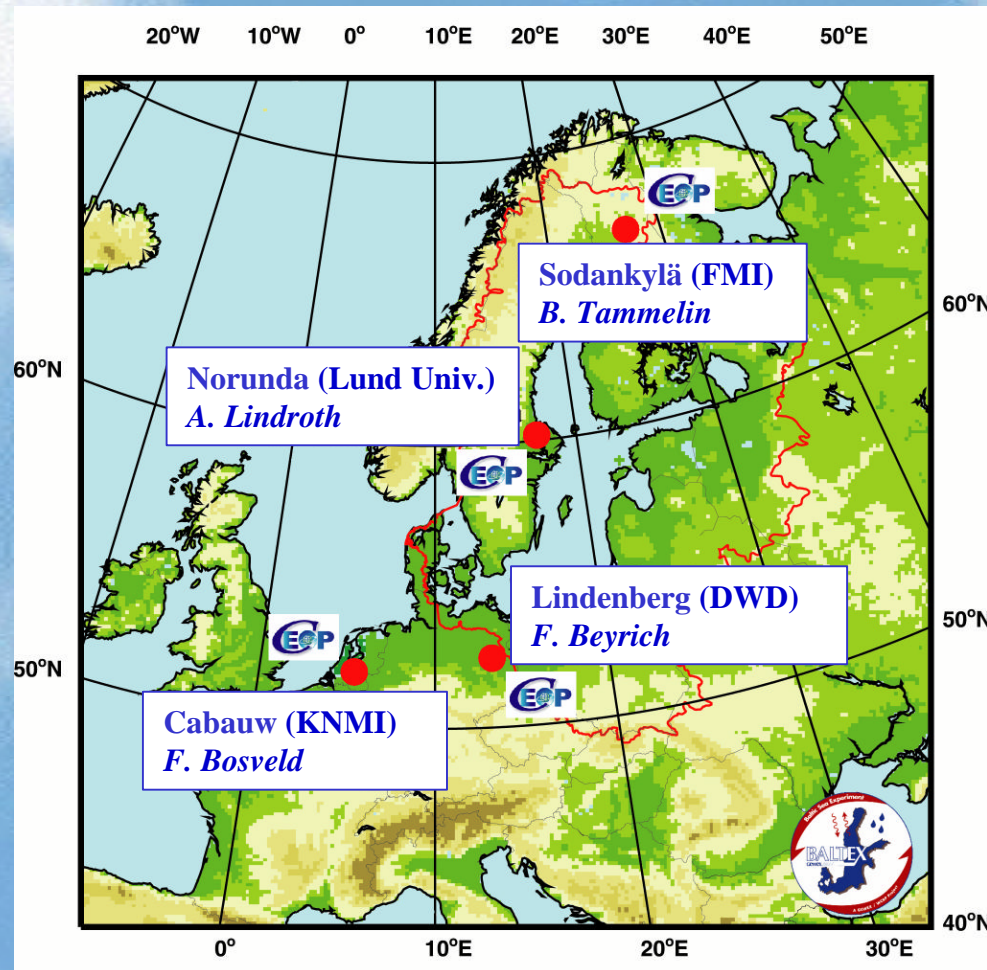




A Status Report from the European (BALTEX) Reference Sites in CEOP



- Introduction
- Data Delivery Status
- Recent Activities
- Site Cooperation
- Perspectives





