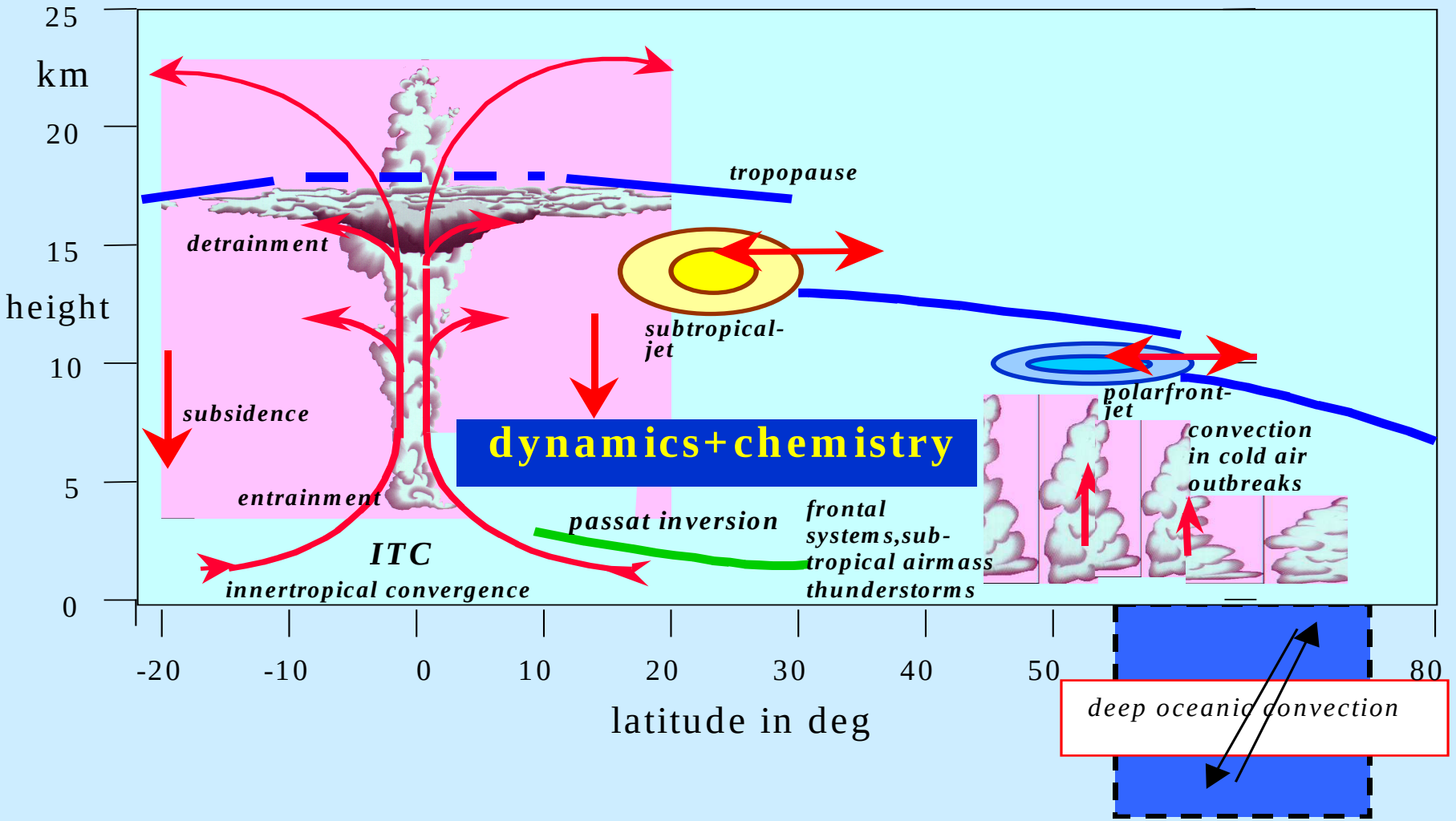
TRACKS – Transport and Chemical Conversion in Convective Systems



Transport and Chemical Conversion in Convective Systems

Motivation

- Convective systems are ubiquitous, but ‘‘small‘‘ and variable, transport efficient and difficult to study
- Convective systems contribute significantly to precipitation and moist deposition
- Convective systems contribute significantly to gas and aerosol budgets at the surface and in the upper troposphere
- Convective systems bear essentially open questions for gas-aerosol-droplet interaction (chemistry and dynamics)

Helmholtz-Centers Involved

AWI DLR GKSS FZK FZJ GFZ

TRACKS – Transport and Chemical Conversion in Convective Systems

Objectives

- **Transport Processes and Precipitation Formation in Convective Systems**
- **Influence of Deep Convection on the Budget of Climatically Active Substances (Gases and Aerosols) in the Upper Troposphere**
- **Influence of Convection on the Trace Gas Balance of the Atmospheric Boundary Layer**

