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Experimental Strategy for Airborne measurements

Observation Systems

- Satellite: global coverage
- Ground remote sensing: fixed location
- Instrumented aircraft: mobile, in situ

Instrumented aircraft: Constraints

- ATC limitations
- Alternative reserve
- Fly almost horizontally (± 15 m/s)
- Airflow disturbance
- Limited pay-load, space, endurance

Preparing a Research Flight

- Get info on ATC restrictions
- Remove 10' for take-off, 10' for landing
- Max ascent or descent rate: 15 m/s
- Speed: 100 m/s (turboprop)
  200 m/s (jet)
- Complete turn (360°) 2'

Define a strategy

- The aircraft provides a snapshot of the phenomenon, along a narrow spaghetti !
- If the phenomenon is stationnary over the duration of the flight, the 3D structure can be documented by the whole pot of spaghettis !
- If the evolution time scale of the phenomenon is shorter than the flight duration, the data set combines both the spatial and the temporal evolution !

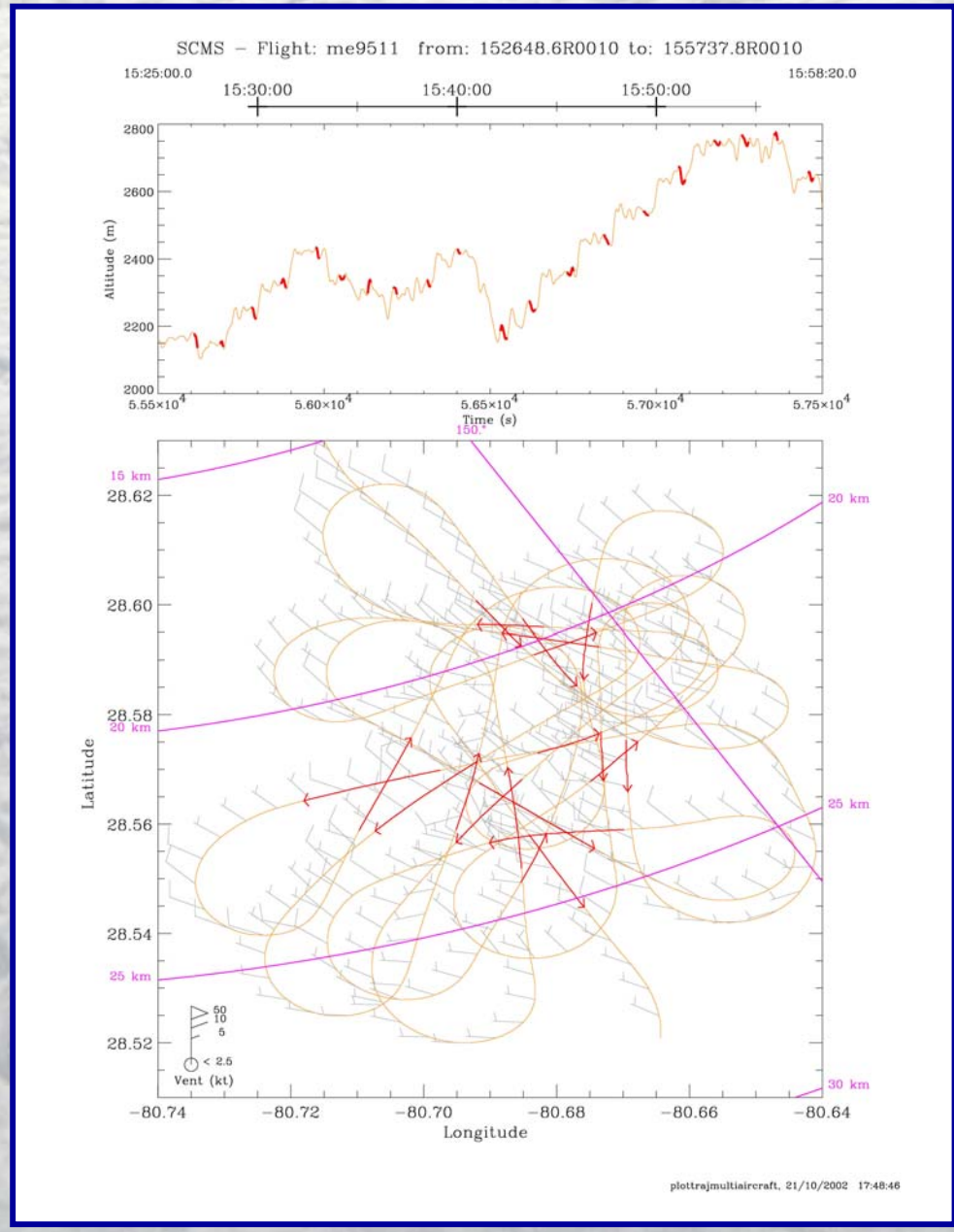
Eulerian versus Lagrangian

- If the phenomenon is fixed with respect to a geographical location, the aircraft trajectory shall be defined with respect to the ground as for example studies of an orographic cloud or mountain waves.

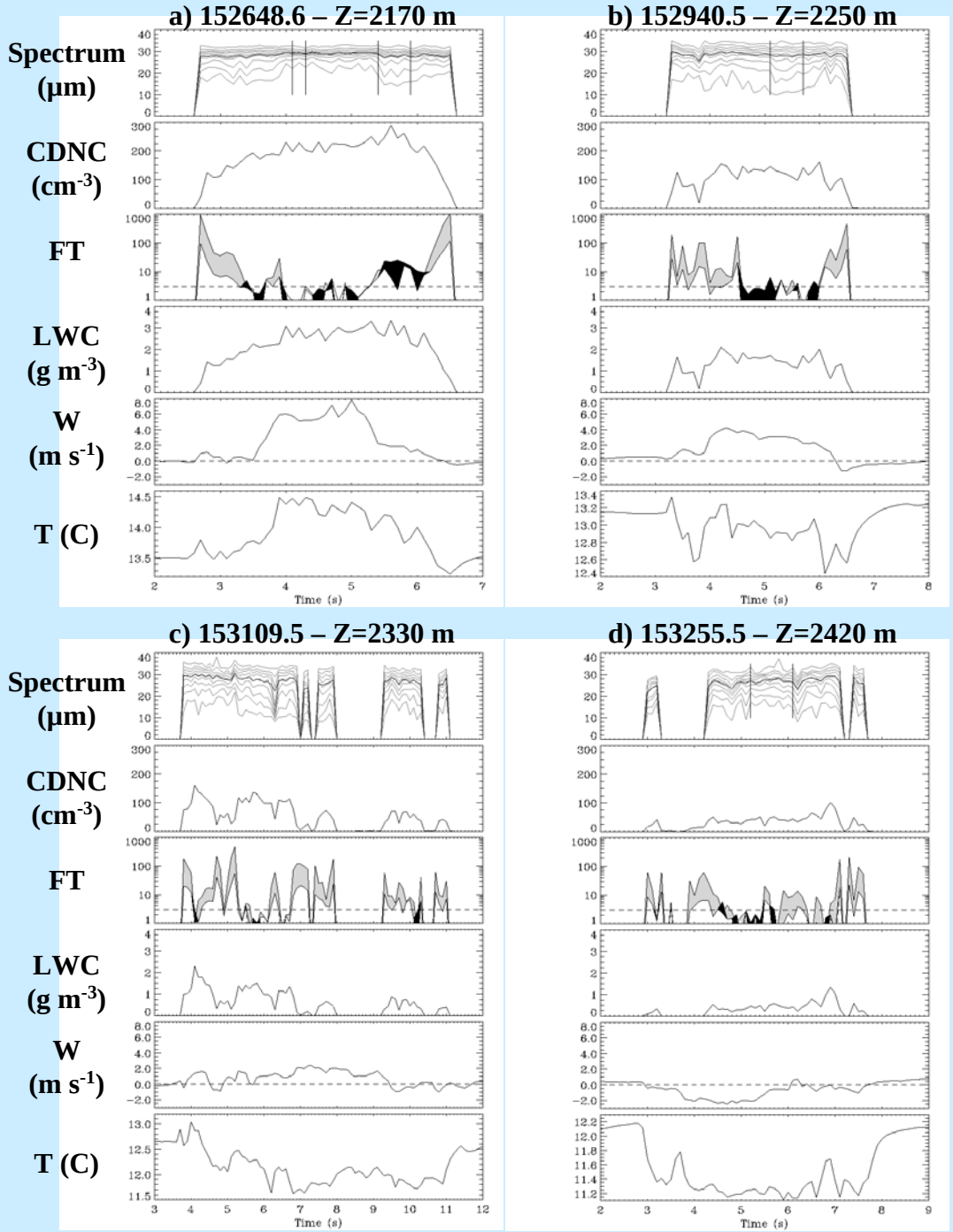
- If the phenomenon moves with the wind, the aircraft trajectory shall be defined with respect to the air, as for example studies of a frontal system, squall line.