The European (BALTEX) Reference Sites in CEOP - Landscape and Climate



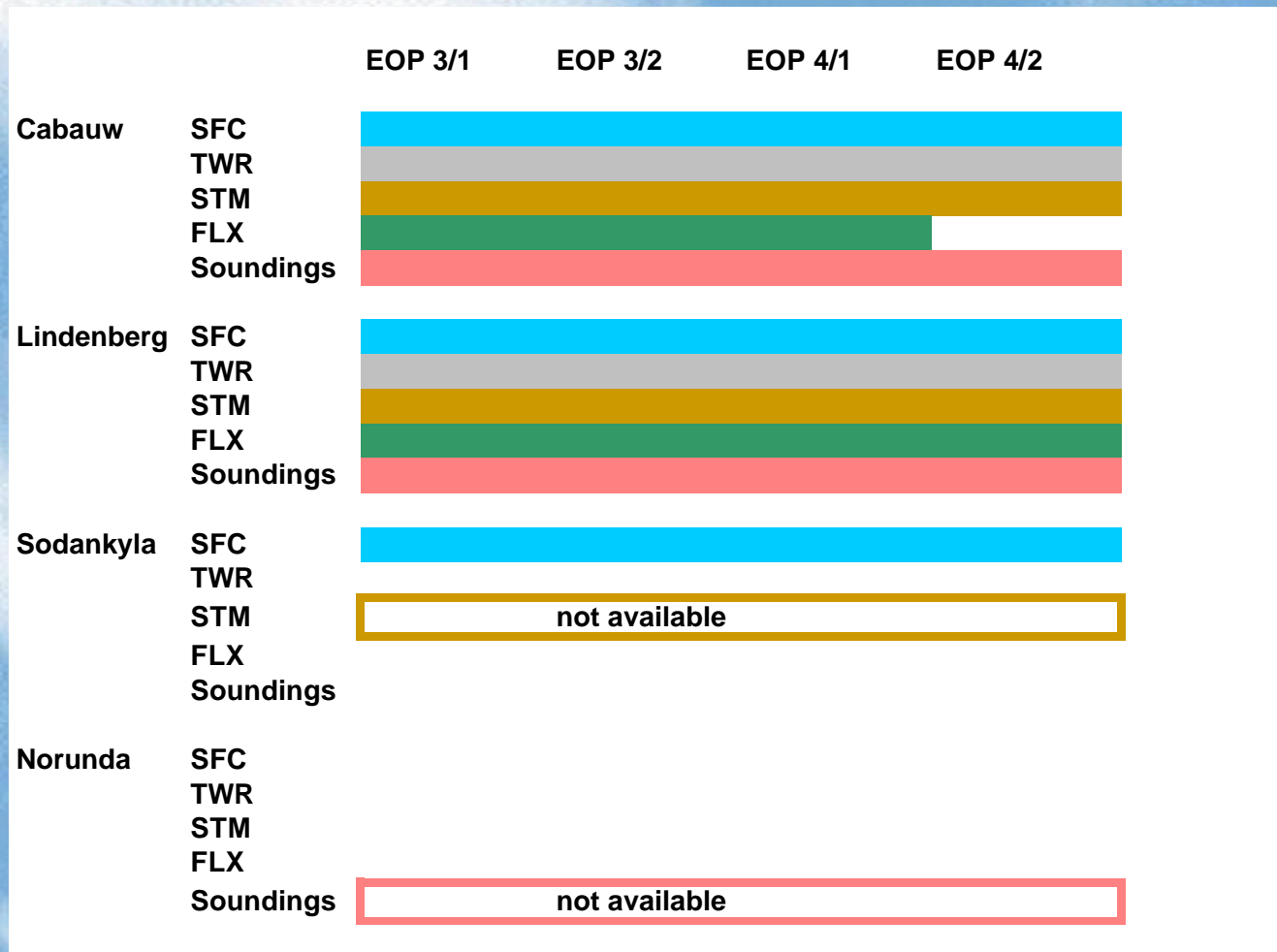
Climate conditions at the BALTEX-CEOP reference sites

Site	T (summer)	T (winter)	RR (annual)
Cabauw	17 °C	+ 3 °C	793 mm
Lindenberg	18 °C	- 1 °C	565 mm
Norunda	16 °C	- 5 °C	520 mm
Sodankylä	14 °C	- 15 °C	500 mm





Data Delivery Status of BALTEX Reference Sites in CEOP





Additional Measurements

(data might become available upon request)



Instrument	Measurements	Cabauw	Lindenberg	Norunda	Sodankylä
Wind Profiler / RASS	V-/T- profiles	X	X		
MW rad. Profiler	T-/q-profiles		X		
MW radiometer	Q (column)	X	X		X
GPS antenna	Q (column)	X	X		X
Ceilometer	Cloud height	X	X		X
Cloud radar	Cloud microphys.	X	X		
Micro rain radar	Rain microphys.	X	X		
UV radiometer	UV radiation	X	X		X
Nephelometer	Aerosol opt. Depth	X	X		
Gas analyser	Surface ozone	X	X		X
Ozone Sonde	Ozone profiles		X		X



Participation of the BALTEX Reference Sites in other International Programs



Projects	Focus	Cabauw	Lindenberg	Norunda	Sodankylä
BSRN	Radiation	X (New)	X		
GABLS	Stable ABL	X	X		
GCOS	Climate Data		X		X
GAW	Atm. Composition				X
EDUCE / SUVNET	UV radiation	X	X		X
FLUXNET	CO2 budget	X		X	X

Remark: Unification of data formats (within GEWEX) desirable



Actual Research Activities at Cabauw



Consortium of 7 institutes:



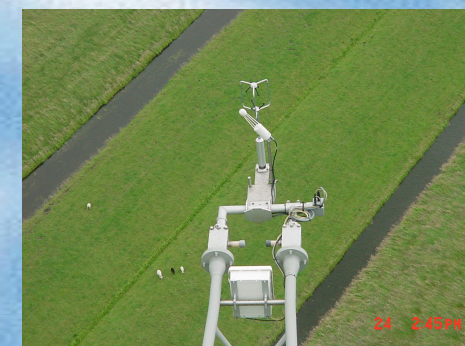
<http://www.cesar-observatory.nl/>



CESAR Research Program at Cabauw 2005-2009



- Multi instrument remote sensing of clouds
- Multi instrument remote sensing of thermodynamic profiles
- Turbulent structure of the boundary layer
- In-situ GHG and aerosol observations
- Extended soil hydrological program with polder run-off observation



