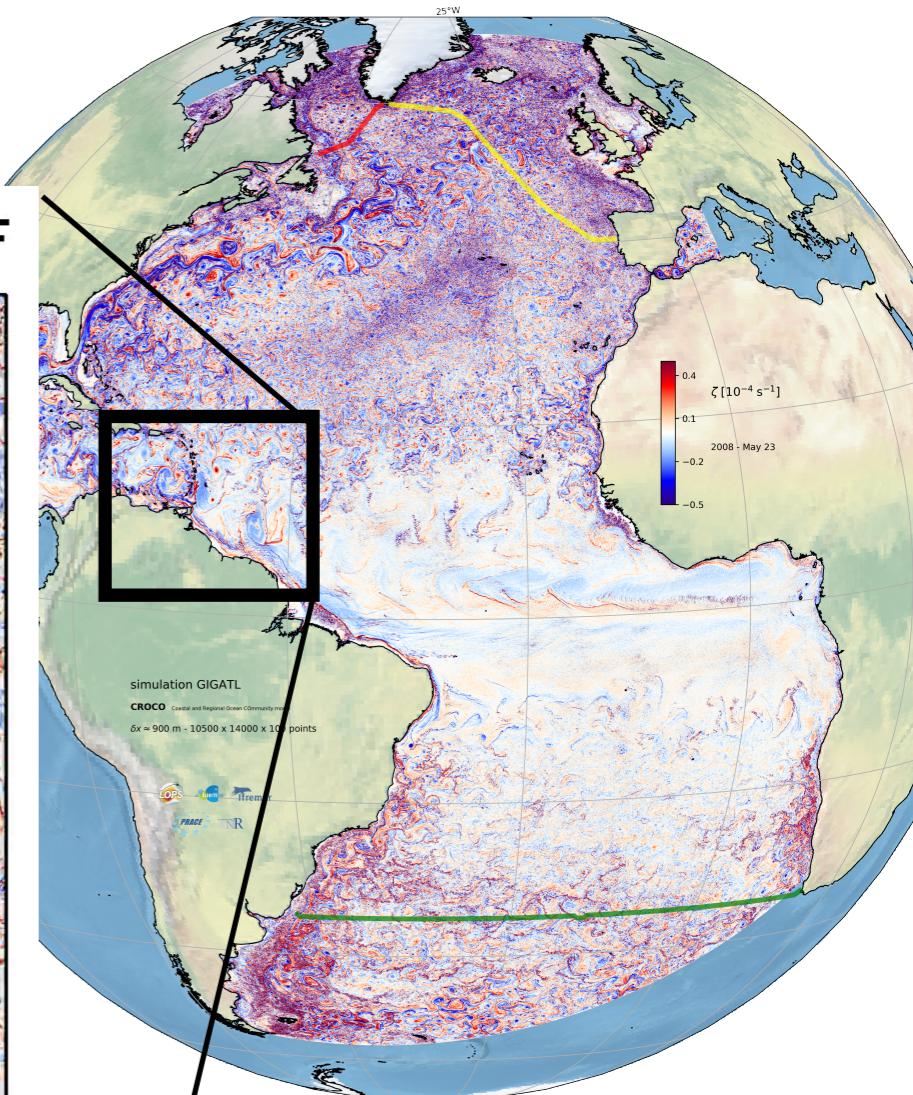
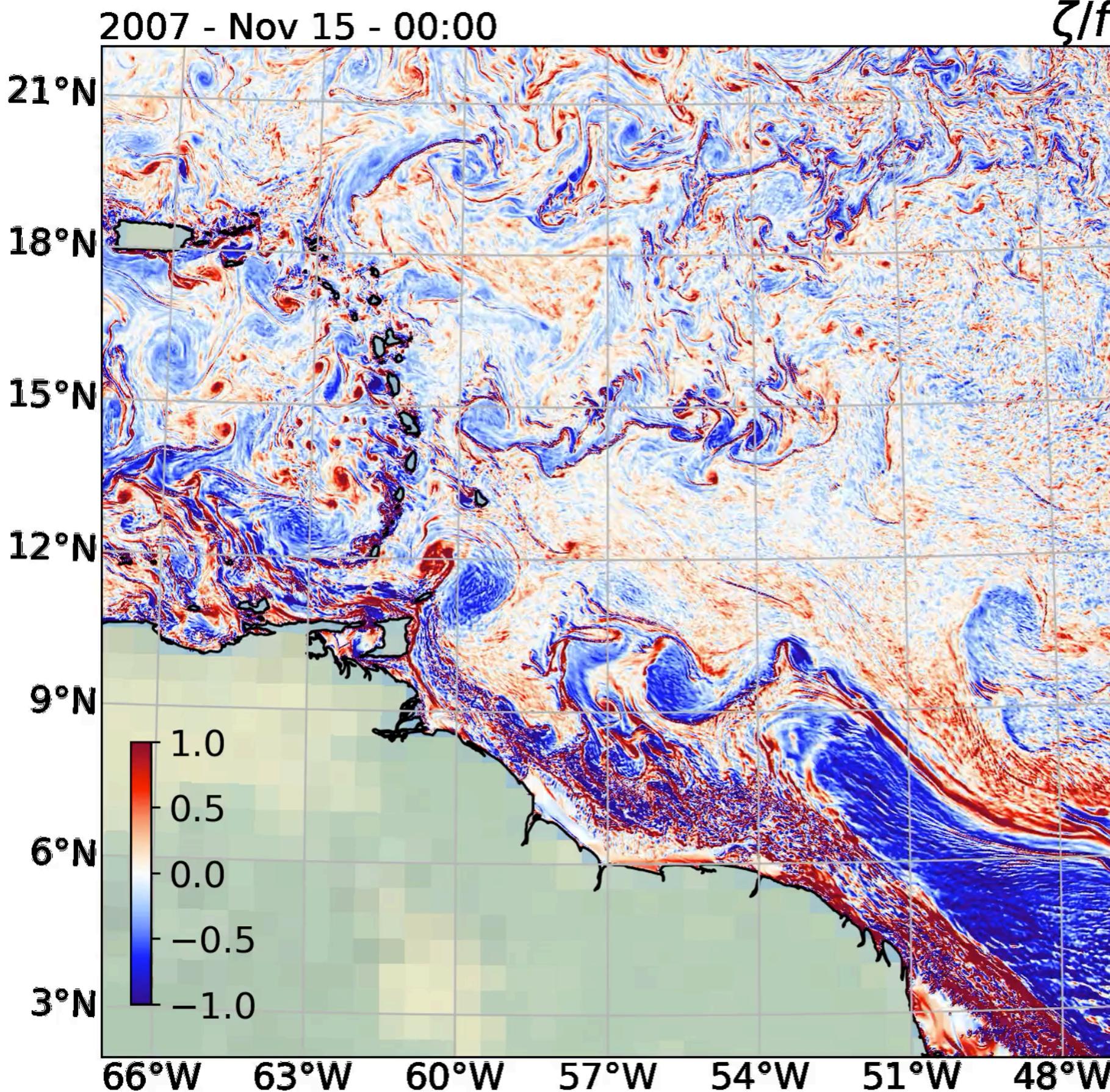
GIGATL6 (many versions) = From 2004-01-01 to 2014-01-01 = 10 years

