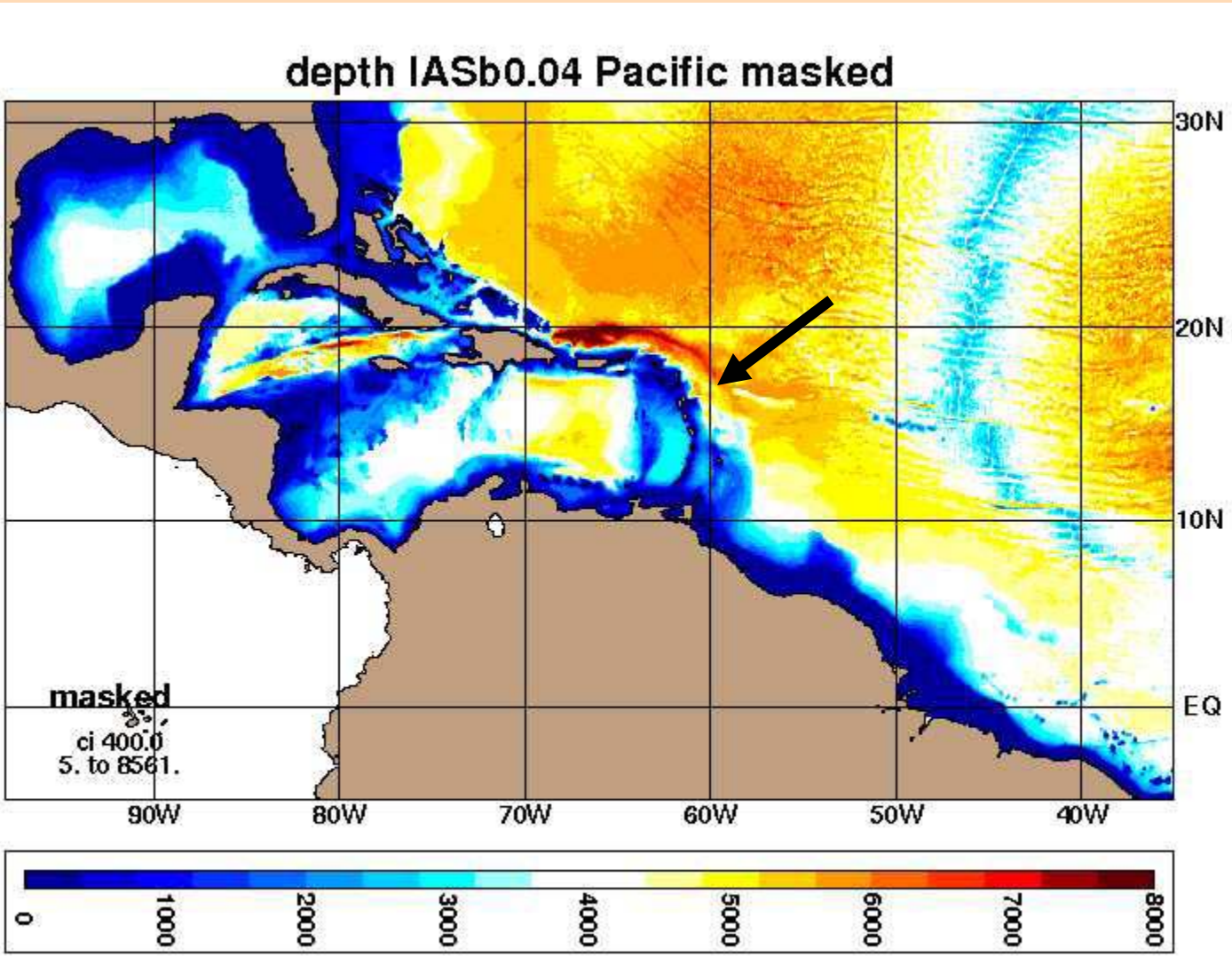
The Wider Caribbean Region
CARIB-HYCOM domain:

(The extended IAS-HYCOM domain:)
preliminary results from nested simulations

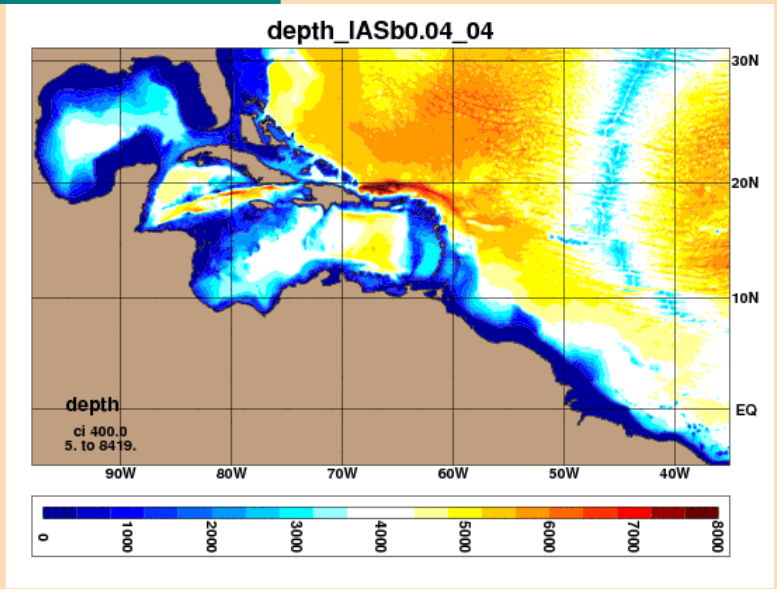
Villy Kourafalou, Zulema Garraffo, George Halliwell, Laurent Cherubin, Claire Paris and Annalisa Griffa

UM/RSMAS

In Collaboration with
Joe Metzger and Alan Walcraft *(NRLSSC)*


depth IASb0.04 Pacific masked
30N
20N
10N
EQ
90W
80W
70W
60W
50W
40W
masked
ci 400.0
5. to 8561.
0
1000
2000
3000
4000
5000
6000
7000
8000

HYCOM Wider Caribbean Region domain



- 1/24° resolution
- Domain: 98W-35W, 5S-31N

- nested to HYCOM expt 07.1, global 1/12° (NRL)

- depth: 5m coastline, merged depth from:
  a) DBDB2 for depth < 10m,
  b) elsewhere interpolated from topography with corrected sills in the NW Caribbean and Florida passages (GLBa0.08 T=7)

- sigma2* (same layers as GLBa0.08 expt 07.1)
- Forcing: (as GLBa0.08 expt 07.1)
  climatological ERA40, 1979-2002.

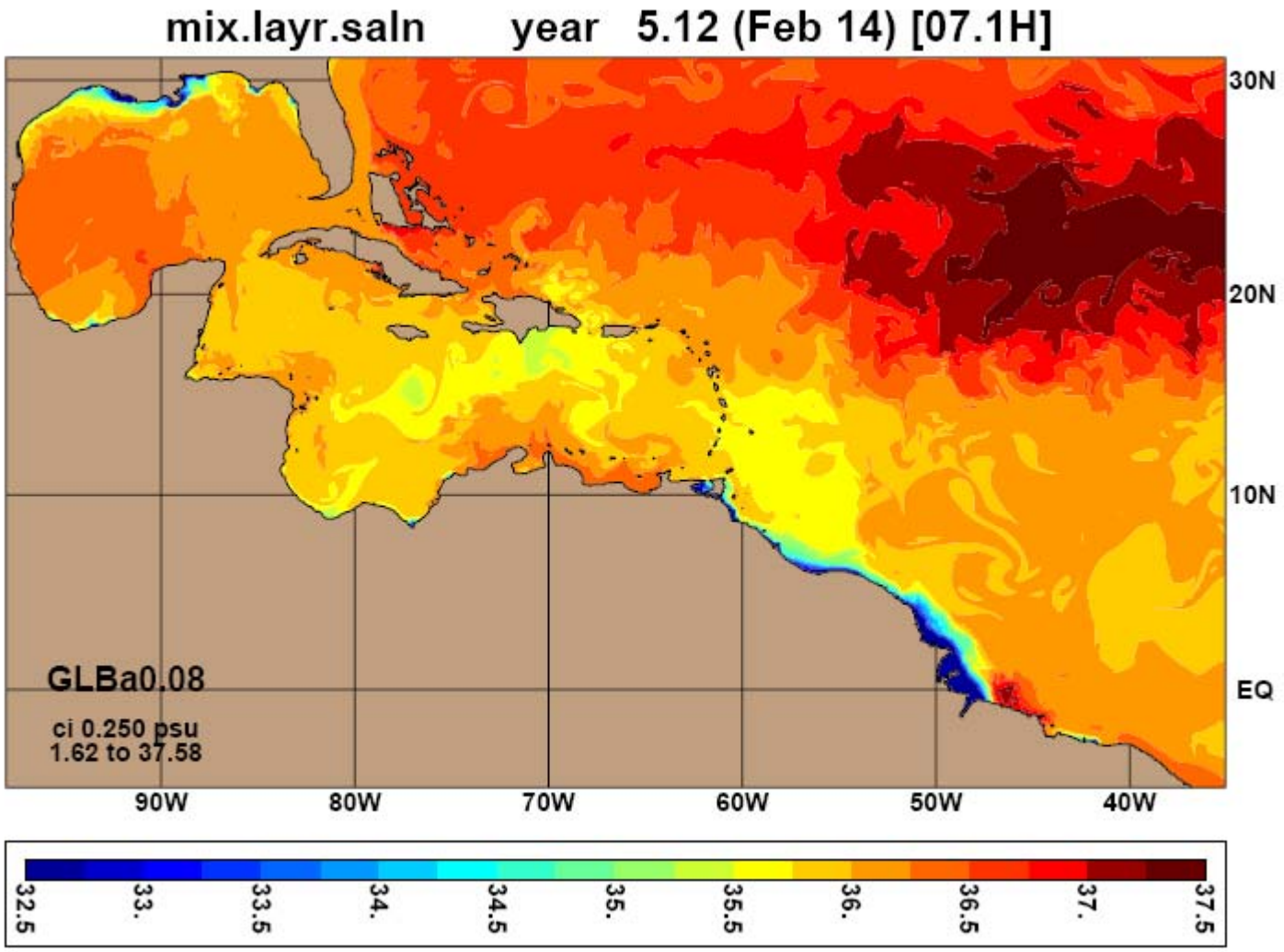
  Thermal forcing: sea-extrapolated
  precip: regression-corrected (GPCP)
  surface salinity: relaxation (30 days).