® considerably strengthened by national funding sources

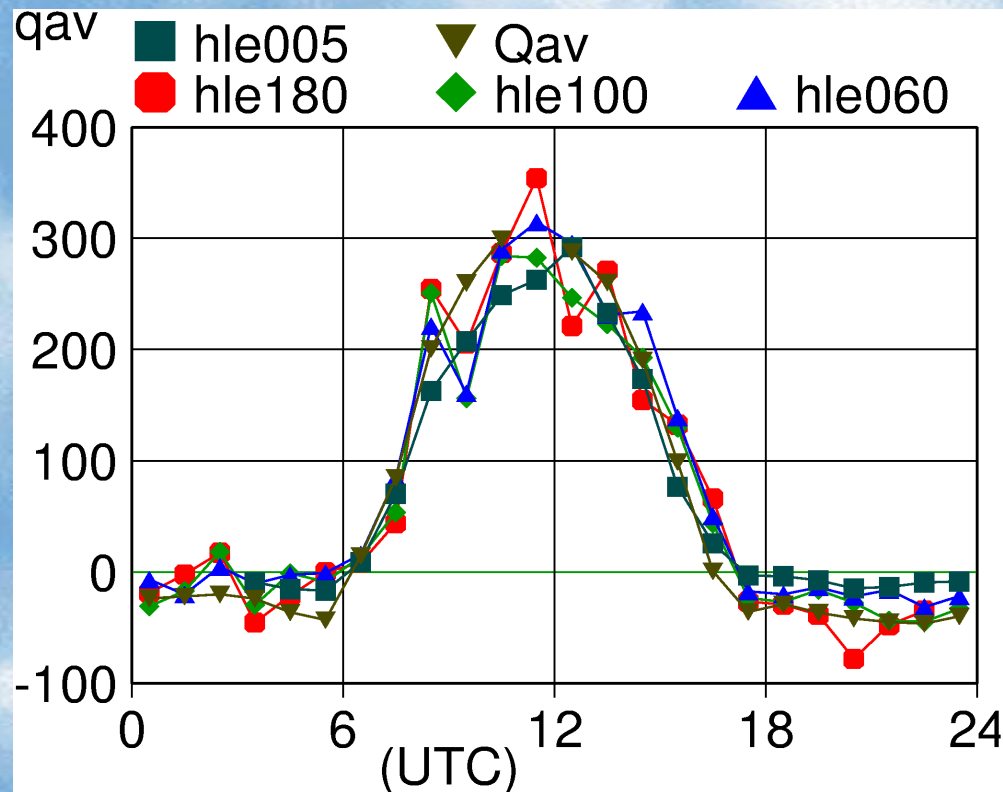




Actual Research Results from Cabauw



Surface energy budget on a regional scale



*hle = turbulent flux +
d/dt (storage below
observation level)
Qav = Net radiation –
soil heat flux*

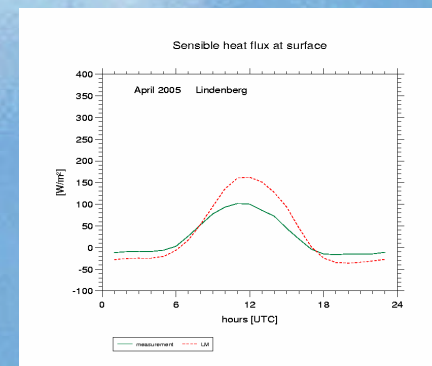
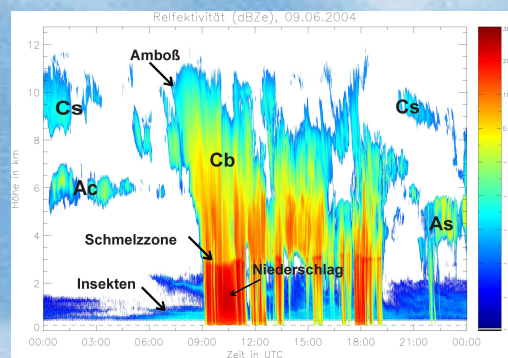
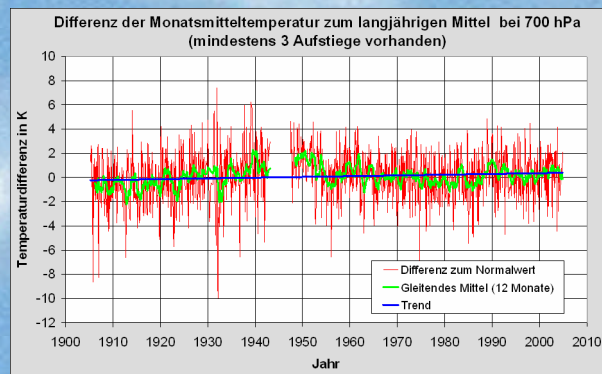
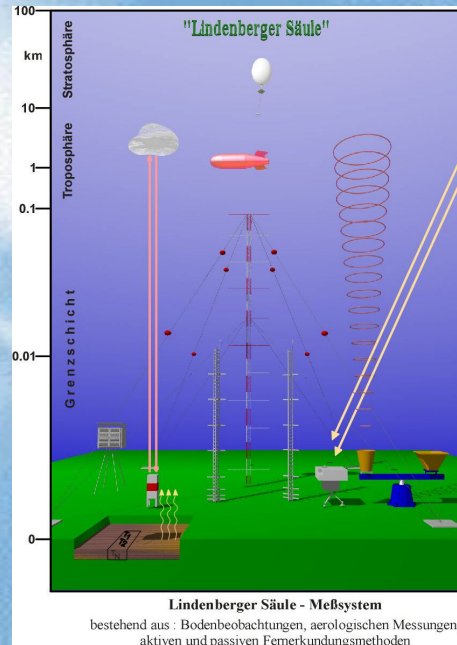




