

## **Understanding mixing from observations**

In the ocean there are different types of mixing processes, that are related to small-scale turbulence or larger scale circulation. These mixing processes can mix water with different temperatures and as a result, make the ocean's temperature more the same everywhere (less differences and more uniform). At the same time, other processes such as warming by the sun or cooling by the wind, can cause the ocean's temperature to be less the same everywhere (creating extreme temperatures, larger difference making the ocean less uniform). Worldwide, there is a balance in the ocean between mixing processes making the ocean more the same, and other processes causing the ocean to be more different everywhere.

In this study we use measurements from ARGO Floats and ships that are collected into a worldwide representation of the ocean's temperature and salinity structure. We know that this structure does not change too much, but we also know there are processes that are trying to change this structure. From that knowledge we can estimate how much mixing there must be, to undo those changes by making the ocean more uniform again. These estimates of mixing help us understand and estimate ocean circulation, ocean heat and carbon uptake, transport and storage and how we need to include these processes in numerical models that make predictions of our future climate.