1156-86-244 **Geoffrey Gebbie*** (ggebbie@whoi.edu), 266 Woods Hole Rd., MS #29, WHOI, Woods Hole, MA 02543. *Using Machine Learning to Determine Why Water Masses Describe the Ocean So Well.*

The ocean is spatially and dynamically complex, but only a handful of water masses are needed to successfully describe oceanic property distributions. An interesting clue about the organization of the complex system, namely that the sea surface fills the interior ocean according to a simple power law reminiscent of the 80-20 rule in economics. This shallow power law indicates that many thousand surface locations all significantly influence the interior ocean, in contrast to the traditional view of only a few major water masses. How many water masses are necessary to explain oceanic spatial variability: just a handful or many thousand? The optimal water masses will be the combinations of surface waters that recur the most often. In satellite image analysis, the extraction of the mixture of constituent materials in the visible spectrum, or spectral unmixing, is equivalent to this optimal water mass problem. Using an unsupervised machine learning algorithm, the ocean is spectrally unmixed and the most important water masses are identified and ranked by importance. We find the number of water masses needed to explain 95% of ocean property variability is intermediate to previous high and low estimates. (Received January 25, 2020)