Experiment Configuration

- **Convective Transport and Precipitation Formation in Polar Cold Air Outbreaks**
- **Deep Convective Transport and Chemical Conversions above Europe**
- **Deep Convective Transport and Chemical Conversions in the Tropics**

Helmholtz-Centers Involved

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TRACKS – Implementation

1999 Recommendations of Helmholtz Review Committee
(-> HALO, -> Large Experiments)
2000 Preparation Group Established
2001 TRACKS Concept finished
2002 Helmholtz Steering Committee:
Fiedler FZK; Schumann, DLR; Lemke, AWI; Wahner, FZJ;
Kottmeier, FZK
Contacts with French and US scientists to broaden participation
2003 TRACKS elements in EU- FP 6 -proposals
Review of TRACKS as part of HGF- Earth and Environm./Progr.2
2004 - 2007 Helmholtz-Society finances Virtual Institute „Convective Storms“ (U Mainz, U Hohenheim, DLR, FZK)
2007Mideuropean Experiment linked with PP1167 (COPS)

Focus on convective trace gas transport !

Helmholtz-Centers Involved

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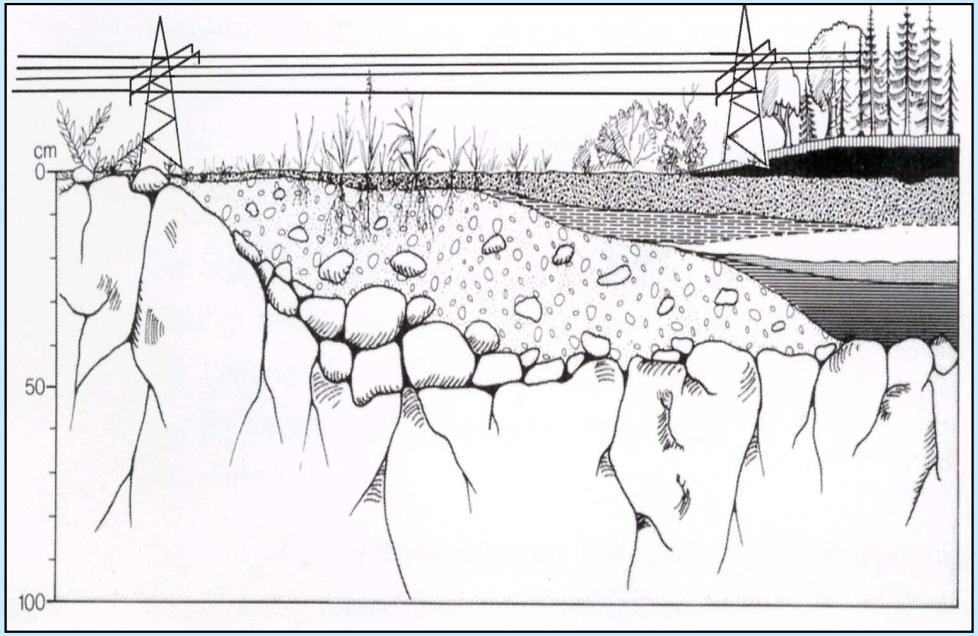
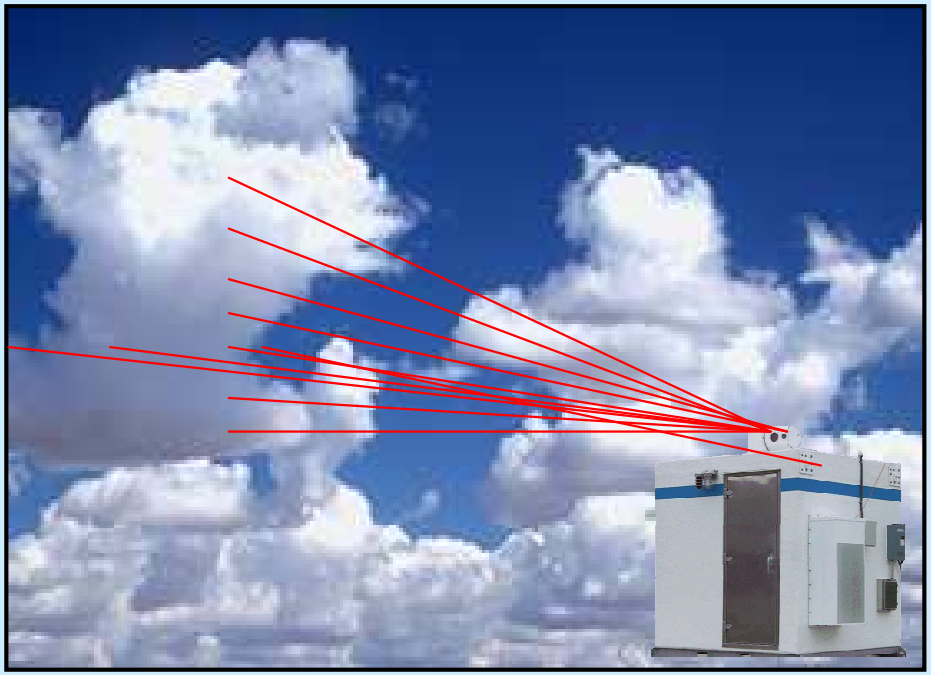
TRACKS – Transport and Chemical Conversion in Convective Systems

