TRIO: Thermocline Ridge of the Indian Ocean

Jérôme Vialard
LOCEAN
jv@locean-ipsl.upmc.fr

Jean-Philippe Duvel
LMD
jpduvel@lmd.ens.fr
The thermocline ridge and its phenomenology

The Seychelles-Chagos thermocline ridge

High SST, shallow thermocline and mixed layer => strong Air-Sea coupling

(Vialard et al. 2008a; in press in BAMS)
The “SCTR” and its phenomenology

- Generation region for cyclones
- Strong SST signature to MJO at intraseasonal timescale
- Interannual variability: signature of IOD / ENSO with strong climatic consequences
Statistical study: Duvel and Vialard (2007)

Two regions of largest SST signature of the MJO in JFM are the thermocline ridge and North-Western Australian Basin.
Cirene/RAMA provided first insights in the processes of the upper ocean response, but many questions remain unanswered.

From (Vialard et al. 2008b) (GRL, in press)
The TRIO project

- TRIO: one framework to analyse the Cirene data and to address the science questions related to the thermocline ridge
  - Modelling AND past observations
- TRIO: a cruise in early 2011, coordinated with other scientific programs
- Science plan draft available at: http://www.lmd.ens.fr/jpduvel/trio/
- We welcome collaborative offers on either the cruise or the lab work!
TRIO: Thermocline ridge of the Indian Ocean

TRIO: three central timescales

- **Interannual** (IOD / ENSO signature in SCTR)
- **Intraseasonal** (coupling at MJO scale)
- **Synoptic** (tropical depressions, storms and cyclones)

...and their interactions: e.g. impact of interannual variability on the MJO, but also influence of other timescales (e.g. diurnal)
Future field campaigns

TRIO « Thermocline Ridge of the Indian Ocean »

- Early 2011
- Link with other international programs:
  - seek blessing from IOP & AAMP
  - RAMA array (MJO SST signature, interannual variability)
  - french SWICE project (cyclones)
  - CINDY cruise (K. Yoneyama) & other Japanese cruise along 8°S in end of 2011
  - Megha-Tropiques Indo-French satellite (study of convection)
  - AltiKa Indo-French altimeter (clear signals along 8°S)
  - Link SMOS satellite (Salinity front along 8°S)
The TRIO cruise

Why early 2011?

- R/V Atalante will be in western Pacific in late 2010
- Already plans for oceanographic cruise near Papua-New Guinea-Indonesia and in throughflow in late 2010
- Swice (cyclone targeted field campaign) in early 2011
- Contribution to RAMA array (target date for full implementation: 2012)
- Japanese effort in the Indian Ocean in 2012
A mooring in North Western Australian Basin

Region of strong MJO air-sea interactions, strong diurnal cycle, strong baroclinic tides

Mooring as part of process experiment (~1-2 years) and then seek blessing of IOP (easily accessible: Australia, Indonesia)
**Future field campaigns**

**TRIO: overview & contribution to RAMA**

- **Cruise duration:** ~46 days

![Map showing SCTR (Salinity front region) and NWAB (Strongest Rossby waves region)]


Interaction with SWICE

Salinity front region

Strongest Rossby waves region
Future field campaigns

- TRIO: interaction with CINDY and SWICE
  - 2 Japanese cruises in late 2011
  - SWICE: South-West Indian ocean Cyclone Experiment