Research Program at Lindenberg 2005-2010: The Lindenberg Column



- Integrated Profiling (wind, temperature, water vapour)
- Clouds and radiation
- Area-averaged fluxes
- model process validation
- satellite reference
- climatology



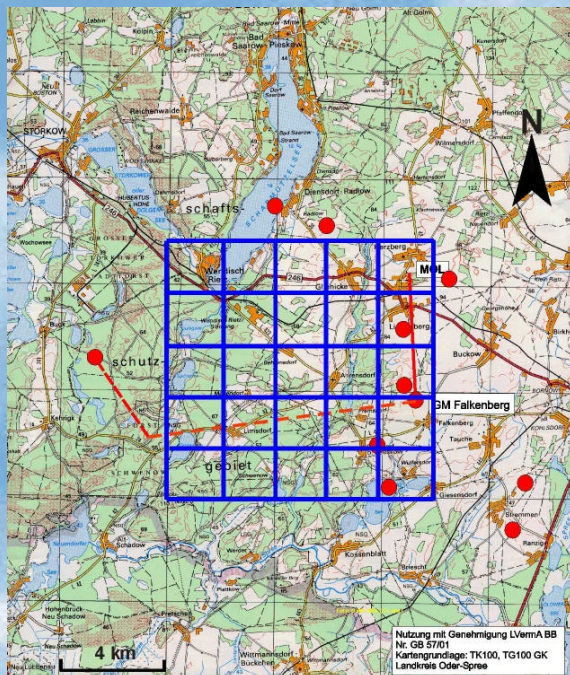


Actual Research Activities at Lindenberg



LITFASS-2003 experiment (during CEOP - EOP 3b)

® flux aggregation over heterogeneous terrain



Flux measurements at different scales

- micrometeorological stations
- scintillometers
- lidar / RASS and lidar / lidar combination
- 60 flight hours with turbulence sonde Helipod



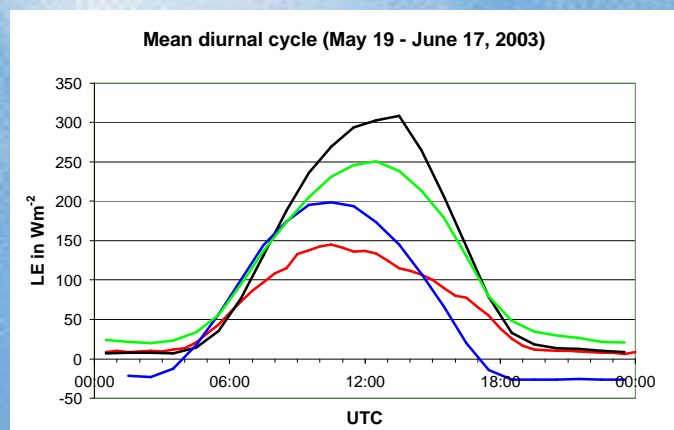
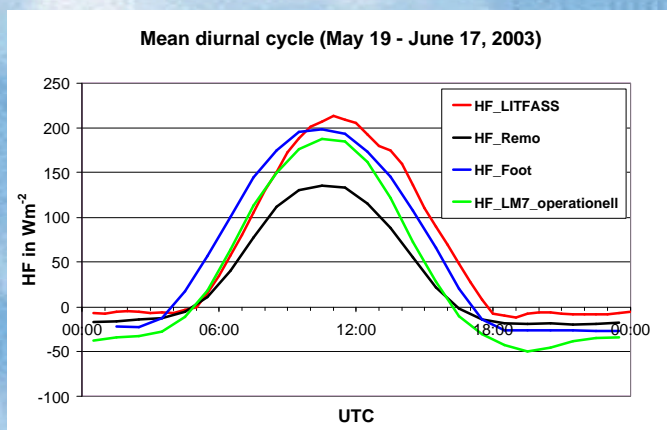
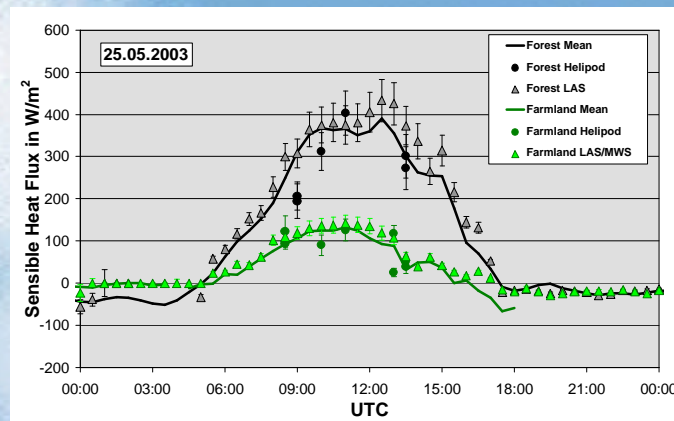
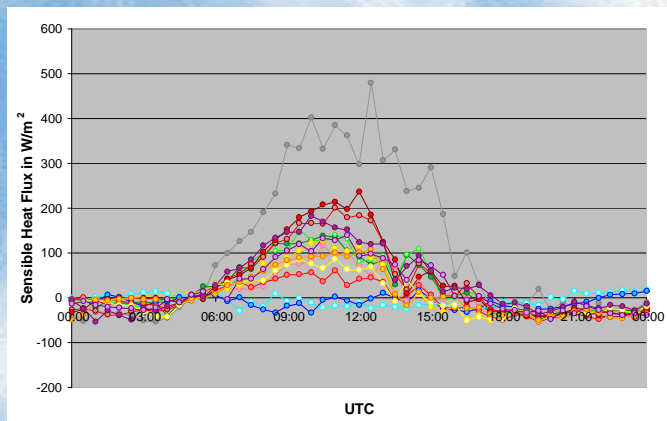