Additional funding FZK: new observational techniques

Free Line Sensing of soil moisture variability as a trigger of moist convection

Doppler Lidar for 3-D convection flow studies





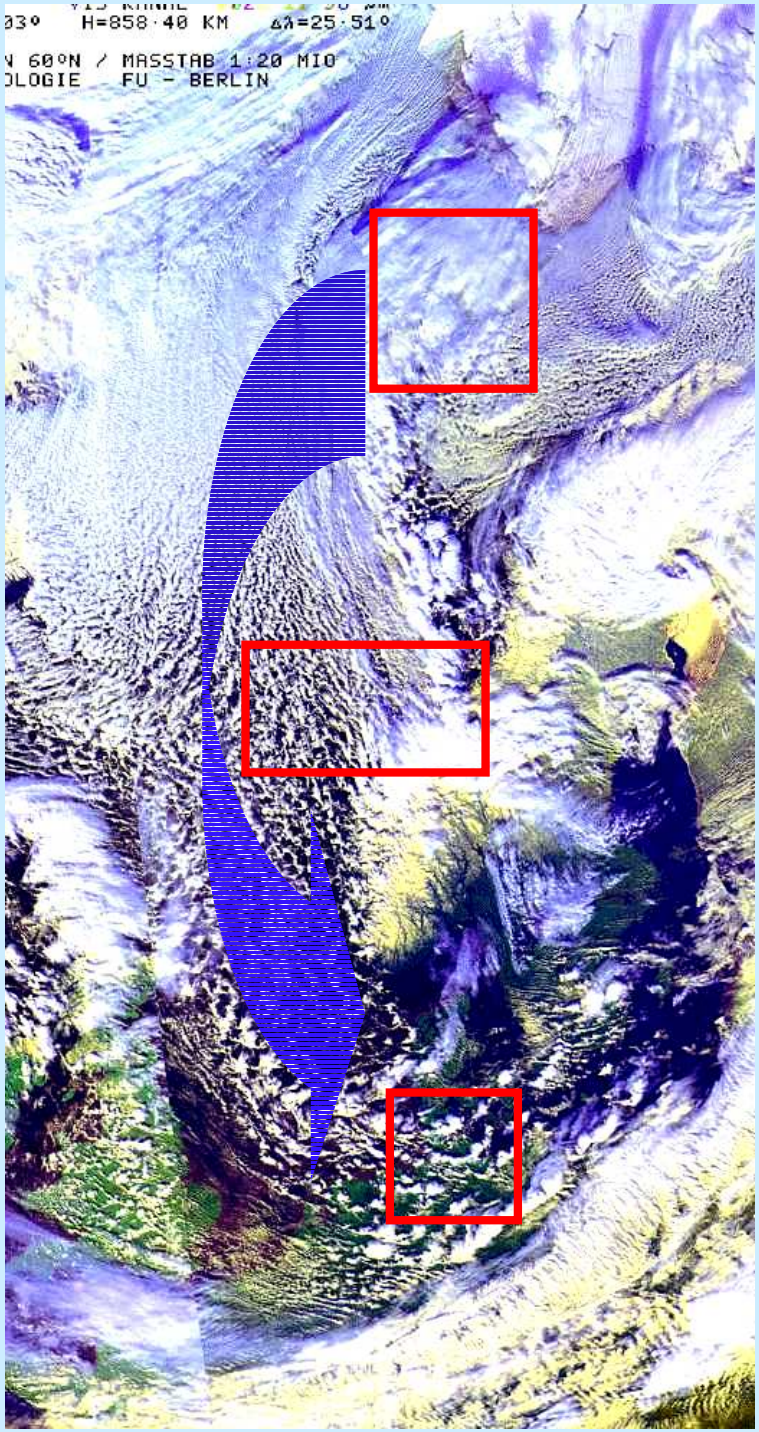
Experiment 1:

