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Inside out: Speed-dependent barriers to reactive mixing DOUGLAS KELLEY, THOMAS NEVINS, University of Rochester — Reactive mixing occurs wherever fluid flow and chemical or biological growth interact over time and space. Those interactions often lead to steep gradients in reactant and product concentration, arranged in complex spatial structures that can cause wide variation in the global reaction rate and concentrations. By simultaneously measuring fluid velocity and reaction front locations in laboratory experiments with the Belousov-Zhabotinsky reaction, we find that the barriers defining those structures vary dramatically with speed. In particular, we find that increasing flow speed causes reacted regions to move from vortex edges to vortex cores, thus turning the barriers "inside out". This observation has implications for reactive mixing of phytoplankton in global oceans.

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