Geophysical Research Abstracts
Vol. 13, EGU2011-6589, 2011
EGU General Assembly 2011

Regularization modeling of buoyancy driven turbulent flow

Bernard Geurts
Netherlands (b.j.geurts@utwente.nl)

The effects of unstable stratication on the turbulent transport in a shear layer are quantied by monitoring global geometric properties of constant density surfaces, such as their area and wrinkling. The flow is simulated using direct and large-eddy simulation, in which regularization modeling for the sub-grid scales in the momentum and the scalar equations is adopted and compared to dynamic sub-grid modeling. We establish the accuracy of the Leray regularization approach for the fluid flow and the scalar mixing.
The LANS- alpha model was found to lead to an overestimation of the small scales, particularly at coarse grids. Predictions based on dynamic models were found to be comparable to the Leray model, but require more computational effort and do not provide a systematic framework for deriving sub-filter closure for complex problems. We quantify the reliability of LES predictions using an error-landscape approach.