Actual Research Activities at Lindenberg



LITFASS-2003 experiment (during CEOP - EOP 3b)

® flux aggregation over heterogeneous terrain

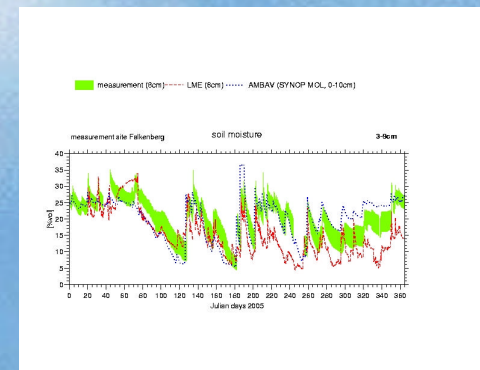
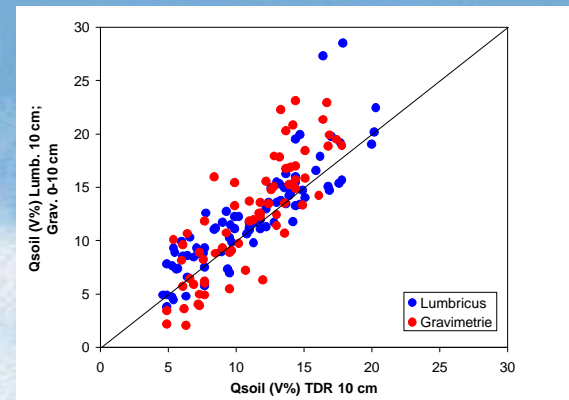
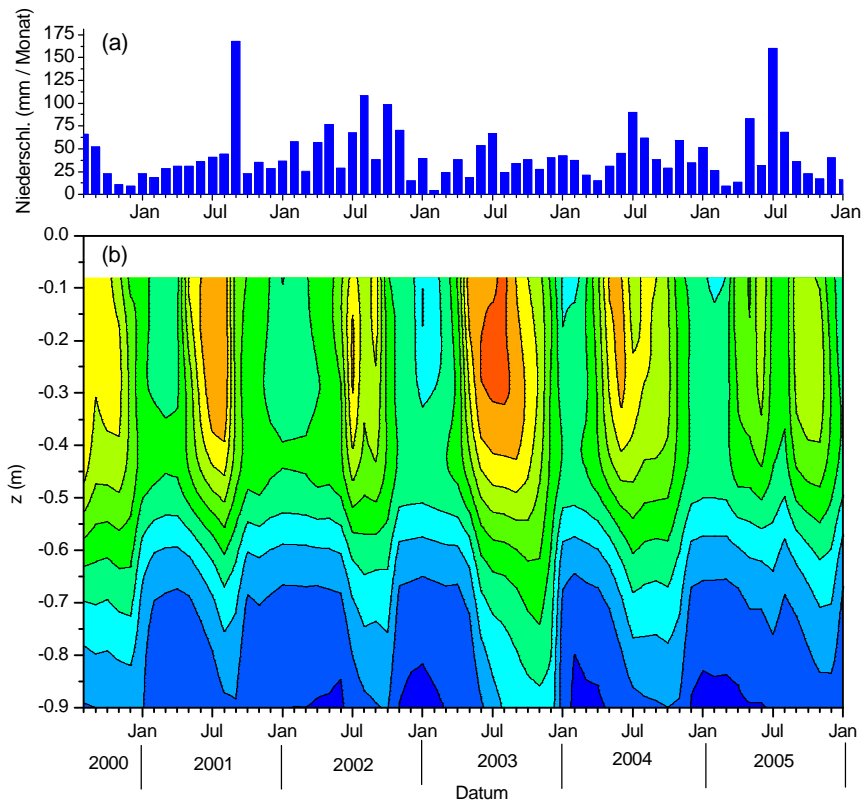