  Winds: scatterometer corrected wind stress and wind speed, plus 6 hourly anomalies (corresponding to NOGAPS Jan 2003-Jan 2004)

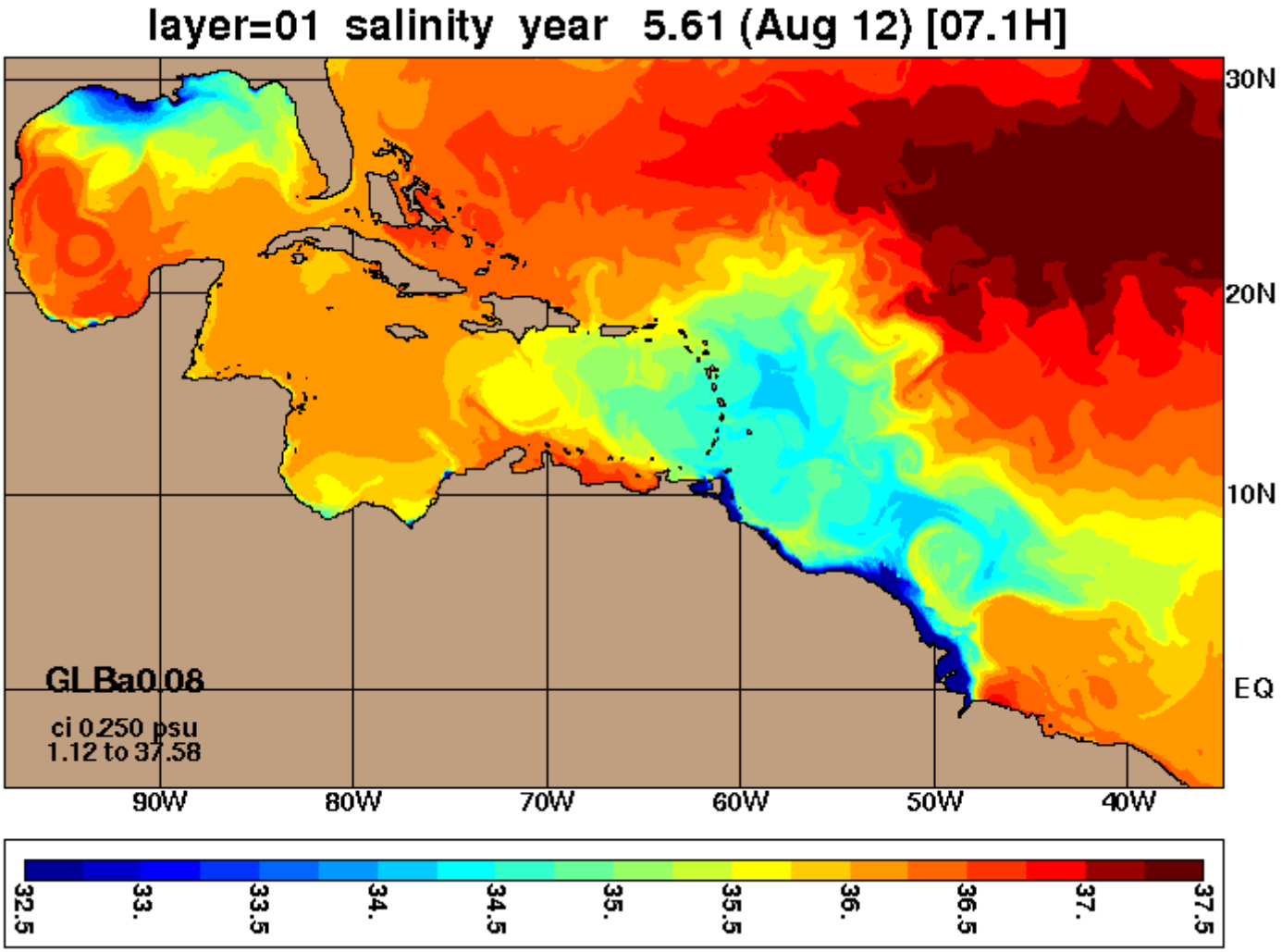
- Lateral boundary conditions: nested (to daily fields of year 6 of GLBa0.08 expt 07.1)
- GISS mixed layer

Seasonal variability in the advection of Amazon and Orinoco low salinity / high nutrient waters

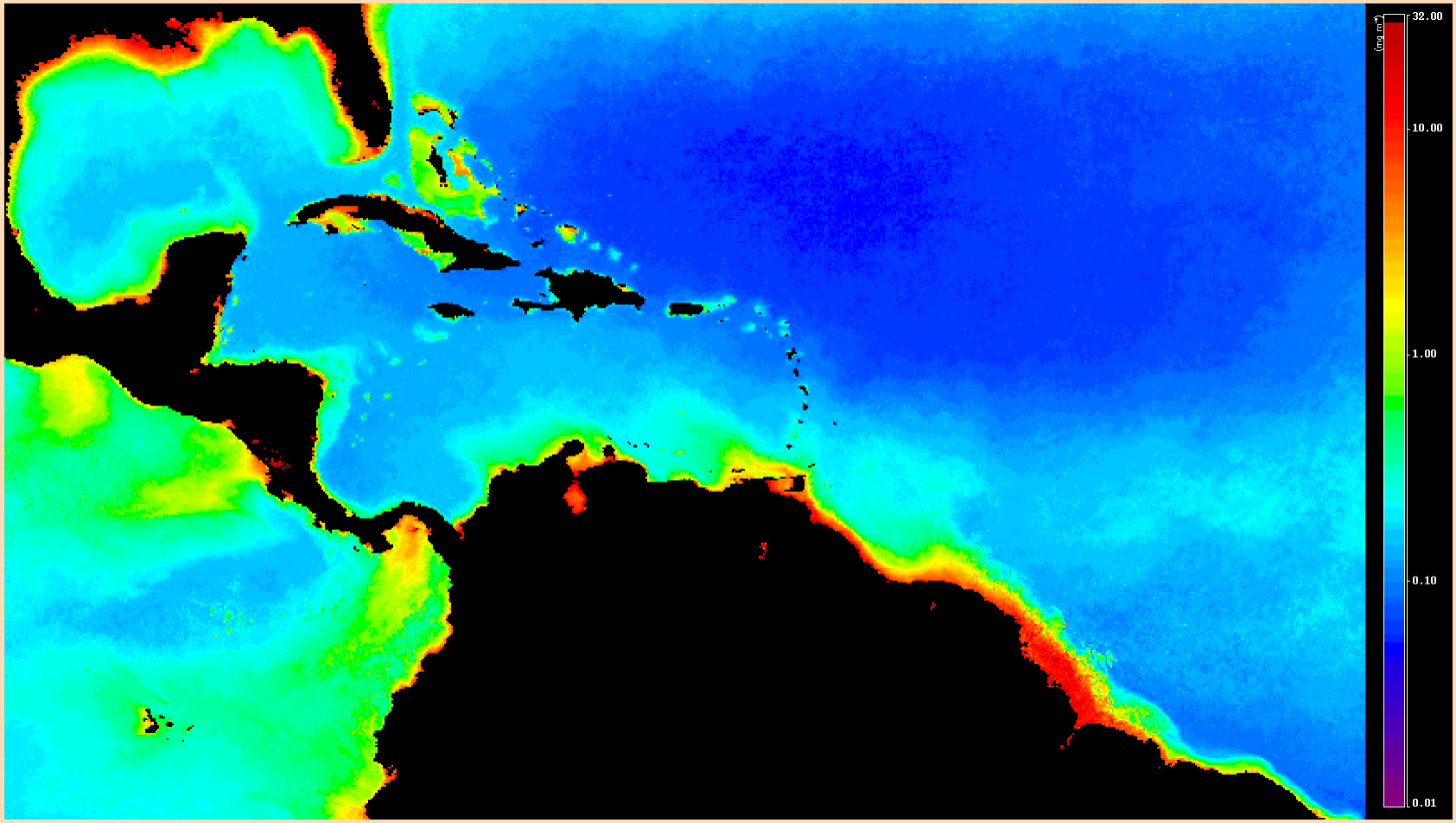
February SSS (daily snapshot)



