

Anne Marie Tréguier (1), Bernard Barnier (2), Julie Deshayes (3),
Claude Talandier (1), Romain Bourdallé Badie (4), Thierry Penduff (2), Julien Le Sommer (2), Jean Marc Molines (2)
 (1) Laboratoire d'Océanographie Physique et Spatiale, (2) Laboratoire de Glaciologie et Géophysique e l'Environnement,
 (3) Laboratoire d'Océanographie et du Climat: Expérimentations et Approches Numériques, (4) Mercator-Océan

1 DRAKKAR: A COORDINATION

- A scientific and technical coordination between research teams in FRANCE (LGGE Grenoble, LOPS Brest, LOCEAN Paris, MERCATOR-Océan Toulouse), UK (NOC Southampton) and GERMANY (GEOMAR Kiel).

Main activities

- Improve and maintain a hierarchy of state-of-the-art ocean/sea-ice model configurations for operational and research applications based on the NEMO modeling framework.
- Design, carry out, assess, and distribute high-resolution global ocean/sea-ice numerical simulations performed over long periods (1958-2015)

Major realizations period 2014-2015

- Contribute to the development of ORCA025, the « eddy-permitting » ocean component to be used in Earth System Models for CMIP6 and beyond.
- « Eddy-resolving » simulations with the 1/12° ORCA12 configurations.

Selected results

- ORCA12: The benefits of the international coordination [Frame No 2]
- The Drakkar Forcing Set : an achievements useful to a wide community [Frame No 3]
- Somali Current: Example of a process study [Frame No 4]

3 DFS5.2: the latest DRAKKAR FORCING SET

Surface atmospheric variables (0.7°x0.7°)

- 10-m wind components : **u10, v10**
- 2-m air humidity : **q2**
- 2-m air temperature : **t2**
- downward shortwave radiation at the sea surface : **radsw**
- downward longwave radiation at the sea surface : **radlw**
- precipitation total and solid : **P, snow**

Period 1958-1978:

U10, v10, q2, t2: ERAi* daily climatology
 combined with ERA40 3-hourly.