Actual Research Activities at Lindenberg



Soil moisture measurements and modelling

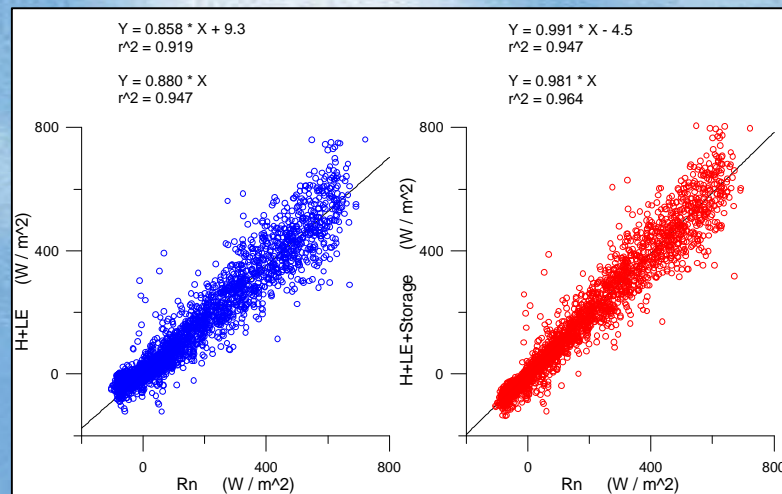
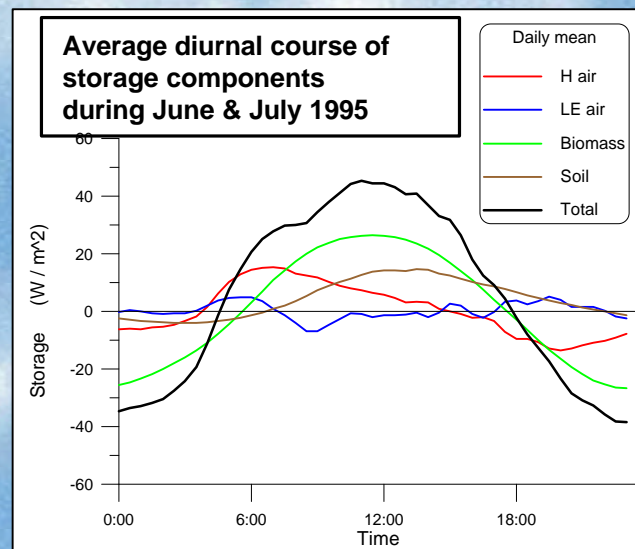
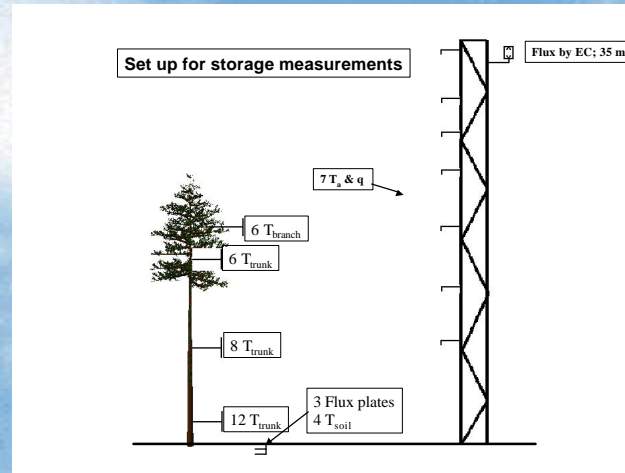