Example: short evolution time scale Sampling a series of cumulus clouds, with a life time of about 20 min

Lagrangian approach visually



Time evolution of cloud microphysics at cloud top



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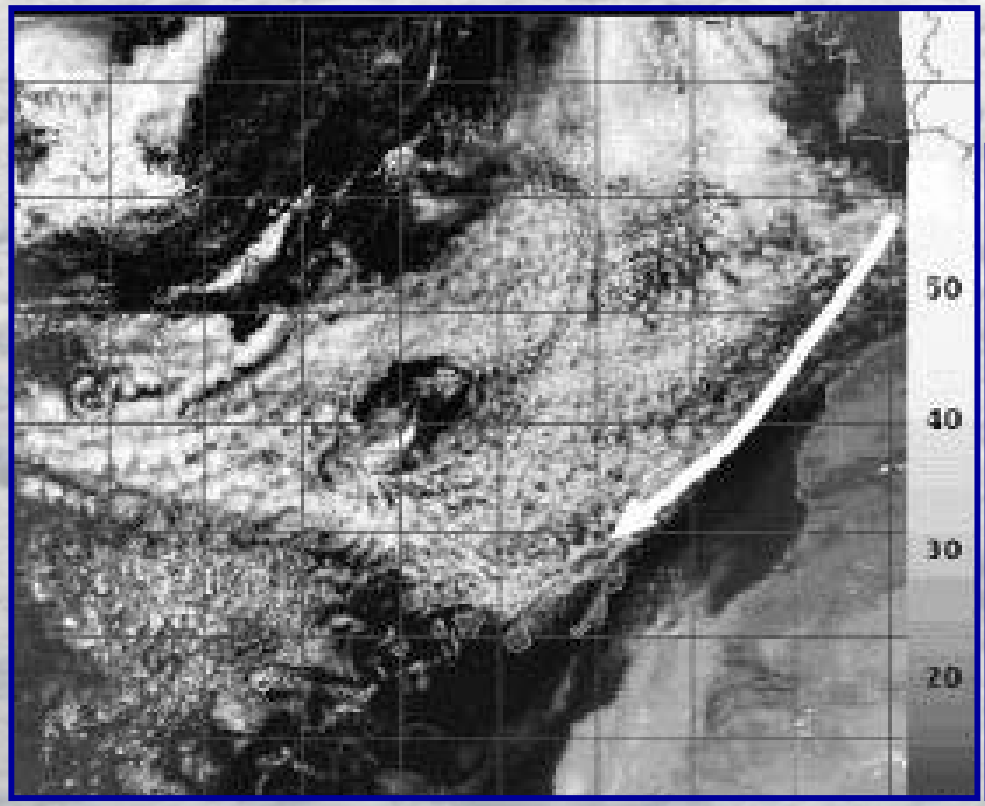
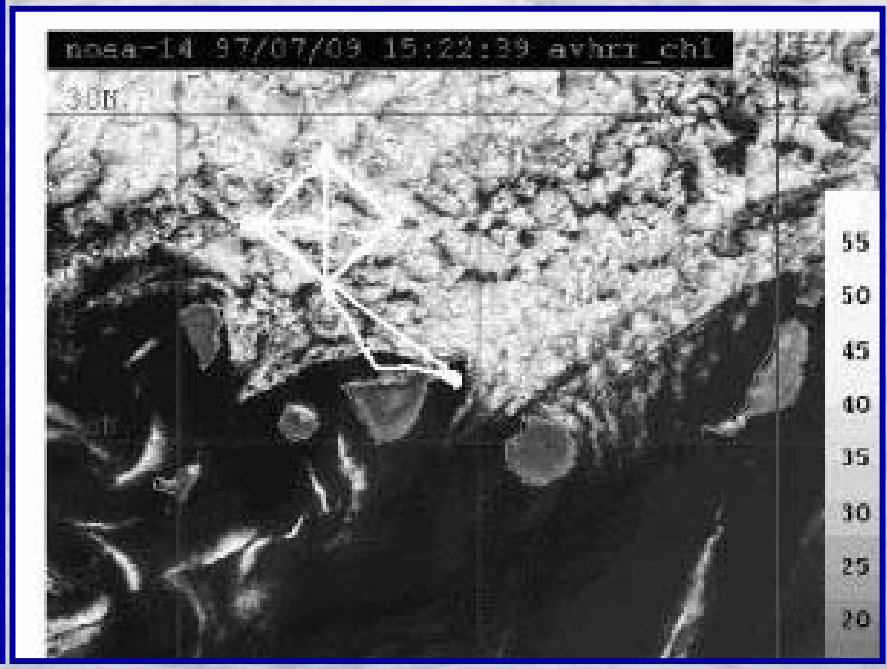
Example: large scale microphysical properties of a stationnary (local noon) boundary layer cloud system

