Argo detecting mixed layer intra-seasonal variations in Tropical Indian Ocean

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Why SST cooling?

- **What we have known ...**
  - Less solar radiation
  - Stronger latent heat release

- **What we are not sure ...**
  - Temperature advection
  - Entrainment through the bottom of mixed layer

**One key point:** lack of subsurface observation
Argo Network, as of June 2006

2483 Active Floats

ARGENTINA (6)  AUSTRALIA (96)  BRAZIL (3)  CANADA (75)  CHILE (4)  CHINA (14)  COSTA RICA (1)  EUROPEAN UN. (18)  FRANCE (189)  GERMANY (111)  INDIA (71)  IRELAND (1)  JAPAN (367)  KOREA, REP. OF (84)  MAURITIUS (4)  MEXICO (1)  NETHERLANDS (11)  NEW ZEALAND (5)  NORWAY (10)  RUSSIAN FED. (3)  SPAIN (6)  UNITED KINGDOM (100)  UNITED STATES (1303)
Indian Ocean Argo Profile Density

Time evolution of the number of Argo Profiles in Indian Ocean
MLD data sets available

- Monterey and Levitus, 1997
- de Boyer Montégut et al, 2004

MLD Ref. level 10m below the surface
Potential Density Criteria: 0.03kg/m^3

BLT = ID - MLD
ID Ref. level 10m below the surface, Temperature criteria 0.2°C
Monthly MLD products from Argo profile

Year 2004
Monthly MLD products from Argo profile

Year 2005
Seasonal Mean of Indian Ocean MLD
Monthly BLT products from Argo profiles

Year 2005

Year 2004
ISO
ISO composite based on three winters (2003-2005)
Phase relation among OLR, zonal wind, SST, subsurface temperature and MLD
PWP MLD model driven by WHOI IMET buoy data
PWP MLD model driven by OAflux + NCEP wind
Implication of the interannual ISO variations

Yu et al., 2006
Summary

1. Monthly MLD/BLT data sets derived from Argo
2. First evidence of the basin-scale mixed layer variations during ISO: negative correlation between MLD and SST
3. Ocean process contribute to the SST variations during ISO
4. Data basis for the ocean-atmosphere interaction during ISO
5. Potential implication for the interannual ISO variations