



Monitoring variability and changes of the Indonesian Throughflow

Ming Feng and Susan Wijffels

CSIRO Oceans and Atmosphere, Australia (ming.feng@csiro.au)

The Indonesian Throughflow (ITF) is an important component of the upper cell of the global overturning circulation that provides a low-latitude pathway for warm, fresh waters from the Pacific to enter the Indian Ocean. The IX1 XBT line between the coasts of Australia and Indonesia, initially championed by Gary Meyers, crosses the ITF and has now been in operation for more than 30 years. In this presentation, we review research progresses on the variability and changes of the ITF based on the IX1 XBT data, in memory of Gary's contribution to the Indian Ocean research. The ITF passes across a region that comprises the intersection of two ocean waveguides – those of the equatorial Pacific and equatorial Indian Ocean. The ITF geostrophic transport is stronger during La Niñas and weaker during El Niños. The Indian Ocean wind variability associated with the Indian Ocean Dipole (IOD) in many years offsets the Pacific ENSO influences on the ITF geostrophic transport during the developing and mature phases of El Niño and La Niña, due to the covarying IOD variability with ENSO. The IX1 line reveals the geostrophic ITF decadal and multi-decadal changes: there was a weakening change from the mid-1970s climate regime shift followed by a strengthening trend of about 1 Sv every 10 years over the recent decades. These decadal changes appear mostly due to the ITF responses to decadal variations of the trade winds in the Pacific. Climate models project a weakening trend of the ITF under the global warming, due to the slowdown of the global overturning circulation. The consistent and now multidecadal sampling along IX1 is a precious resource for the climate community and is a testament to the vision and commitment of Gary Meyers to use observations to drive insight into earth's climate variability.