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Global Tracer-Based Diagnostics of Eddy Mixing from AVISO Satellite Velocities

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Satellites that measure sea-surface height are able to prove the large-scale surface geostrophic currents, and these currents can be used to simulate the advection of passive tracers. Such tracer-based methods for assessing mesoscale-eddy effective diffusivity in recent years have been restricted to the Southern Ocean, where the zonally-reentrant geometry is well suited to the method of Nakamura (1996). Here we explore approaches for applying tracer-based methods globally. One of these approaches is effectively "zonalize" the east Pacific and apply diagnostics appropriate to channel flow. The other is to introduce a variant of the Osborn-Cox diffusivity that measures local irreversible mixing. The latter approach produces a simple map of global mixing rates. We compare this map to the estimates of Holloway (1986) and show that the mean flow exerts significant control over mixing rates nearly everywhere in the ocean.