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Anatomy of small-scale mixing along a Northeast Atlantic transect

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The study of turbulence occurring at the smallest scales, in the energy dissipation range, is required when evaluating interrelations between turbulent mixing and phytoplankton distribution. To derive microturbulent parameters, microstructure profiler surveys, consisting in high resolution temperature, salinity or velocity vertical profiles have been performed in localized regions of the open ocean. However, they are very localized and based on few datasets, difficult to extrapolate to other regions due to the dependence on the local background conditions.

During the STRATIPHYT-I cruise (July-August 2009) from Las Palmas (Gran Canaria) to Reykjavik (Iceland), high resolution measurements of both turbulent mixing (with a Self Contained Autonomous Micro Profiler, SCAMP) and phytoplankton have been carried out in the top 100 m of the ocean. With these data, the gradient from a more stratified, warmer surface water tropical environment to a less stratified subpolar ocean environment is covered. Adding up a total of 15 stations and 148 profiles, it constitutes the most extensive dataset of directly derived vertical mixing coefficients in a latitudinal transect of the Northeast Atlantic. In the presentation, the focus is on the explanation of the changes in turbulent mixing along the cruise section, recalling in its latitudinal gradient and presenting parameters that can further help to evaluate effects in the phytoplankton distribution. Side issues such as the encountered disagreement between heat and density eddy diffusivities and an analysis of the main source of instabilities through GOTM model and an internal wave analysis, are also treated in detail.