AIR POLLUTANT DISTRIBUTION AND MESO-SCALE CIRCULATION SYSTEMS DURING ESCOMPTÉ

1. ESCOMPTÉ experiment
The ESCOMPTÉ-experiment (1) was carried out in June and July 2001 in the urban area of Marseille and its rural surroundings to investigate periods with photochemical conditions. The overall aim is to produce an appropriate high quality 3-D data set which includes emission, meteorological and chemical data. The data are used for the validation of mesoscale models and for chemical and meteorological process studies. The evolution of photochemical episodes with high ozone concentrations depends on both chemical transformation processes and meteorological conditions. As Marseille is situated between the Mediterranean Sea in the south and mountainous sites in the north, under weak large-scale flow the meteorological conditions are dominated by thermally driven circulation systems which strongly influence the horizontal transport of air pollutants.

2. Experimental region and IMK measurements
Within the dense network of ground based meteorological and chemical measurements with in-situ and remote sensing techniques as well as aircraft, the IMK contributed 2 radiosonde stations at Vinon (R1) and St. Remy (R3), energy balance, turbulence and SODAR measurements at R3 and aircraft flights with a Dornier 128 aircraft operating from Avignon. Flights covered the whole region at heights up to 4 km agl.

3. Specific Objectives
The Institute of Meteorology and Climate Research (University Karlsruhe, Research Center Karlsruhe) participated in ESCOMPTÉ cooperatively with the following objectives:
- Investigation of mesoscale flow patterns developing by interacting land-sea-breeze circulation, synoptic scale flow and mountain-induced circulation.
- Studies of transport and vertical diffusion of trace substances, in particular of ozone, nitrogen oxides and their sources.
- Study of convection in a dry mountainous region, influence of sub-scale soil heterogeneity on turbulent fluxes in the convective boundary layer, and parameterizations of turbulent transport above inhomogeneous land surfaces.
- Investigation of land-sea processes between the boundary layer and the free atmosphere.

4. Wind systems and ozone distribution during IOP 2b / June 25, 2001

5. Vertical transport by convection
Very strong up- and downscaled up to 8 m/s were passed during flights blue line (hot) over Marseilles, Victor, Evrohel and Durante valley.downscaled patterns of convection are found in relation to geography. The updrafts are clearly associated with positive deviations of NBR due to high concentration at lower layers. Dry air from the uppermost PBL (top, cold) is mixed downward by downscaled. A 3 km-long section at 150 m with fast measurements of vertical velocity, temperature, mixing ratio and nitrogen oxide.