Eulerian approach





How to sample a thin cloud layer and get its vertical stratification

Characterization of the vertical profile of cloud microphysics

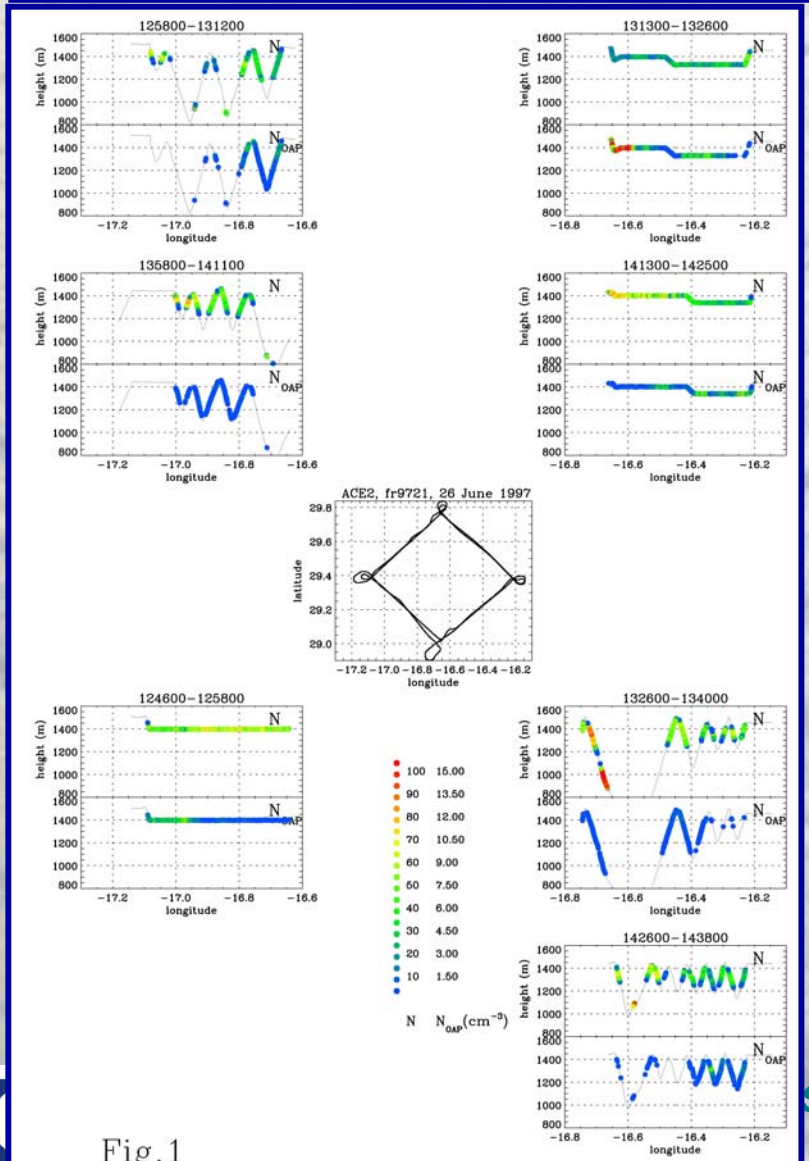
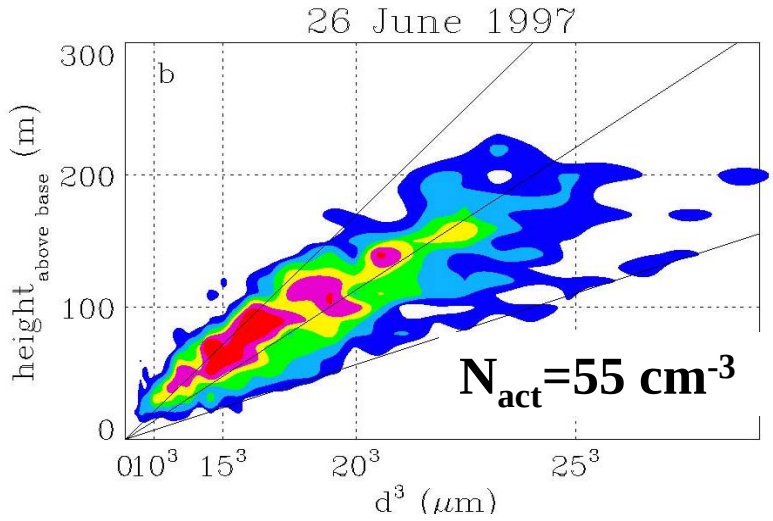
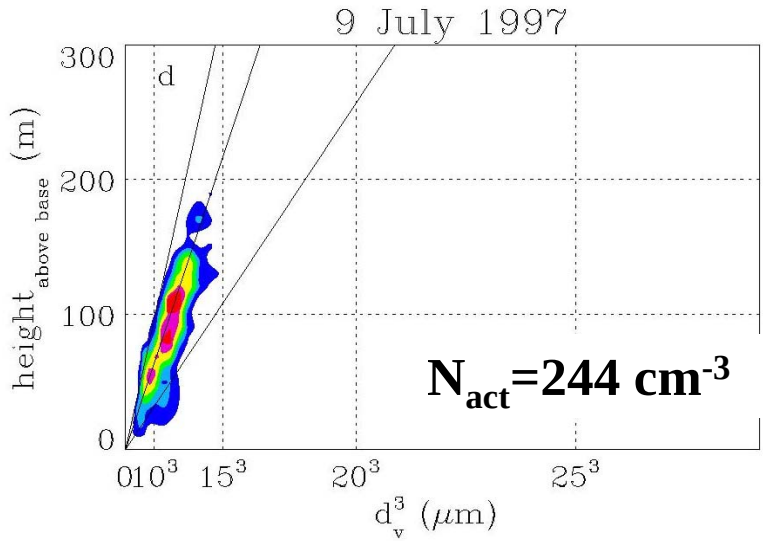