August SSS (daily snapshot)

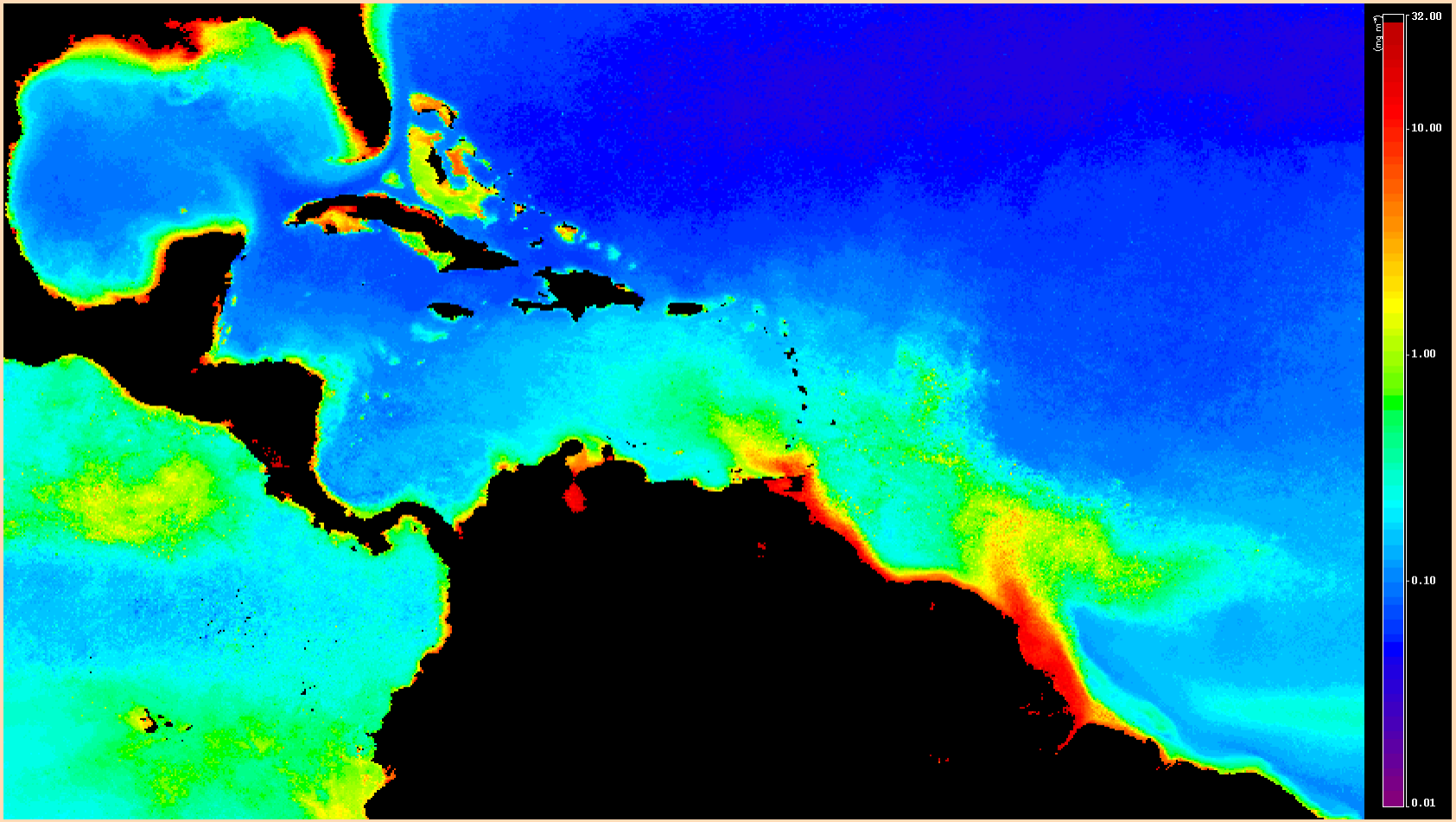


MODIS climatology – February (monthly mean)

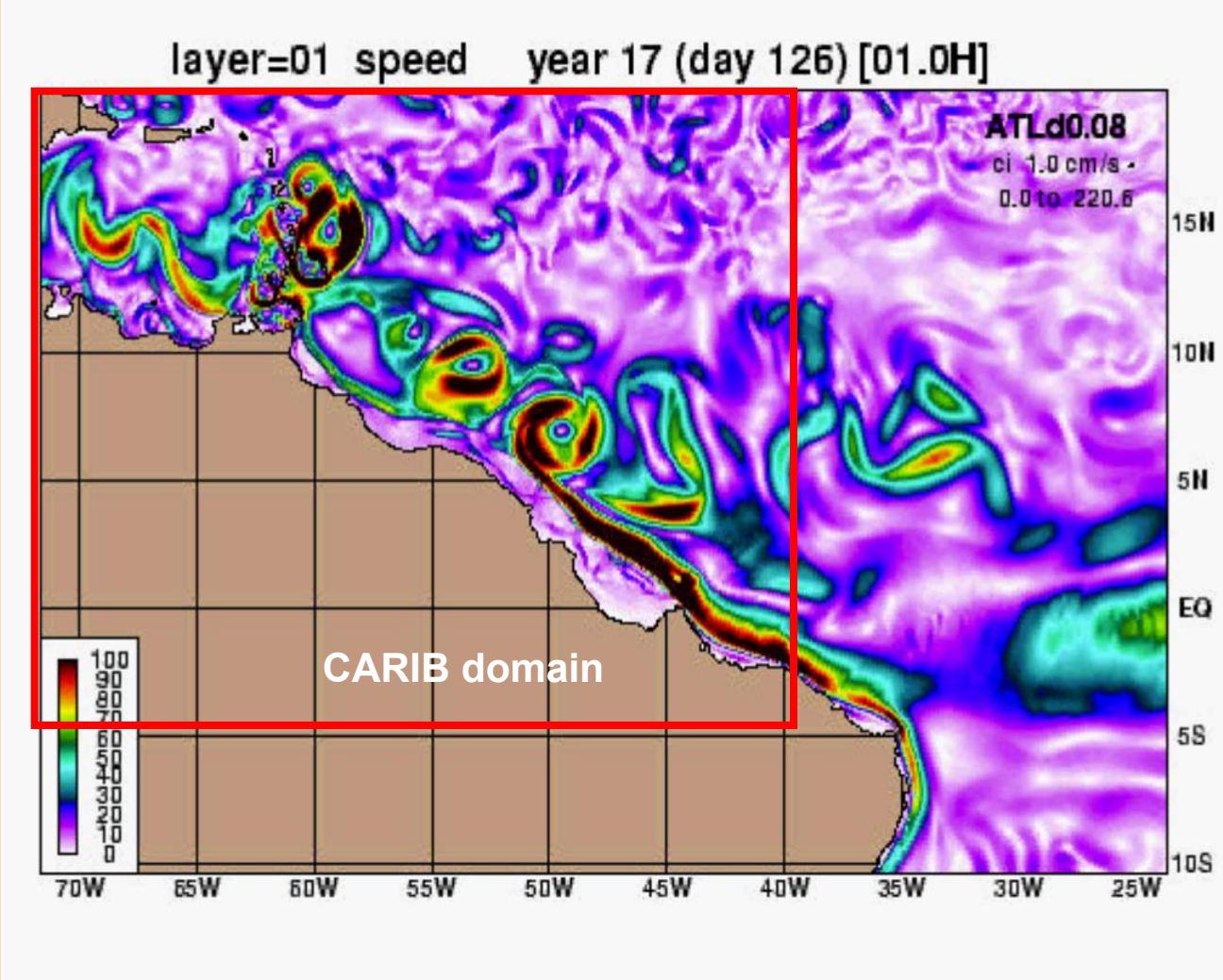


Provided by Viva Benzon, RSMAS satellite group

MODIS climatology – August (monthly mean)



