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Interactive comment on "On the observability of turbulent transport rates by Argo: supporting evidence from an inversion experiment" *by* G. Forget et al.

Anonymous Referee #2

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This study shows that observations of the large scale stratification by Argo yield useful constraints to estimate turbulent transport parameters in the ocean.While the parameter estimation significantly reduces the misfits wrt to temperature and salinity as well as non-assimilated biogeochemical tracers, it seems questionable if the parameters are entirely physically reasonable or if they reflect other model errors. My main concern is the physicality of the mixing parameters, and a better discussion/comparison to the differences in approach and results of Liu et al.

What distinguishes this study from Liu, Koehl and Stammer? It seems the focus here is more on the Argo data, but Liu et al. also used the Argo data as constraints.

please specify what are your control parameters exactly?

Figure 1: if you show all of those panels I think you should also describe in more detail how the experiments differed and not only refer to another paper.

The authors should compare their Redi diffusivity estimates to recent Argo data based eddy diffusion estimates by S. Cole et al. "Eddy stirring and horizontal diffusivity from Argo float observations: Geographic and depth variability". GRL, 2015.

section 4, GM and Redi coefficients: What do you mean by "can be defended on theoretical grounds" (Marshall, 2006). What theory are you refering to? I think Marshall (2006) would be refering to the Redi rather than the GM coefficient. Do you see any evidence of a steering level effect (enhanced mixing where the Rossby wave speed equals the mean flow speed) in the Redi coefficient?

It is striking that the GM coefficient (Figure 8 top) has minima in the Western Boundary Currents (see also section 6, line 15, can you comment on the differences). Do you allow for a negative GM coefficient to occur?

section 4, diapycnal diffusivity: can you comment on the apparent "missing mixing" in the ACC? As compared to Whalen et al. it seems one striking difference is in the Southern Ocean. Is there any evidence for links to topography?

Interactive comment on Ocean Sci. Discuss., 12, 1107, 2015.