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Aerosols as an important link between large scale land-use modification and subsequent regional climate change: an experimental approach

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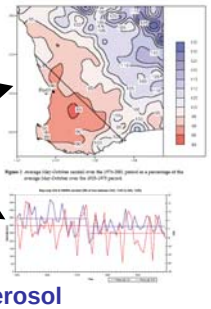
Background

Regional change of precipitation distribution superimposing large scale trends (-)

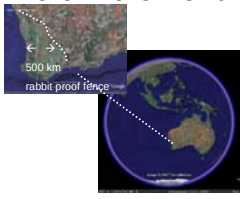


Possibly caused by: (micro)meteorology, regional transport, aerosol

The BUFEX experiment: airborne investigations natural laboratory, 2 seasons agriculture <-> natural vegetation

Where in the world?

Clouds above natural vegetation



Results

Coarse particles very low <10/cm^3 (> 300 nm), ~ 10 fold increase of fine particles above the agriculture

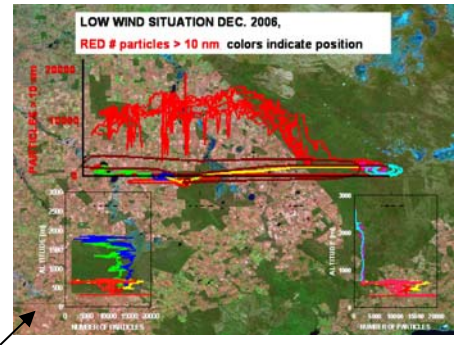
Fresh aerosols above salt lakes, not above native vegetation

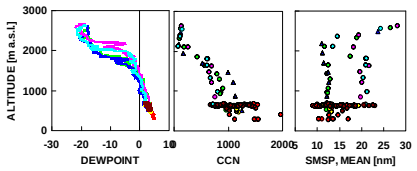
No significant difference between summer (Dec 06) and winter season (Aug 07) despite different wind and H_2O transpiration and concentration

PBL-depth lower above agriculture (> Surface albedo)

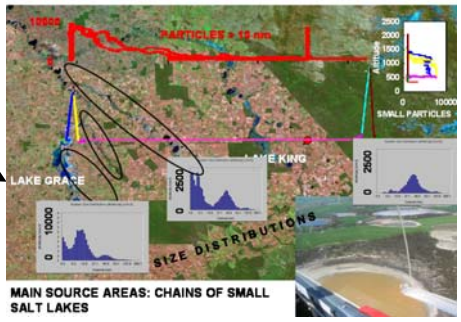
CCN doubled above agriculture

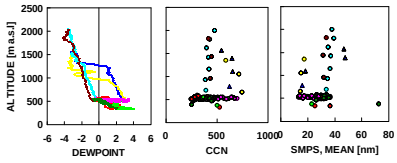
Cloud microphysics
-> more and smaller droplets and less liquid water than above native vegetation
Condensation levels 1300/1800 m





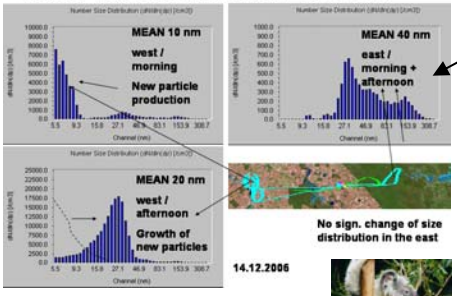
HIGH WIND CONDITIONS AUGUST 2007, NW WIND 20-30 kts

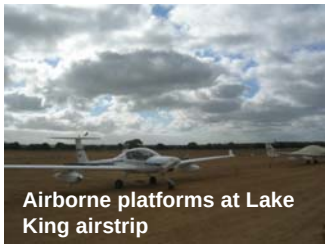




INDICATION OF NUCLEATION 14.12.2006, TWO FLIGHTS

Morning ~ 10:00-12:00 and afternoon ~ 13:30- 15:00

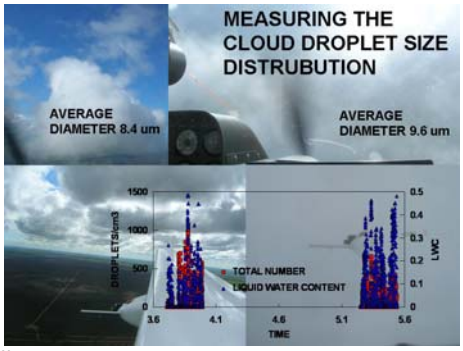




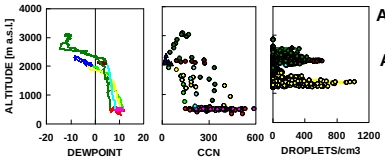
Factors for regional precipitation

Albedo - > vertical stability
local aerosol production
–>CCN and cloud microphysics

Question
Which factors are affecting the productivity of the salt lakes?



Numerous small salt lakes, source areas for ultrafine particles,



AVG_LWC_WEST
0.10 g/cm3
AVG_LWC_EAST
0.15 g/cm3