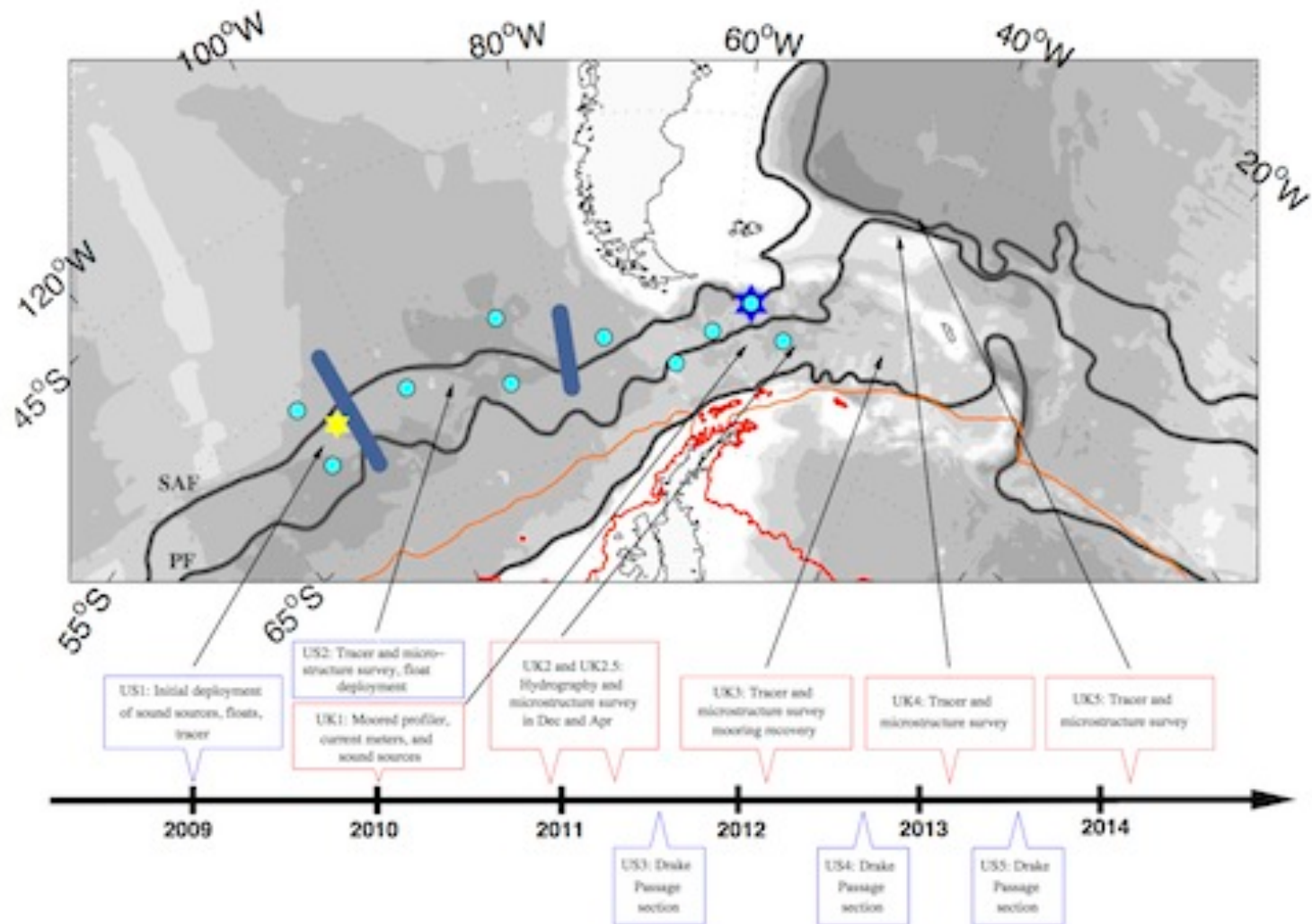




# Diapycnal and Isopycnal Mixing Experiment in the Southern Ocean

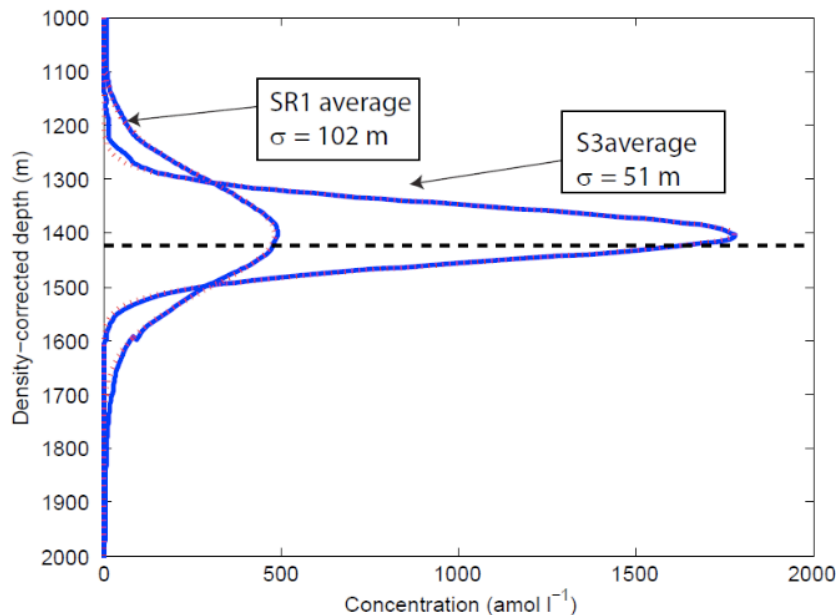
Sarah Gille, J. Ledwell, A. Naveira-Garabato, K. Speer,  
D. Balwada, A. Brearley, J. B. Girton, A. Griesel, R.  
Ferrari, A. Klocker, J. LaCasce, P. Lazarevich, N.  
Mackay, M. Mazloff, M. P. Meredith, M.-J. Messias, B.  
Owens, J.-B. Sallée, K. Sheen, E. Shuckburgh, D. A.  
Smeed, L. C. St. Laurent, J. M. Toole, J. Wang, A. J.  
Watson, N. Wienders, U. Zajaczkovski, and others



### Hypotheses:

- Diapycnal mixing smaller over smooth topography and to increase over rough topography in Drake Passage.
- Isopycnal mixing varies with depth and position, influenced by critical layer.

# Diapycnal mixing



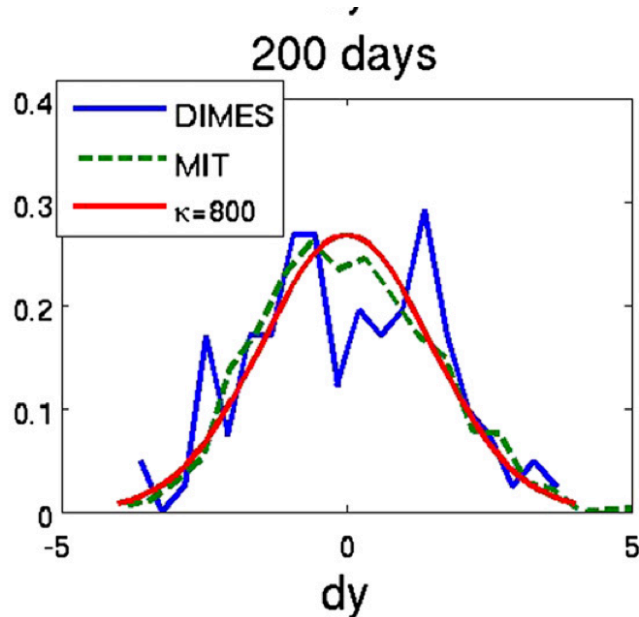
Order of magnitude difference in mixing from abyssal plain to Phoenix Ridge in Drake Passage, with enhanced mixing near bottom.

Open questions:

- What sets diapycnal mixing? Do topography, current speed, other processes matter?
- What happens in upper ocean? How does wind drive mixing?

CLIVAR Exchanges, 2012  
Gille, Ledwell, Naveira Garabato,  
Speer et al

# Isopycnal Mixing



LaCasce et al, JPO, 2014

- DIMES floats and model simulations provide consistent effective eddy diffusivity ( $800 \pm 200 \text{ m}^2 \text{ s}^{-1}$ ) upstream of Drake Passage.
- Open questions:
  - How do we characterize eddy mixing in Drake Passage?
  - What is vertical structure of eddy stirring?
  - How much of stirring by eddies can a parameterization explain?