Actual Research Activities at Norunda

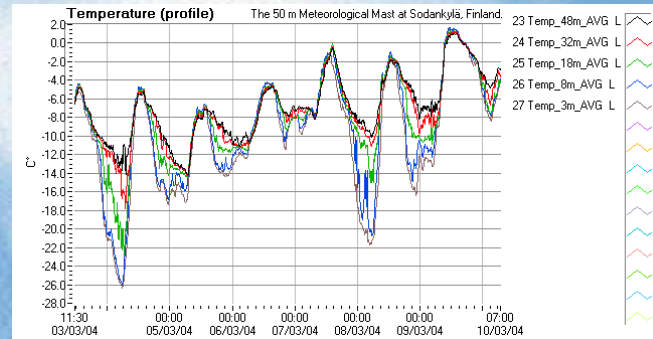
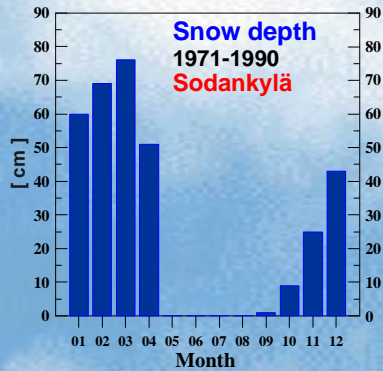


Careful consideration of all storage terms contributes to energy budget closure



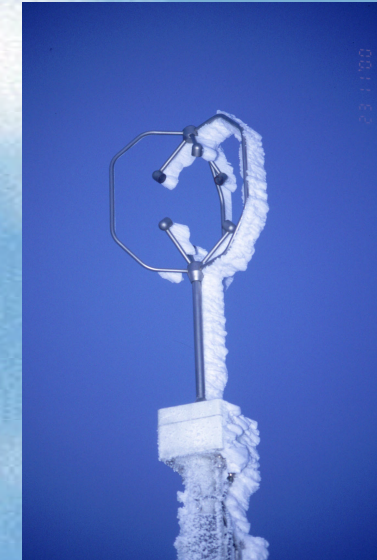
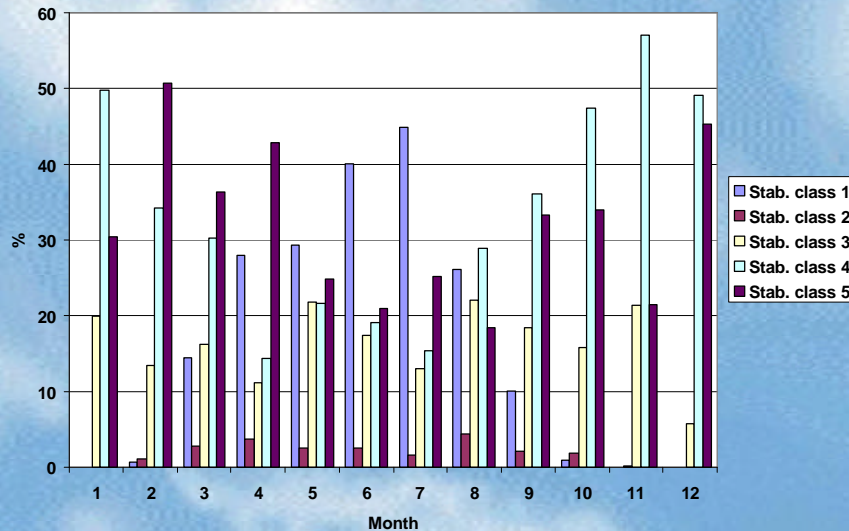