Provided by Viva Benzon, RSMAS satellite group



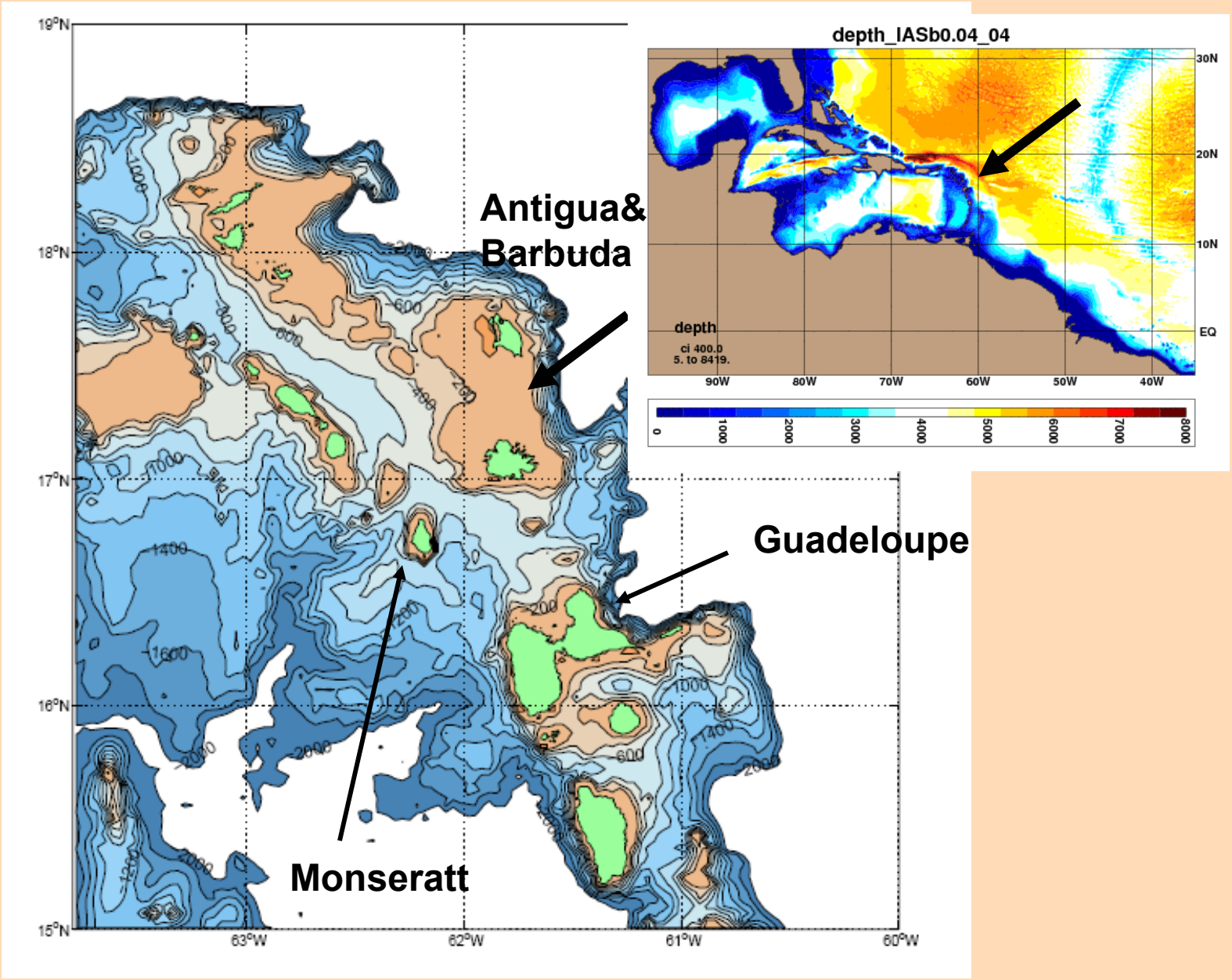
Brazil Current rings (MICOM)

Nested ROMS Model

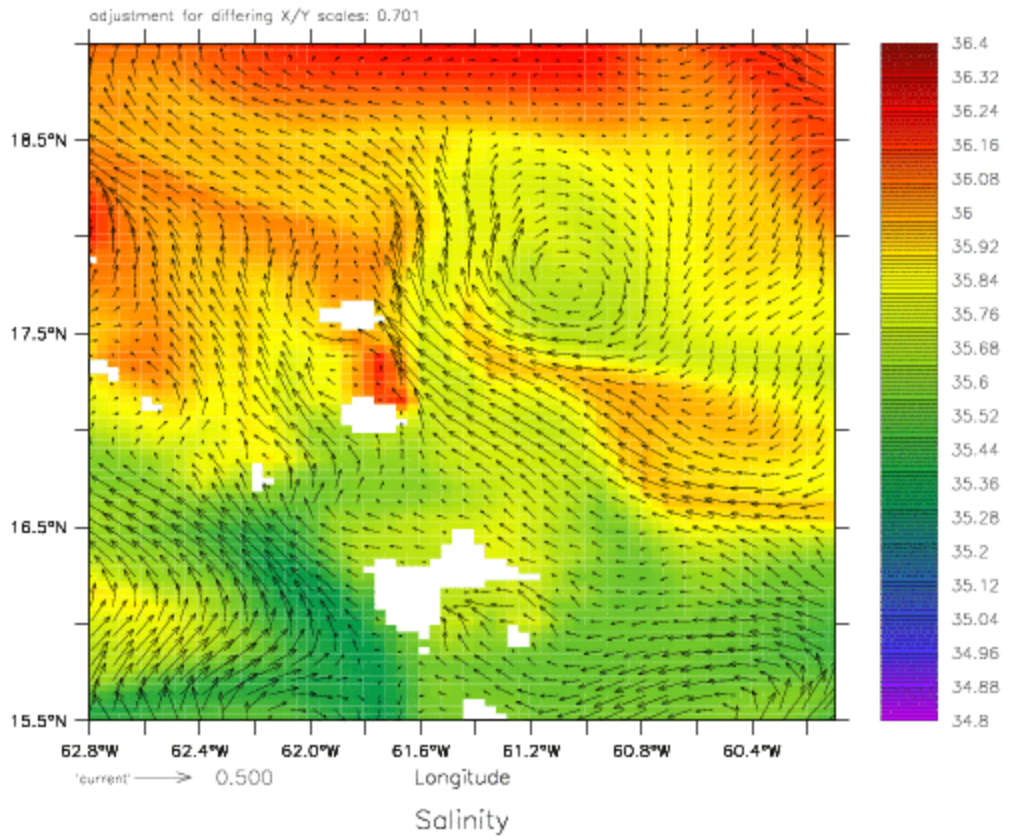
(ROMS: H. G. Arango, Rutgers University and A.F. Shchepetkin, UCLA)

- stretched, terrain-following coordinates in the vertical, 25 layers
- orthogonal curvilinear coordinates in the horizontal (163x221, parent grid, 1.7km)
- Split-explicit time-stepping scheme (Shchepetkin and McWilliams, 1998), dt=240s (no tides).
- Advection scheme: third-order, upstream biased. => velocity-dependent hyper-diffusion dissipation (Shchepetkin and McWilliams, 1998).
- nested weekly (off-line nesting) with the larger scale HYCOM (global / CARIB)

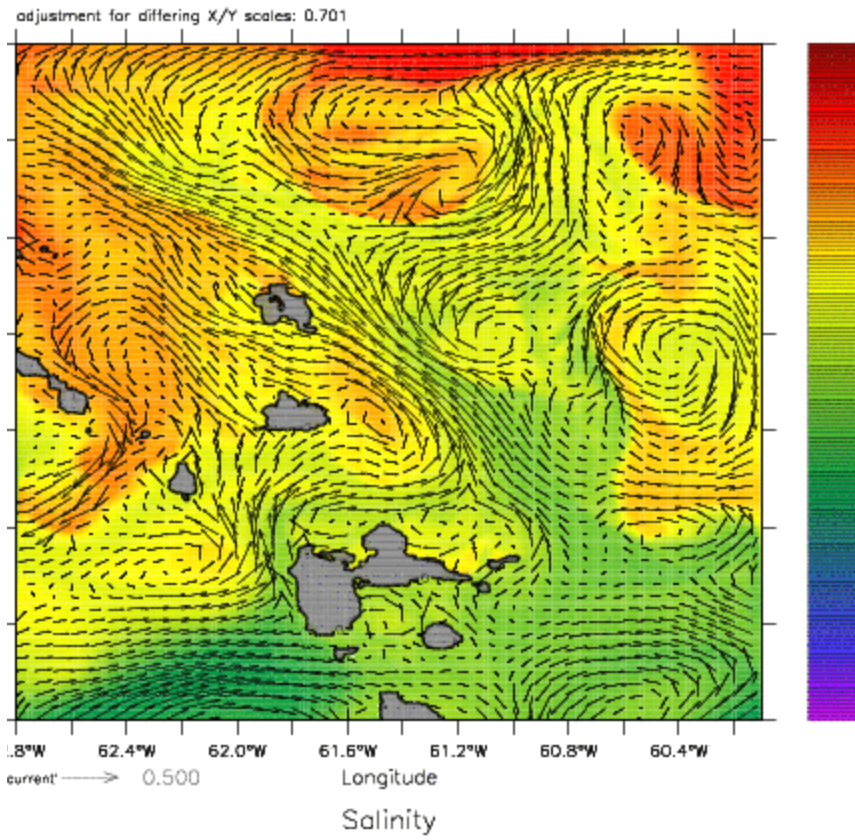
ROMS topography: USGS gtopo30 (~ 1km)