Radsw, radlw, P, snow : ERAi* daily climatology

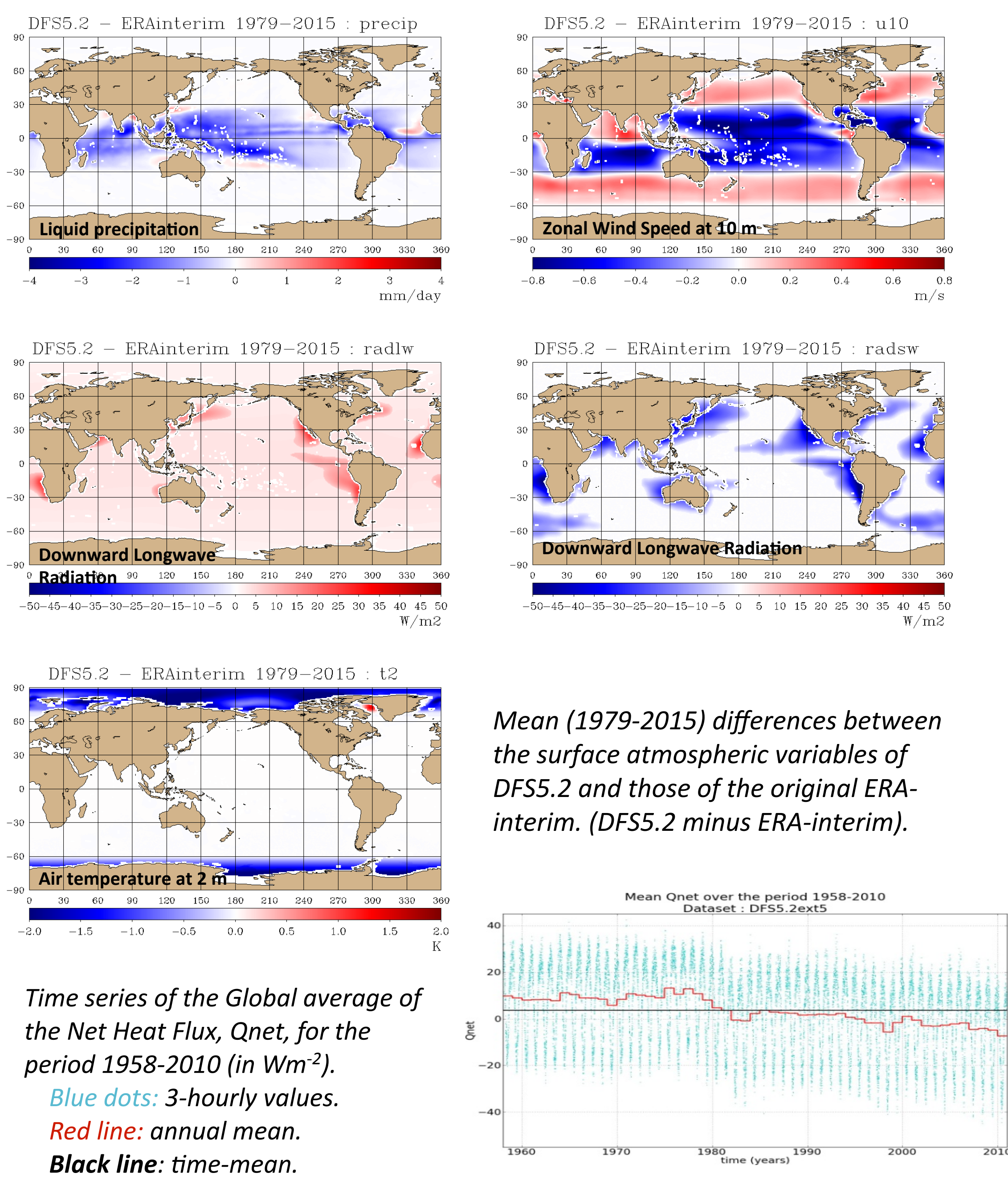
Period 1979-2015:

U10, v10, q2, t2: ERAi* 3-hourly

Radsw, radlw, P, snow : ERAi* daily

ERAi*: a corrected version of ERA-interim reanalysis

Effect of corrections:

