Exploring the mesoscale activity in the Solomon Sea:

a complementary approach with a numerical model and altimetric data

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Solomon Sea

Unusual western boundary geometry:

 \rightarrow 5° latitude barrier in front of continental boundary

 \rightarrow WBC transport may be limited by narrow straits



Base of the Solomon Sea circulation

Input: GPC, NVJ, SSI Inside: NGCC/NGCU, NBCU Output: NGCC/NGCU, NICU



A question: How turbulent is the Solomon Sea and for which impacts?

Objective

To give a first synoptic view of the mesoscale variability at the surface

• EKE

Eddy detection

Seasonal and interannual eddy modulations

Hypothesis for process

Based indifferently on: model: 1/12° global DRAKKAR AVISO DT maps

Mean Eddy Kinetic Energy/Eddy occurence





- Model and altimetry: similar EKE level
 High EKE level (up to 400 cm²/s²)
 EKE higher in the Northern basin
- In relation with the Solomon Strait Inflow (SSI)
- In relation with eddy activity

Eddy trajectories

Anticyclonic Eddies



Cyclonic Eddies

CEs along the central Solomon Sea
More CEs in the north

Two CEs types:

- propagative CEs generated in the south
- Stationary CEs generated in the north



- Less AEs than CEs
- Generated in the east and southeast
- Propagating westward

Modulation in time of the mesoscale activity



Seasonal and interannual variability

Seasonal modulation



Which mechanisms ??



Interannual variability: ENSO mode



• EKE out of phase between the north and the south Solomon Sea

● EKE South in phase with the SOI (r=0.81) → EKE increases during La Niña

● EKE North lags El Niño by 6-8 months → EKE spikes during the El Niño/La Niña transition





Interannual variability: ENSO mode



Conclusion

• A first description of the mesoscale activity in the Solomon Sea

- Coherent results between model and altimetric data
 The model used to interpret the altimetric data
- High EKE level linked with eddy activity
- Cyclonic and Anticyclonic eddies behave differently
- Mesoscale activity modulated at seasonal and interannual timescale

Linked with current instabilities: a main trigger appears to be the Solomon Strait Inflow more than the LLWBCs

Gourdeau, L., J. Verron, A. Melet, W. Kessler, F. Marin, and B. Djath (2014), Exploring the mesoscale activity in the Solomon Sea: A complementary approach with a numerical model and altimetric data, *J. Geophys. Res. Oceans*, 119, doi:10.1002/2013JC009614.

Perspective

Works in progress:

Looking at glider data

A 1/36° Model

In preparation of SWOT



Djath et al. 2014a, 2014b