HYCOM SSS and currents

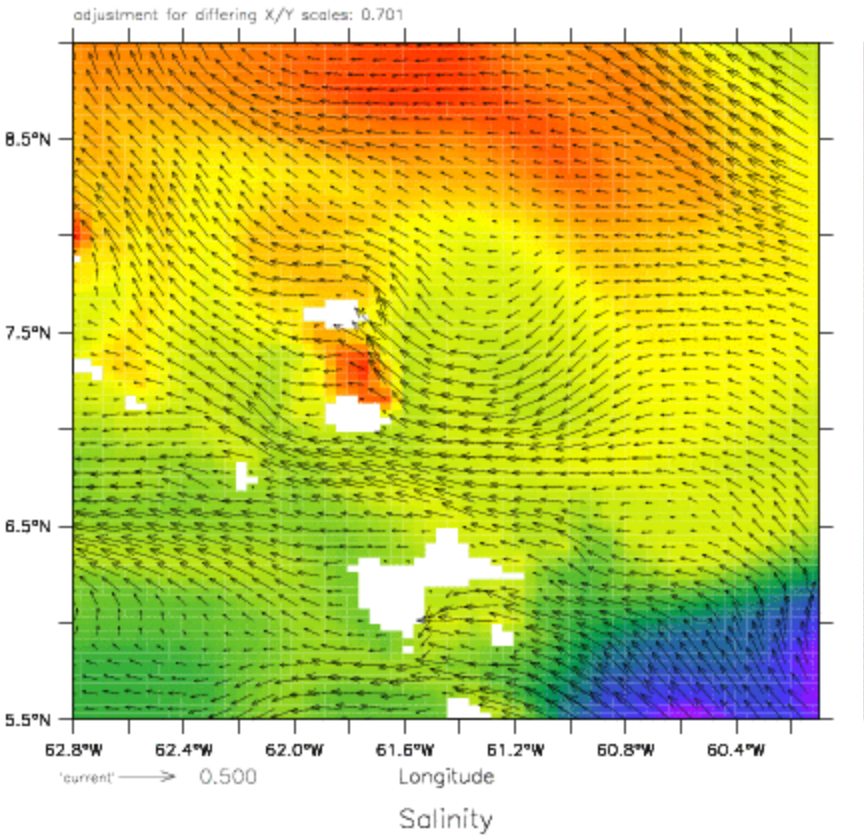


ROMS SSS and currents

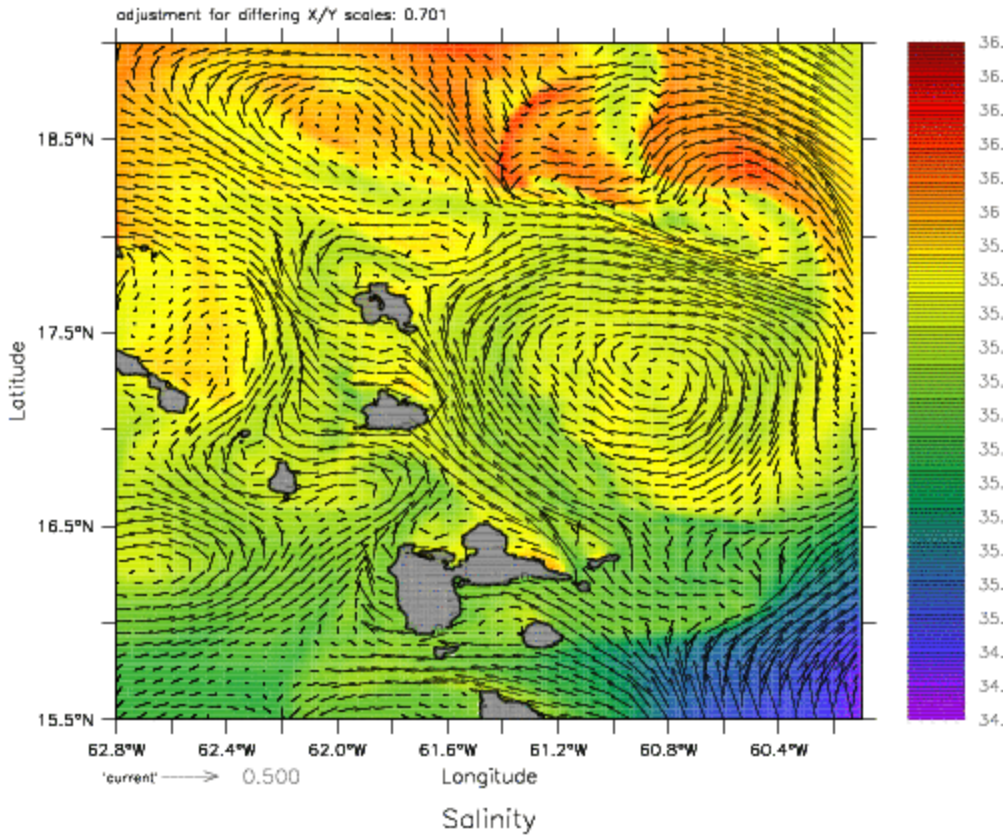


June 1

HYCOM SSS and currents

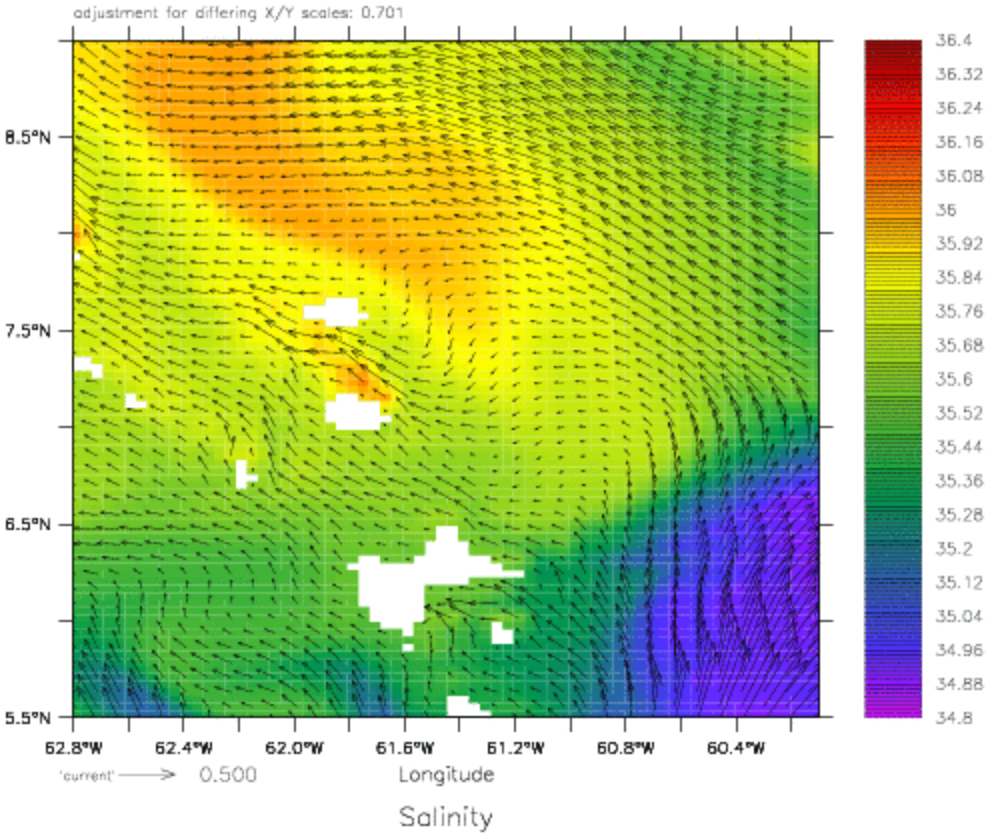


ROMS SSS and currents

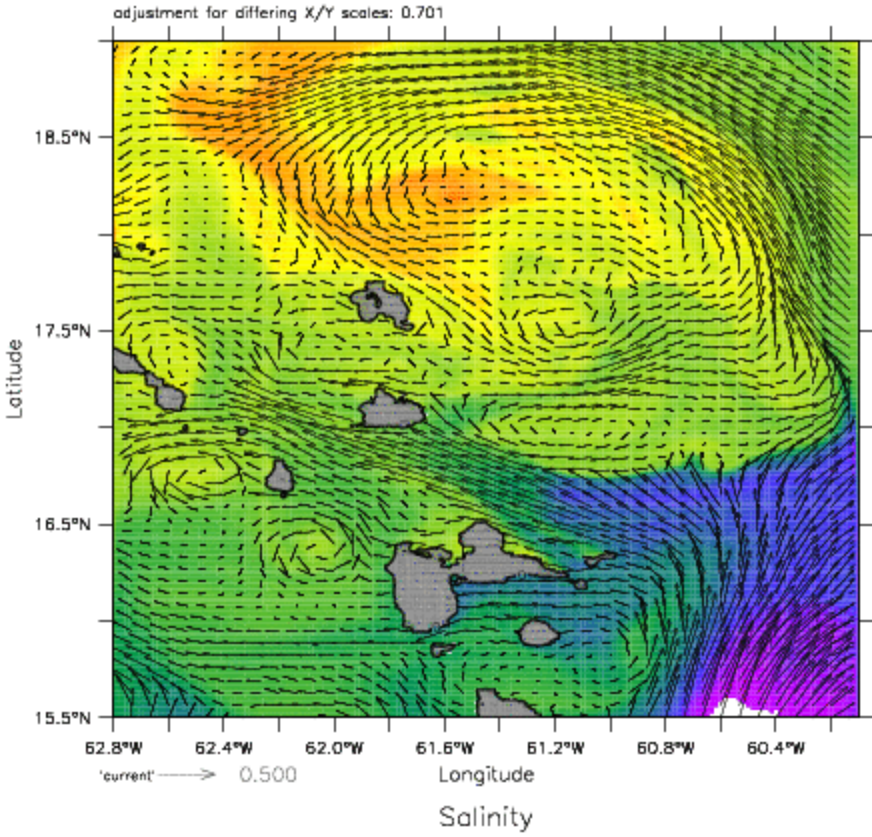


June 15

HYCOM SSS and currents