GIGATL3 (no tides) = From 2004-01-01 to 2013-03-17 = 9.5 years  
GIGATL3 (tides) = From 2007-03-25 to 2009-03-17 = 3 years

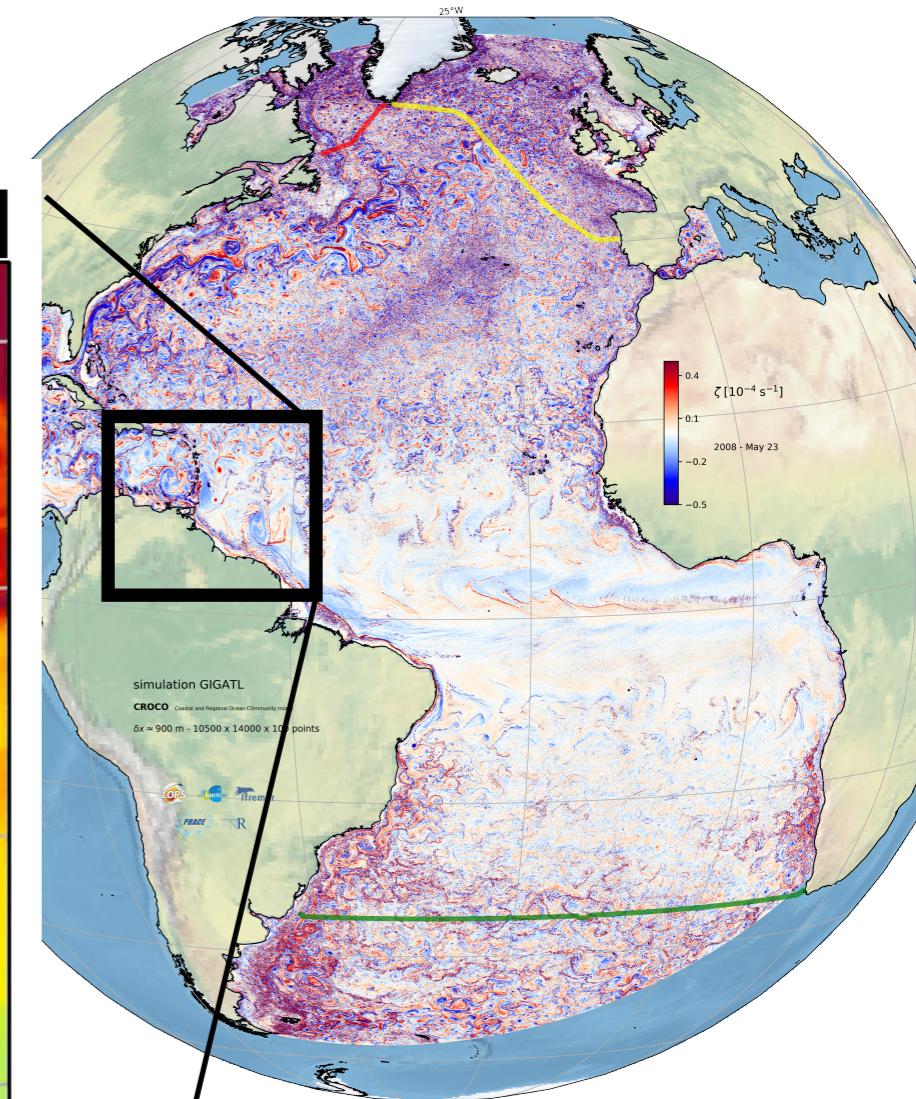
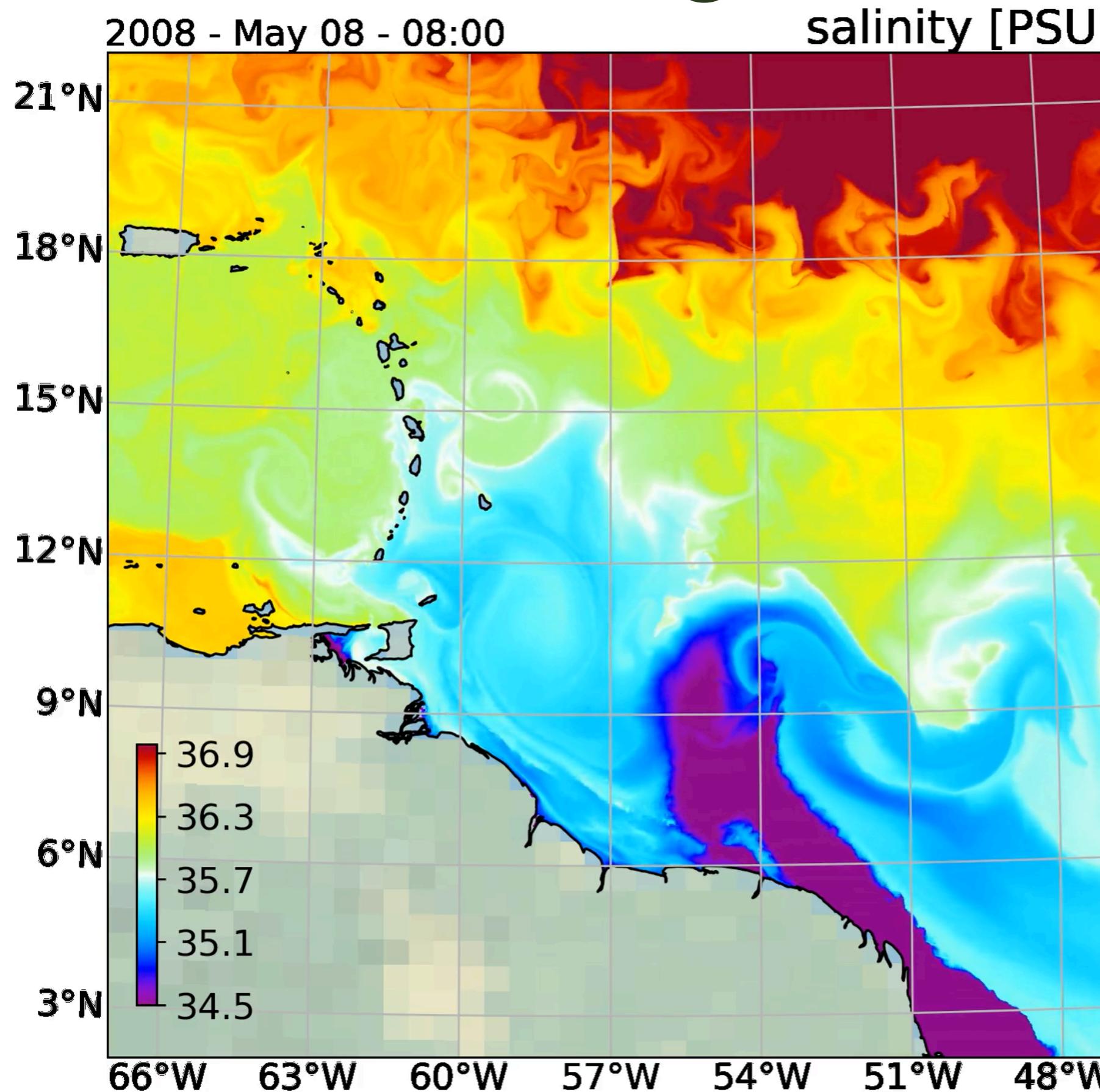
GIGATL1 (no tides) = From 2007-07-12 to 2009-02-19 = 1.6 years  
GIGATL1 (tides) = From 2007-07-02 to 2009-06-12 = 1.9 years

About **5.5Pb** of data so far.

# EUREC4A-OA region



# EUREC4A-OA region



# Next step

**Regional nests with  
CROCO (ocean-only)**

using GIGATL1 boundary  
conditions.

Including **tides (TPXO)**,  
**hourly atmospheric  
forcings (CFSR)** and **river  
outflows**.

**$dx = 300 \text{ m}$ , 200 levels**  
 **$dx = 100 \text{ m}$ , 300 levels**

