

THE MIXING PROCESSES IN AND AROUND CUMULUS CLOUDS

PROJECT AIM

As cumulus clouds play a vital but greatly unknown role in weather and climate modeling, we carry out accurate numerical simulations of cumulus clouds. By using Large Eddy Simulations, we try and resolve important questions as to cloud dynamics, cloud mixing phenomena (lateral versus top-bottom) and precipitation. The computational results are visualized and analyzed by use of a virtual reality workbench. In addition, the computational results are compared with plane observations.

PROGRESS

Extensive studies have been carried out as to the interaction between a cumulus cloud and its environment. Particular attention was paid to the issue of the mass flux balance in the vertical direction, and to the role of the subsiding shell. The increased significance of the subsiding shell may have consequences for a correct parameterization of clouds in climate modelling. Lifecycle analyses of clouds in the virtual reality setting shows that clouds consist of separate pulses. This behavior seems to be universal and to originate from the area of negative buoyancy just above the cloud base.

DISSERTATIONS

1. Heus, T., On the edge of a cloud, TU Delft, December 2008.

SCIENTIFIC PUBLICATIONS

1. Heus, T. and Jonker, H.J.J., Subsiding shells around shallow cumulus clouds, *J. Atm. Sci.* 65, pp. 1003-1018 (2008).
2. Jonker, H.J.J., Heus, T. and Sullivan, P.P., A refined view of vertical mass transport by cumulus convection, *Geophys. Research Letters* 35, Article L07810 (2008).
3. Heus, T., Van Dijk, G., Jonker, H.J.J. And Van den Akker, H.E.A., Mixing in shallow cumulus clouds studied by Lagrangian particle tracking, *J. Atm. Sci.* 65, pp. 2581-2597 (2008).

PROJECT LEADERS

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RESEARCH THEME

Complex dynamics of fluids

PARTICIPANTS

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COOPERATIONS

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FUNDED

NWO

1st - 2nd 100% 3rd -

START OF THE PROJECT

2004

INFORMATION

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