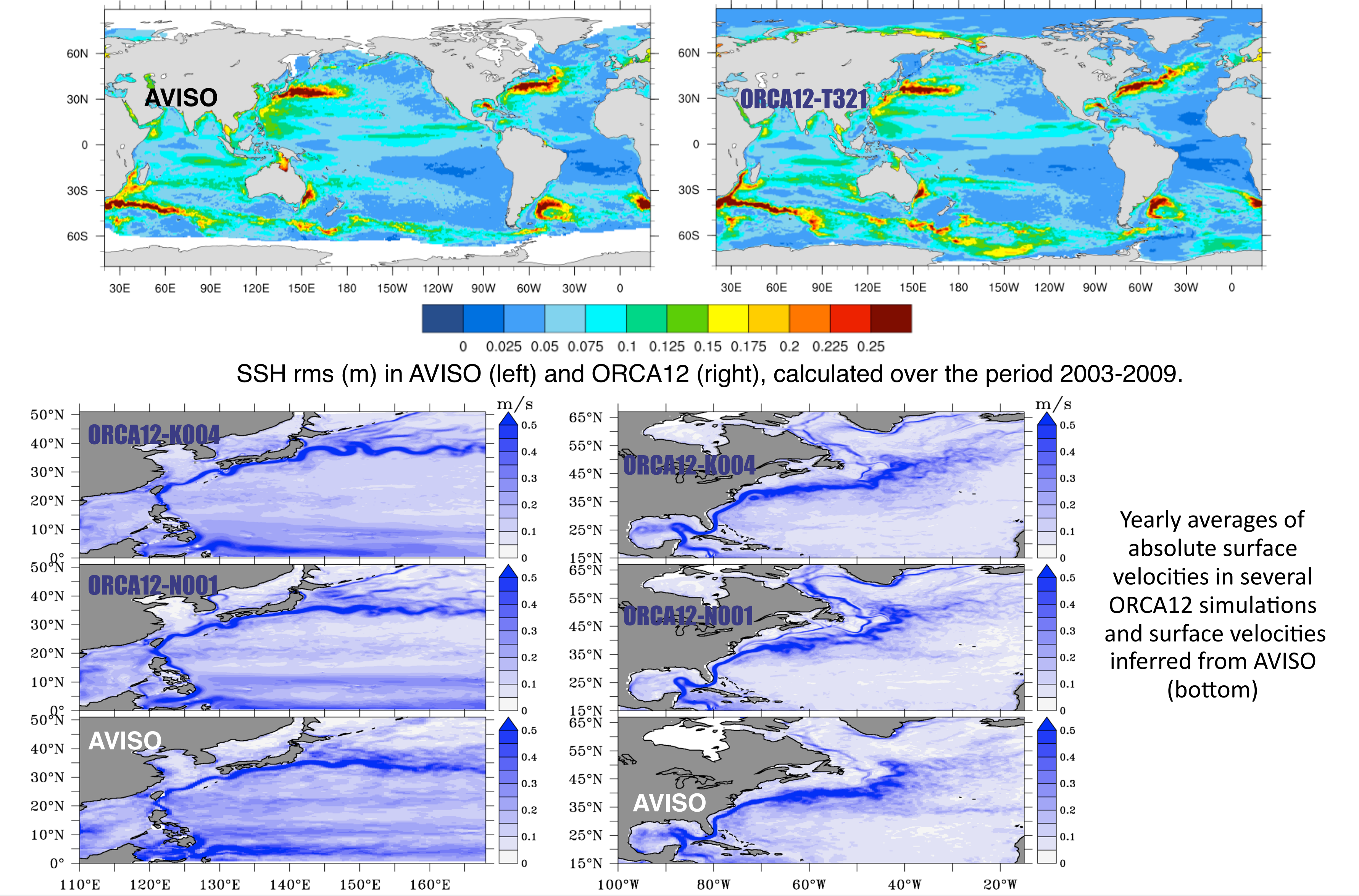


5 CONCLUSION: BILAN 2014-2015

- 26 peer reviewed publications
- 4 PhD theses defended
- 4 PhD theses on going
- DFS given to more than 30 teams
- Drakkar simulations/configurations distributed to more than 20 projects / year
- Drakkar workshops attended by more than 80 scientists (~ 15 different countries)

2 DRAKKAR International coordination

The European DRAKKAR consortium has gathered efforts to develop, improve and validate ORCA12, the global 1/12° configuration of NEMO. At this horizontal resolution (from 2km around Antarctica to 9km at the equator), mesoscale eddy structures are well represented between 50°N and 50°S. This significantly improves the large-scale circulation variability (Mercator-Océan ORCA12-T321 experiment), including in Western Boundary Currents (NOC and GEOMAR-Kiel experiments), when compared to coarser resolution simulations.