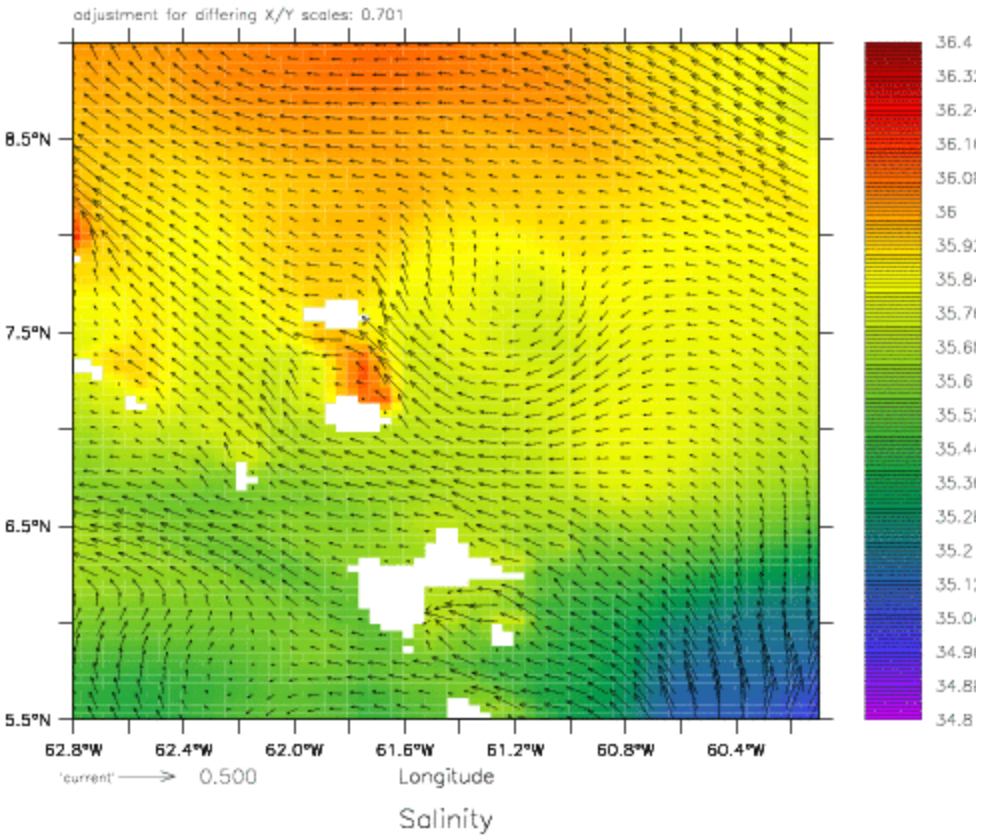


ROMS SSS and currents

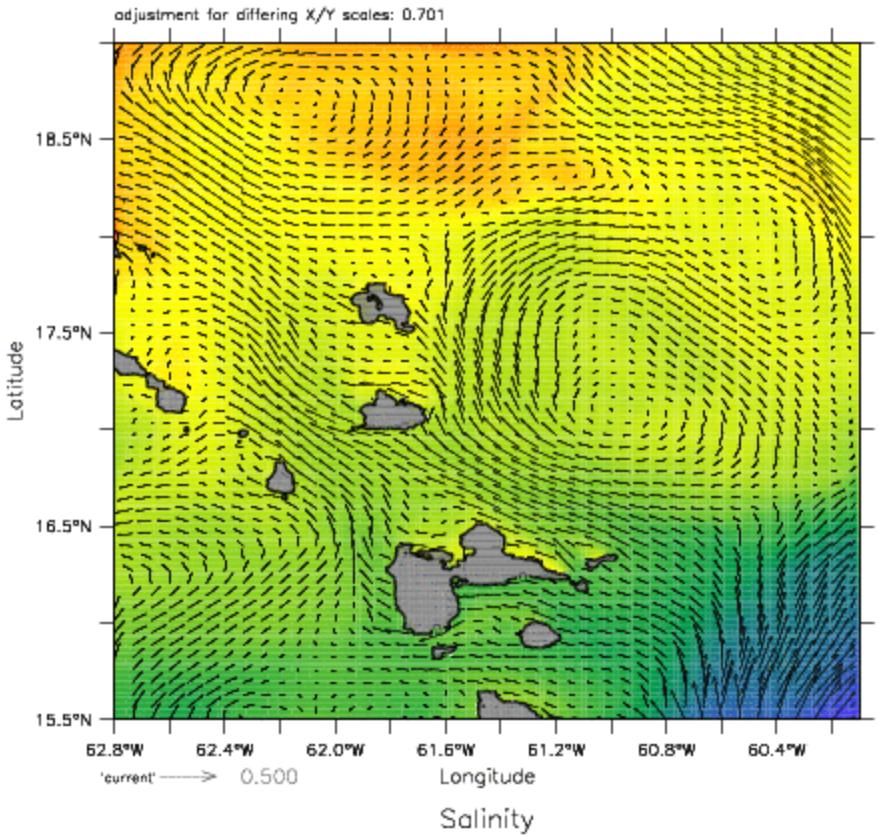


June 30

HYCOM SSS and currents



ROMS SSS and currents



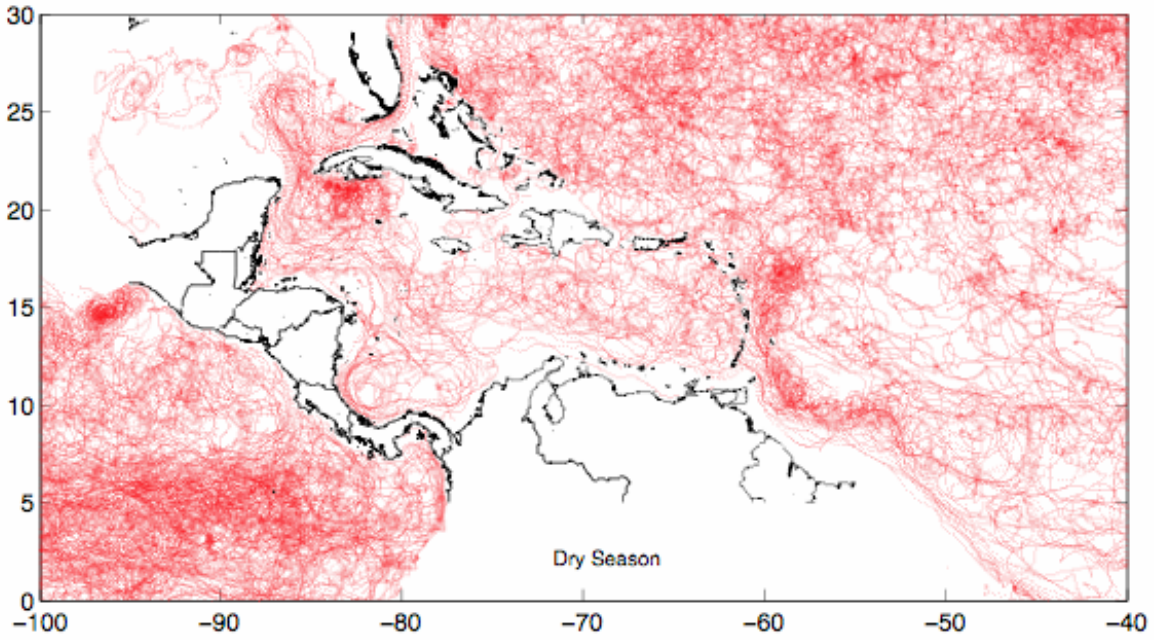
June (mean)

Caribbean historical data set

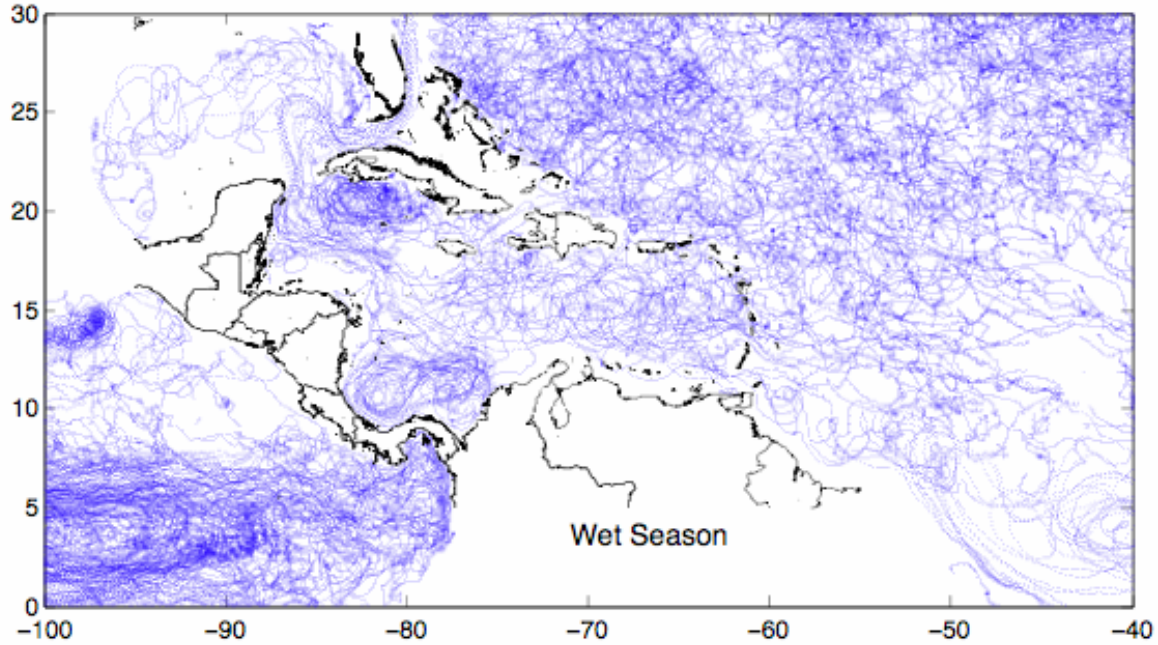
1978-2007

(NOAA/AOML)