Arctic-Northern Europe

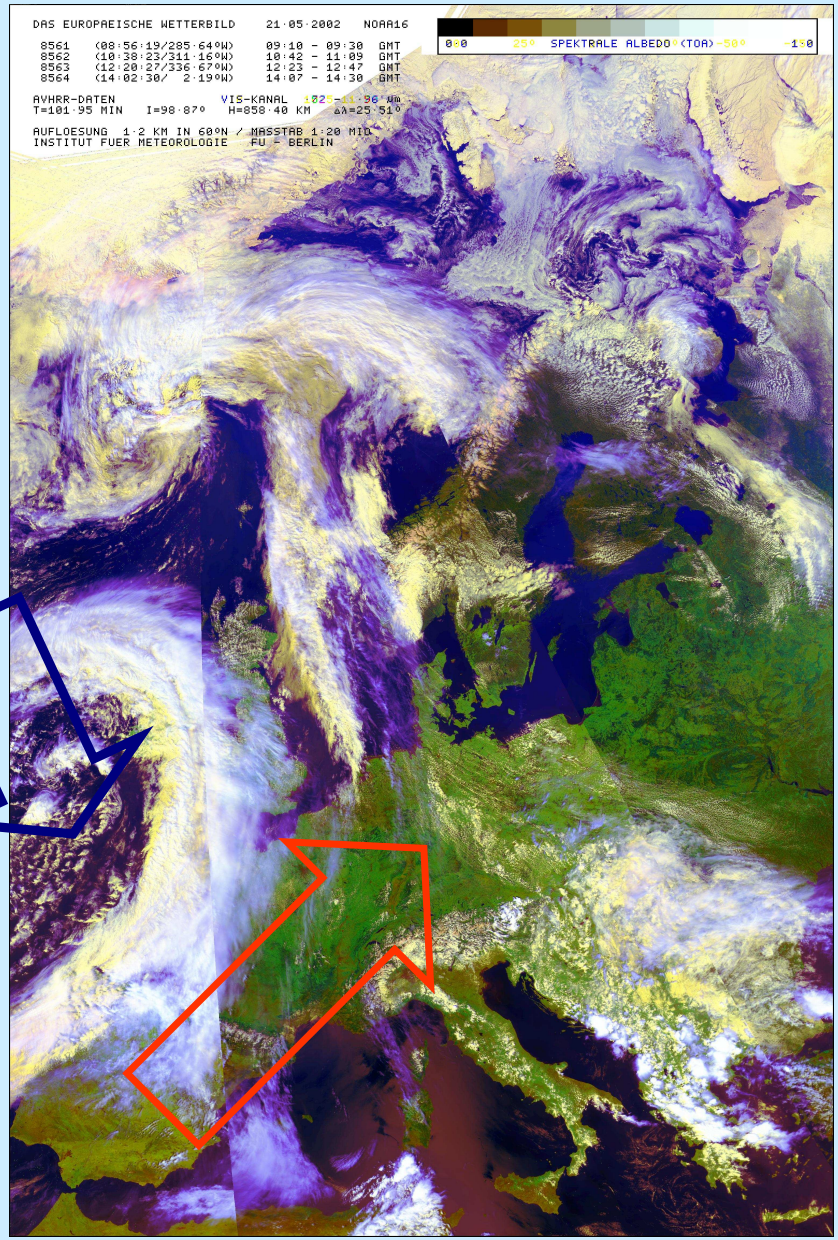
Lagrangian experiment with subregions of intensified measurements

Coordination:

Alfred Wegener Institut



Coupling of the Arctic and Mid-Europe: cold air outbreaks



Fronts with embedded convection,

Thunderstorms and Mesoscale Convective Systems

Experiment 2:

Mid-Europe

Lagrangian experiment with subregions of intensified measurements

Coordination:

Forschungszentrum Karlsruhe

Helmholtz-Centers Involved

AWI DLR GKSS FZK FZJ GFZ

Experiments >2 in tropical regions

Participation in different Tropical Experiments (TROCCINOX, SCOUT, AMMA…)

German Coordination:

DLR (FZJ, FZK)

Helmholtz-Centers Involved

AWI DLR GKSS FZK FZJ GFZ

TRACKS – Transport and Chemical Conversion in Convective Systems

What may TRACKS add to COPS?

Forschungszentrum Jülich:	Instrumented Airship/Small Aircraft for gas measurements
Forschungszentrum Karlsruhe:	Organisational efforts common to COPS and TRACKS Gas analyser system on Do128 aircraft Soil moisture measurements
DLR (?)	Additional Aircraft hours Lightning network
AWI, GKSS	
GFZ	GPS water vapour tomography