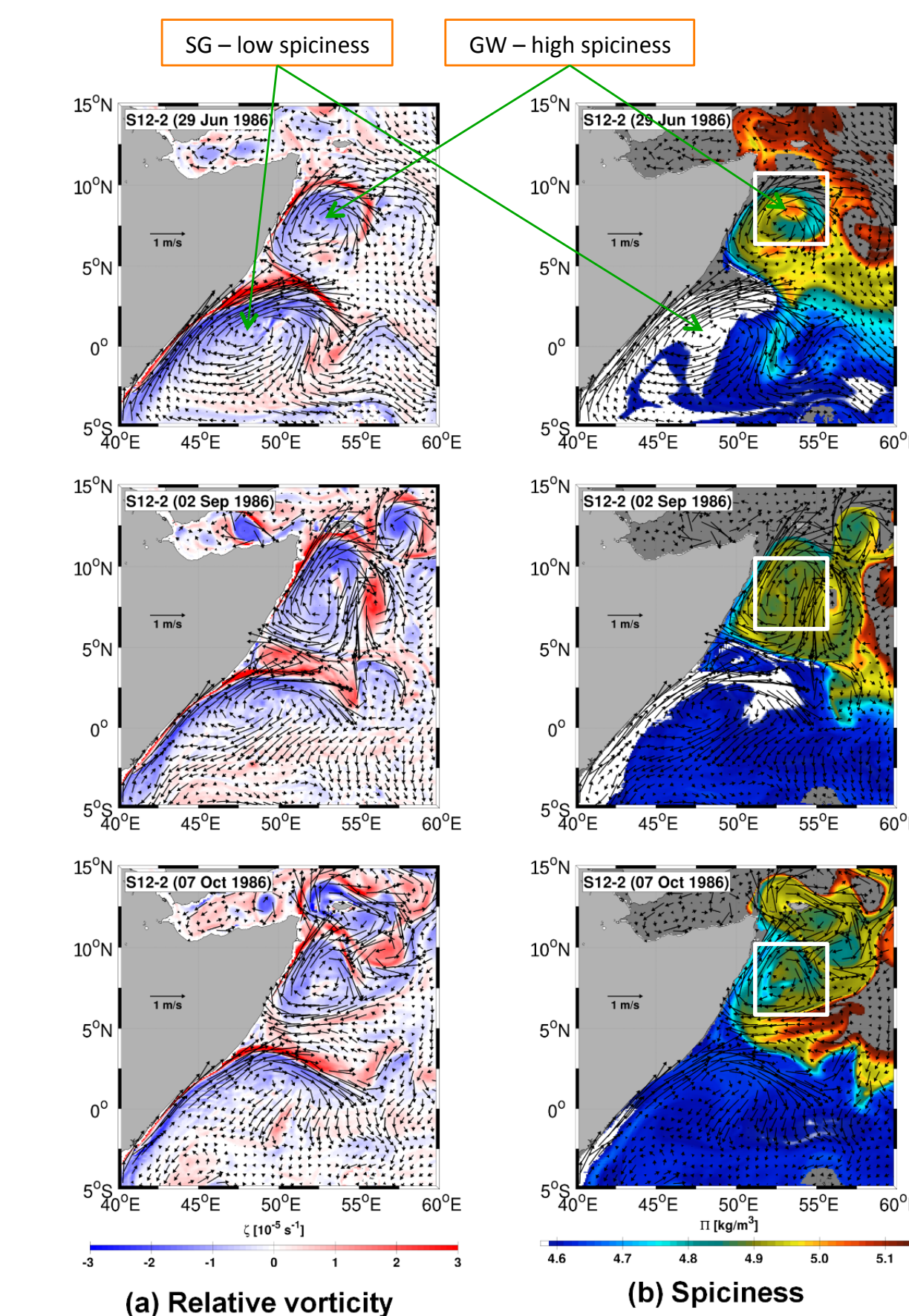
4 Process study: Interactions between the Somali Current eddies during the summer monsoon

Simulations of the Global Ocean Circulation differing by:

- Resolution (1/4 or 1/12°)
- Length of integration
- Parameterizations
- Atmospheric forcing

