

## ***Interactive comment on “Observations of turbulence beneath sea ice in southern McMurdo Sound, Antarctica” by C. L. Stevens et al.***

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Review of "Observations of turbulence below sea ice in southern McMurdo Sound, Antarctica"

The authors describe an exploratory set of shear microstructure measurements made below fast sea ice near the front of the Ross Ice Shelf. This region is of interest because of water mass modifications, including the formation of super-cooled water, that take place in the cavity below the ice shelf. Turbulent mixing below the sea ice outside of the cavity will affect the dispersion and impact of these water masses. From the somewhat limited, but apparently totally unique, measurements, the authors are able to characterize the vertical diffusivity of most of the water column, show that turbulence may affect frazil ice crystals, and estimate a length scale for the penetration of super-

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cooled into the Sound away from the ice shelf. The manuscript is written OK, although a number of sentences seem too vague to me.

Specific Comments:

p 1408, around line 10: "The small-scale turbulent energetics lie on the boundary between isotropy and buoyancy-affected. This will likely influence the formation and aggregation of frazil ice crystals within the supercooled layer" I thought the important factor here was ratio of crystal size to Kolmogorov scale, not turbulent Froude number.

p 1498, lines 17-18: useful to expand on what the unique properties are.

p 1408, line 26: refer to Figure 1 here?

p. 1411, line 11: while as far as I know this is the first use of hydrodynamic diagram in polar domain, it has certainly been used more than a "few" times elsewhere.

p. 1414, line 6, formula formatting problem

p 1415, line 28, mean "ensemble-averaged profile" here?

p 1416, line 12, sentence starting here is not clear to me

p1416, I am interested in the perceived effectiveness of the ensemble-averaging procedure. My colleagues and I have used a similar approach with thermal microstructure data below Arctic sea ice (Shaw et al. (2009), JGR, 10.1029/2008JC004991), so I wonder if the authors could make a more definitive statement on the approach.

p 1418, line 26, this sentence is repetitive.

p1419, line 1, this sentence is pretty vague

Appears that Figure 8 is referenced out of order.

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