Dry Season (Jan-Jul)

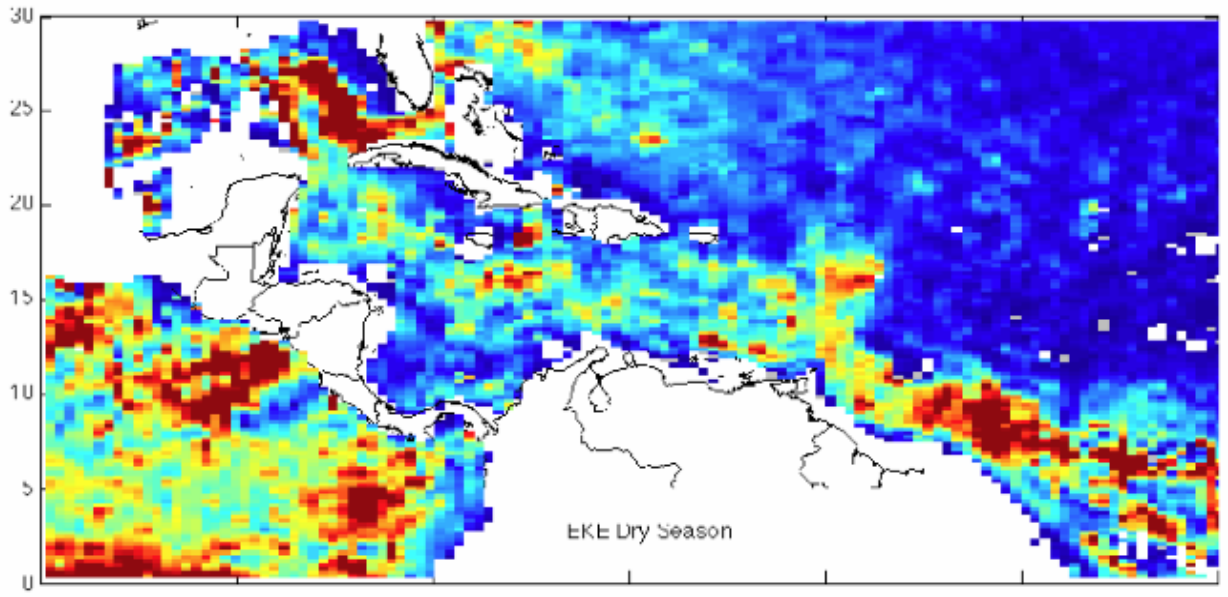


Wet Season (Aug-Dec)

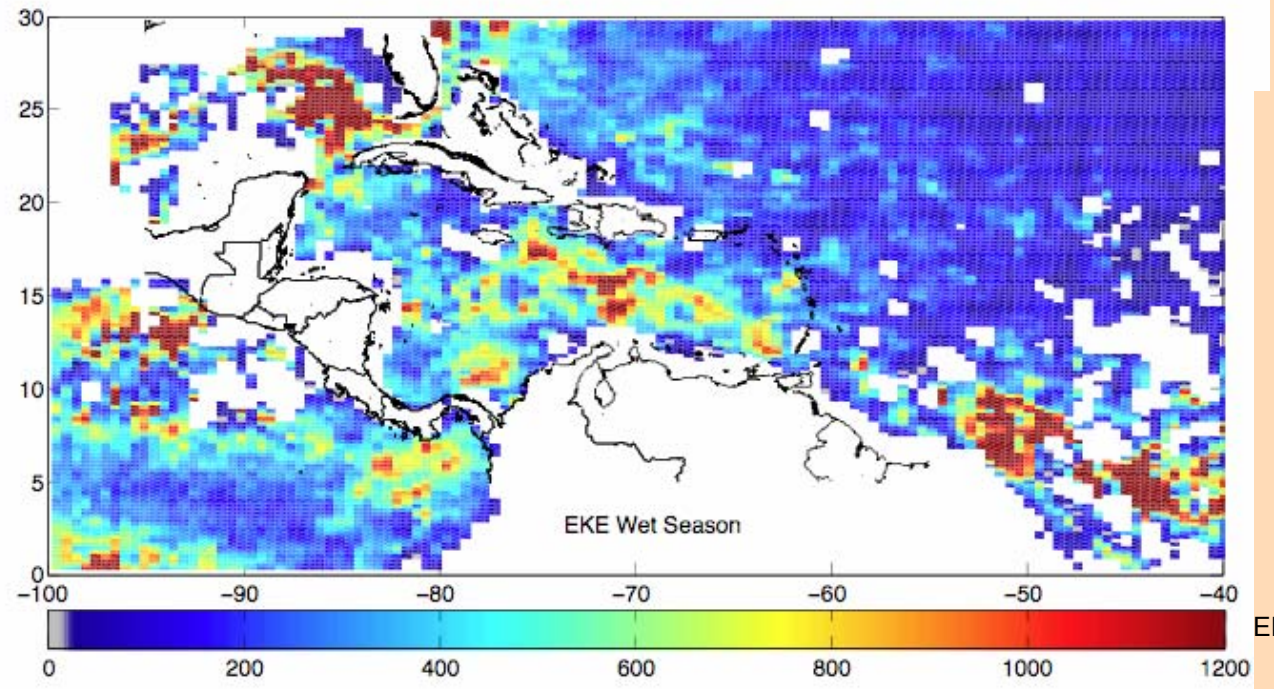


EKE

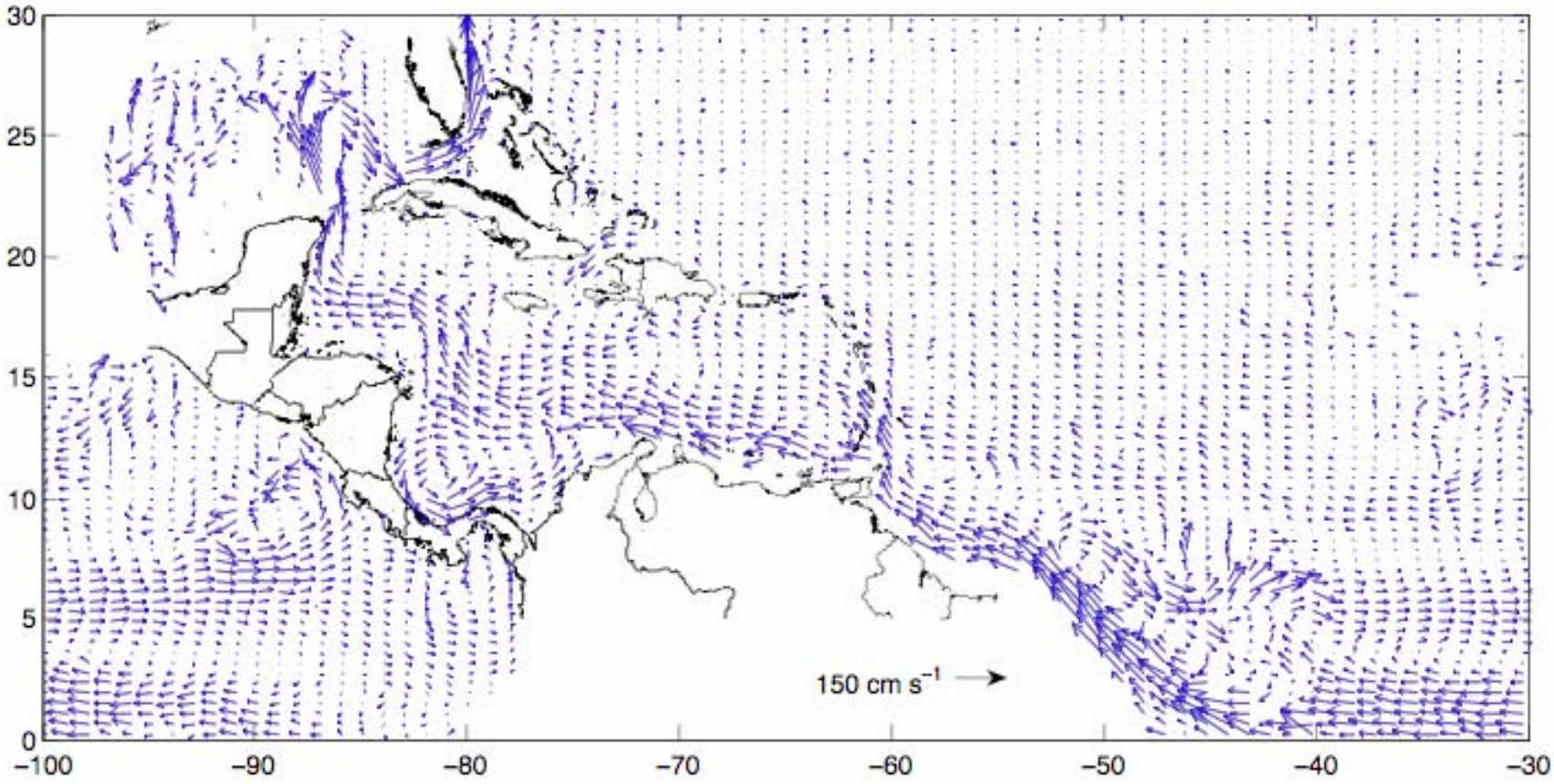
Dry Season (Jan-Jul)