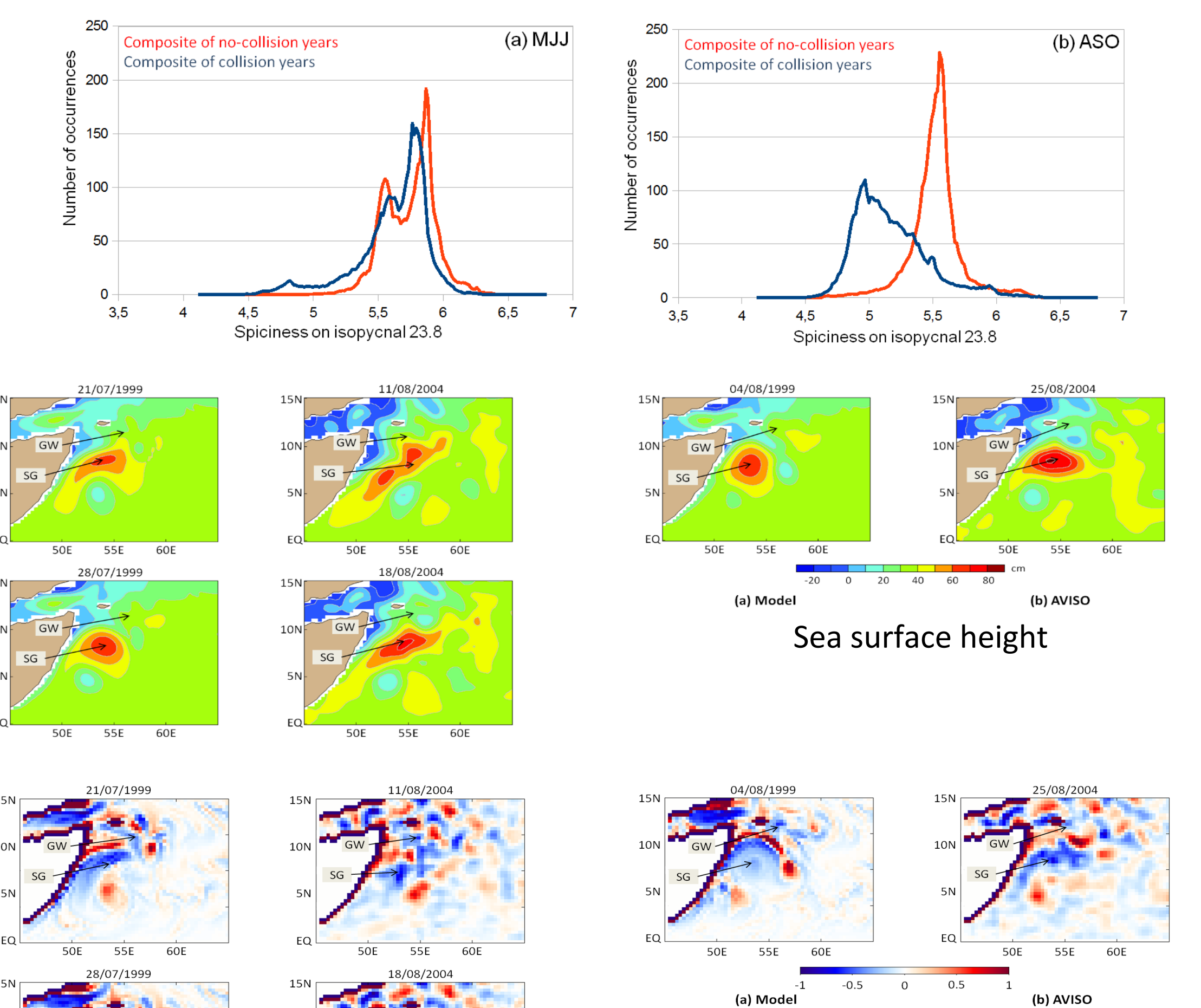
are used to study the fast interactions between the **Southern Gyre** & the **Great Whirl** two large anticyclonic eddies generated in the Somali Current system during the Southwest Monsoon.

Interaction scenario in the model hierarchy (22 time / 30 years)



Between June and September:

- SG moves northward along the Somali coast and encounter the GW
- Interaction between the SG and the GW is a collision without merging
- The GW is pushed to the east of Socotra Island
- sheds several smaller patches of anticyclonic vorticity, often reforms into the Socotra Eddy,
- The SG takes the place of the GW
- The distribution of spiciness in the GW area shows that there is no mixing between SG and GW water masses during the collision.



The comparison of the Model SSH Sample like AVISO altimetry (7 days, 1/3°) show that satellite observations do not exclude the possibility of the collision scenario but clearly lack of resolution.