Fig.1





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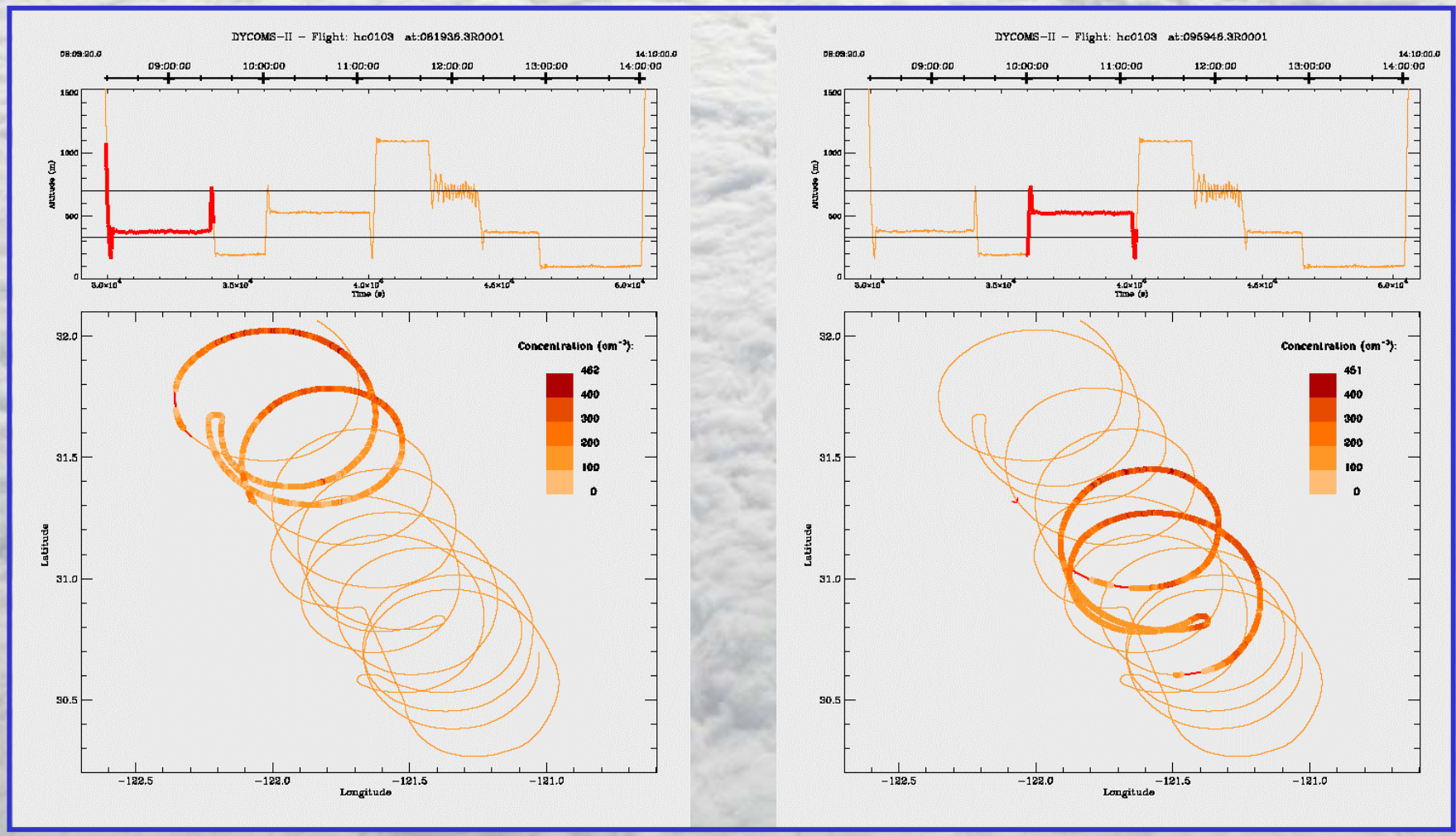
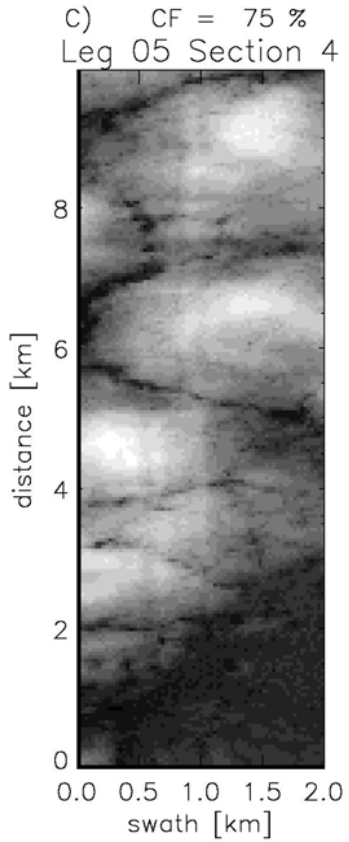
Lagrangian Approach