Wet Season (Aug-Dec)

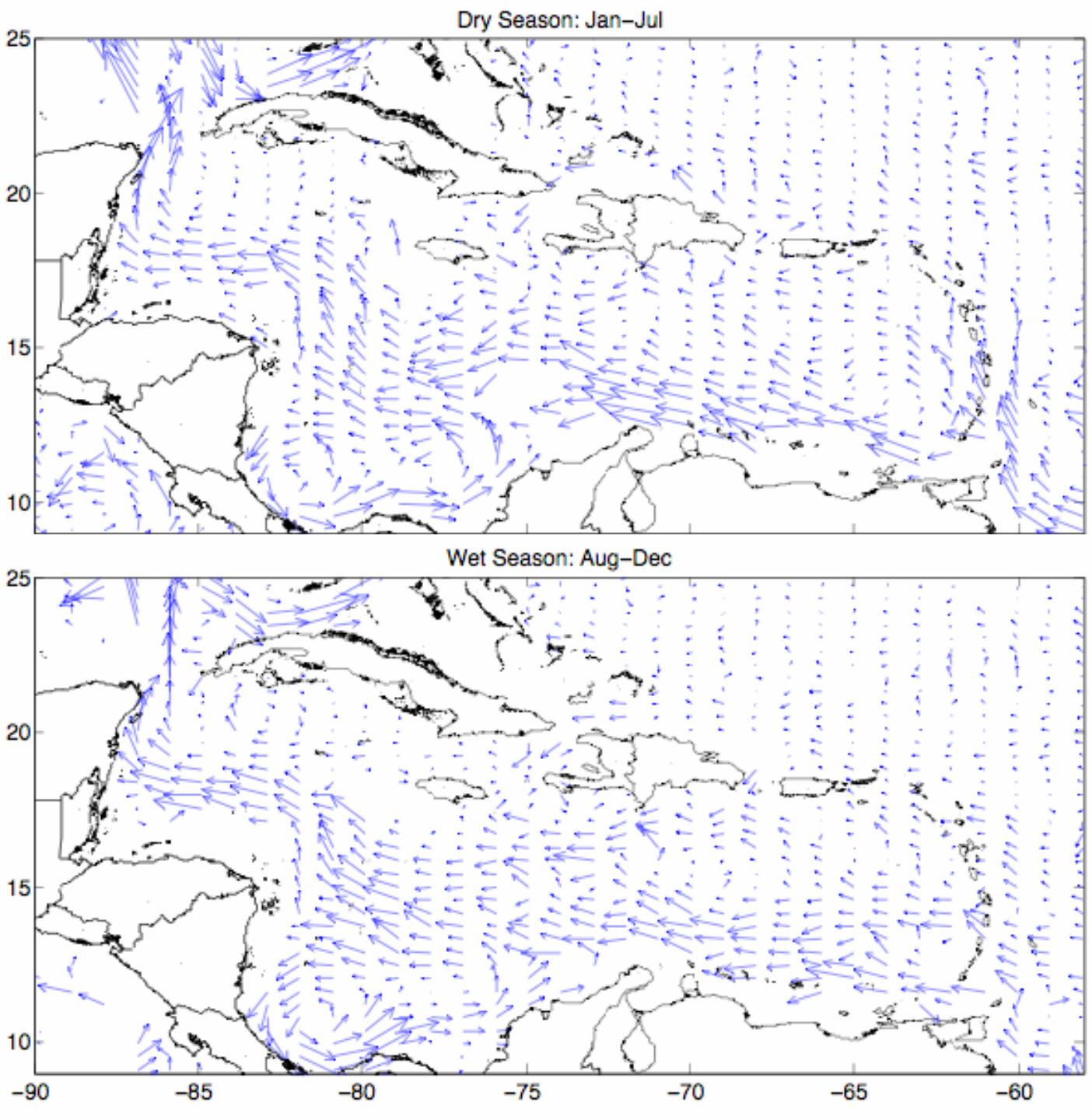


Mean Velocity (from drifters)

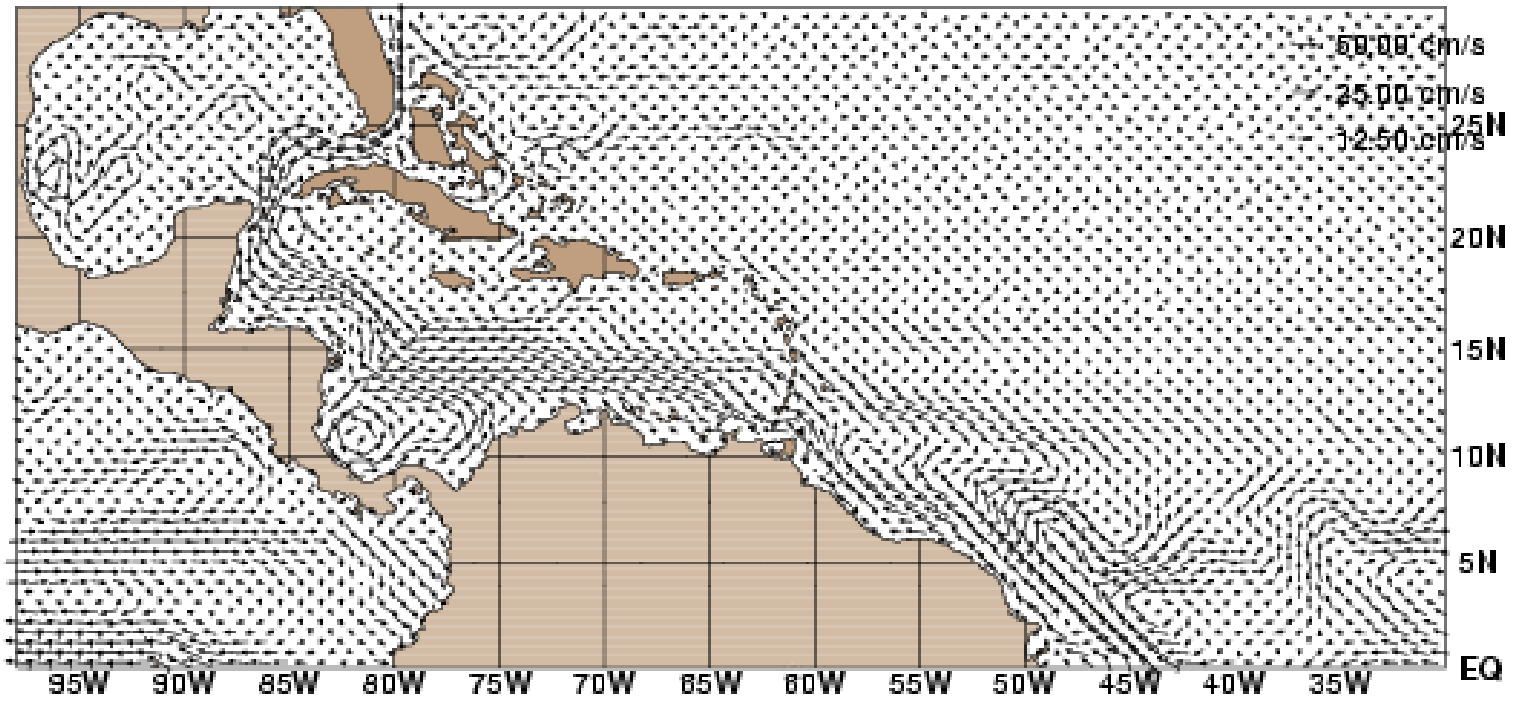


Dry Season (Jan-Jul)

Wet Season (Aug-Dec)



Mean Velocity (from HYCOM)



Mean Transports in the IAS*

Expt.	FC 27°N	Abaco north ward	FC + Abaco	NWP	OBC	Yuc Chan	WW	Mona	Aneg	Less Antil	Lucia Vince Gren
Obs.	30-34	5	37	-1.2	-1.9	23-27	-7.0	-2.6	-2.5	-17.1 (resid)#	-10.1
05.2 (7-9)	24.0	8.0	31.8	-2.2	0.0	22.3	-3.6	-2.1	-4.2	-12.1	-8.3
05.6 (9-13)	24.9	3.1	26.9	-2.4	-0.3	22.6	-2.8	-2.4	-4.6	-12.5	-8.0
07.1 (4)	26.5	8.0	34.4	-2.5	0.7	24.6	-0.2	-2.2	-4.7	-17.5	-11.7

* Positive transport defined northward and eastward
# Residual of Yucatan – WW – Mona - Anegada

Provided by
Joe Metzger

END