Current variability and transport in the Halmahera Sea as measured by the INDOMIX 5 year-bottom ADCP

Recent INSTANT program has been provided three consecutive years (2004-2006) of ITF transport, heat and mass flux, measured simultaneously in the inflow and outflow straits. The sum of mean ITF inflows via Makassar and Lifamatola is 13 Sv (Gordon et al, 2008; Gordon et al, 2010; van Aken et al., 2009), and mean outflow transport via Lombok, Ombai and Timor is 15 Sv (Sprintall et al., 2009). There was a transport discrepancy of about 2 Sv between the inflow and outflow, which is likely coming from the uncertainties of the method of calculation, and from the unmeasured transport from shallow Karimata Strait (entrance of the Java Sea Water) and Halmahera Sea (Gordon et al., 2010). In Karimata Strait throughflow, Fang et al. (2010) found a southward transport volume of 3.6 Sv during the northwest monsoon (January and February 2008) with possible large seasonal variation and reversal flow during the year.
In Halmahera Sea, Cresswell and Luick (2001) reported a mean transport inflow of about 1.5 Sv from one-year (mid 1993 to mid 1994) current measurement. The inflow portal through the Halmahera Sea is constrained by the shallow sill depth of 580 m. Ilahude & Gordon (1996) found high-salinity in the thermocline and lower thermocline of the SPSW downstream in Seram Sea, and concluded that only thermocline and lower thermocline water were entering this portal. However, the very strong turbulent mixing on water mass in this sea (Koch- Larrouy et al., 2007, 2015) could modify this conclusion. Thus, the role and the precise estimate of transport volume of South Pacific water into the ITF water masses via this passage remains unclear (Koch- Larrouy et al., 2007; Atmadipoera et al., 2009; Gordon et al., 2010). More measurements are needed in the secondary inflow portals in order to define well the ITF origin.
The Indonesian Mixing Experiment (INDOMIX 2010) is filling this gap and provides 5 years of currents measurements recorded by a bottom ADCP (Acoustic Doppler current profiler). However, the ADCP is located on the edge of the sill and direct estimate of the transport through the entire strait is tricky.

The goal of this internship is to study the variability (tidal and intraseasonal to interanual) of the currents recorded by the INDOMIX bottom ADCP and provide an estimate of the transport through the Halmahera entrance portal by using the INDOMIX ADCP and the recent INDESO model. The recent tidal analysis tool developed by the LEGOS will be used.

Prerequirements: Ability to code in Matlab or python or IDL, autonomous and motivated.

The main advisor will be Sophie Cravatte (LEGOS). Also Agus Atmadipoera will help the analysis of the observation and the model. Interactions with Damien Allain at LEGOS, will help the student. Collaboration at LEGOS with Ariane Koch-Larrouy will be done mainly before and after the internship as she will be on maternity leave.