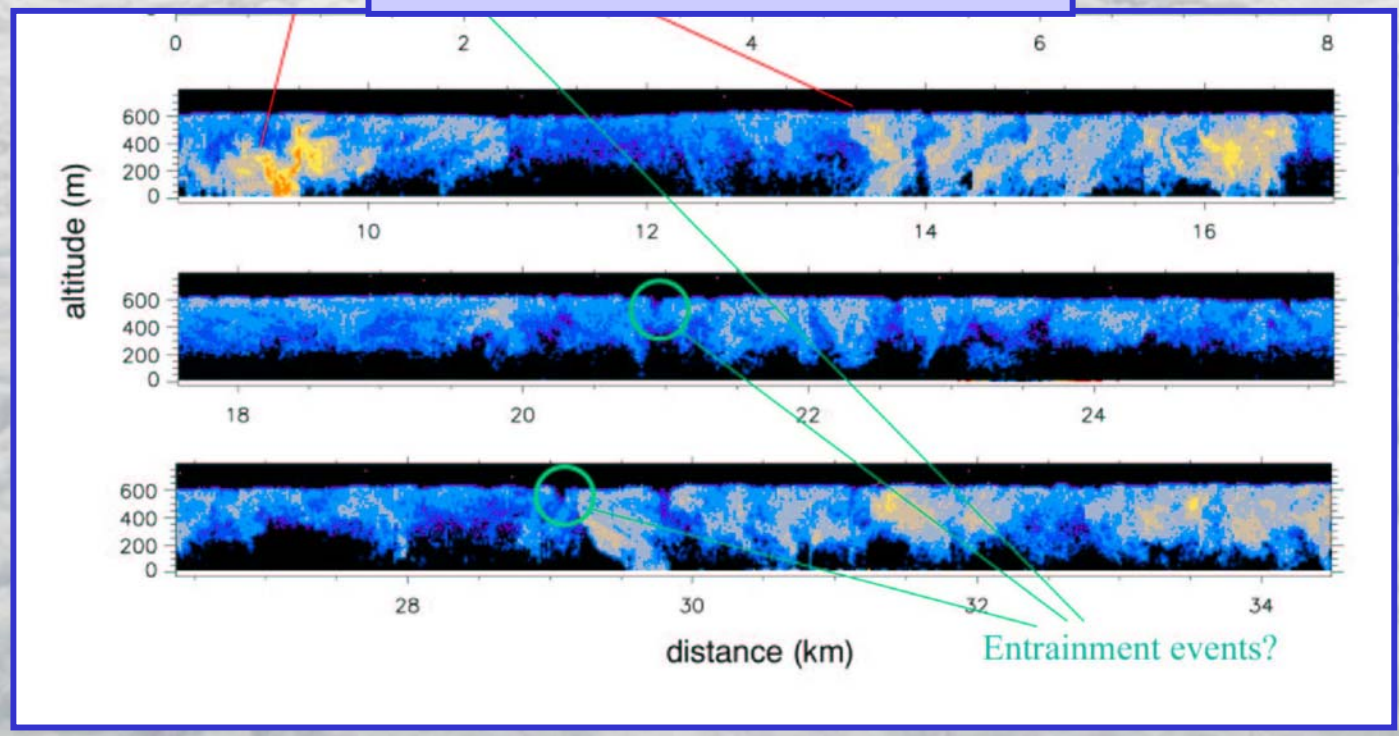


Airborne Remote Sensing
2D sampling

Passive Imagers



Airborne Doppler Radar



Youre ready to write your proposal..

Last recommendation:

Do it simple !

And good luck!!!!!