Actual Research Activities at Sodankylä



- arctic climate
- snow and ice processes
- sensor behaviour

Stability classes according pot. temperature difference difference 32 m - 3 m



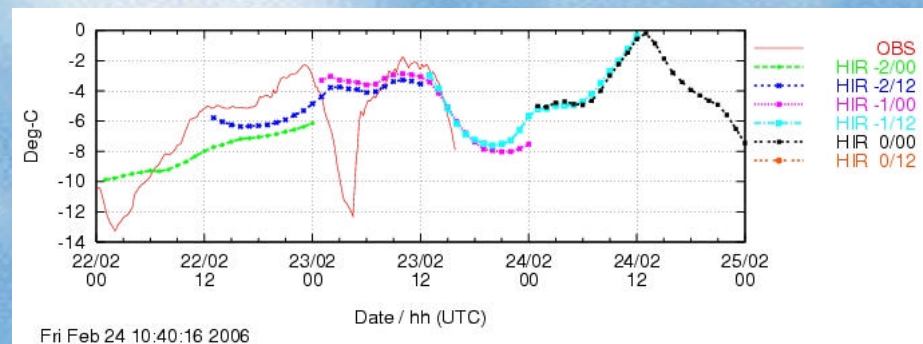
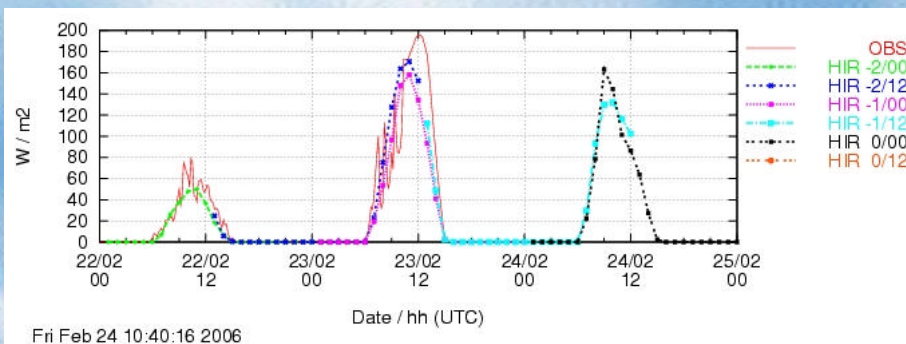
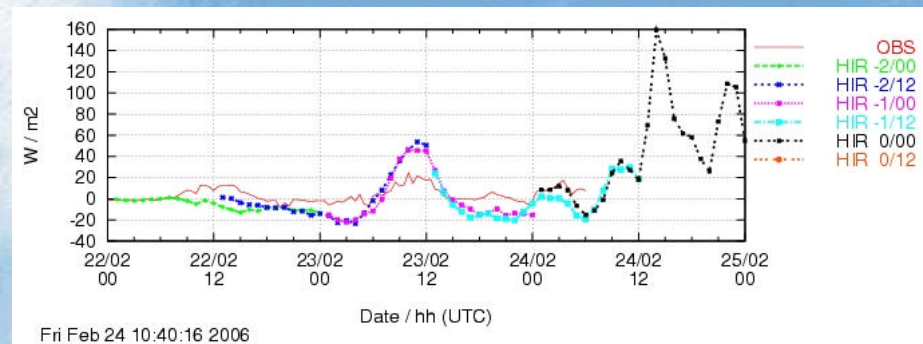
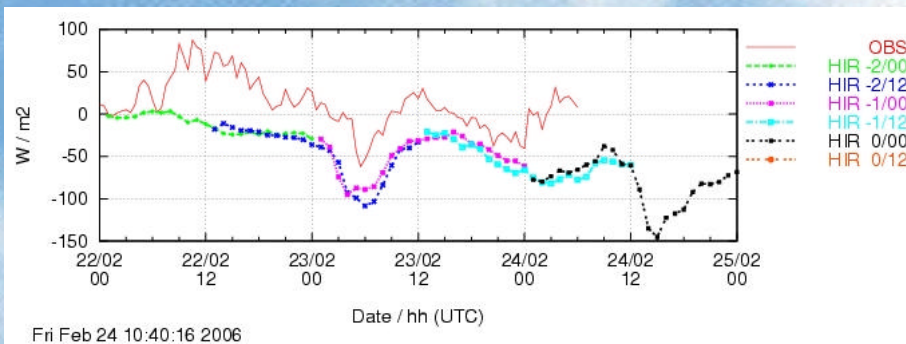
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Actual Research Activities at Sodankylä



operational validation of HIRLAM model output



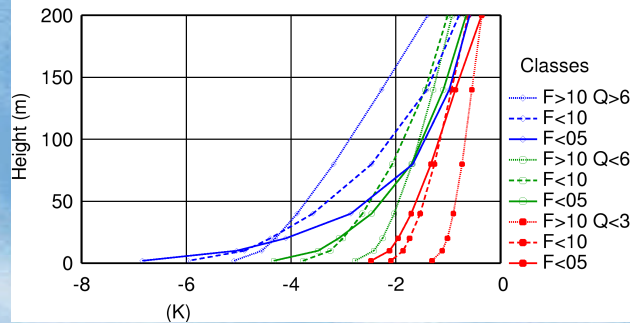
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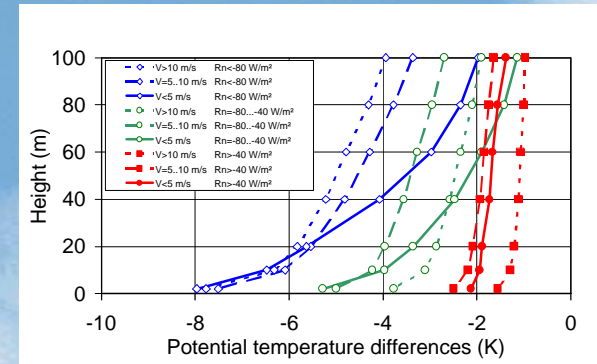
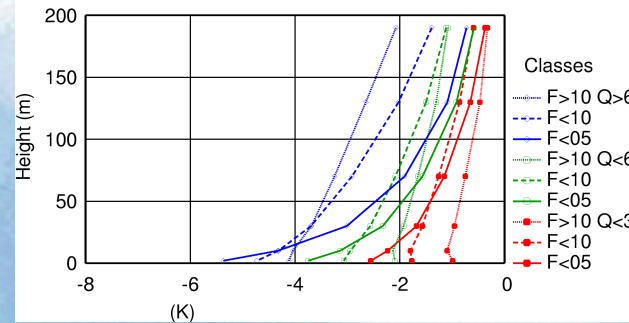
Joint Activities from Cabauw and Lindenberg in GABLS



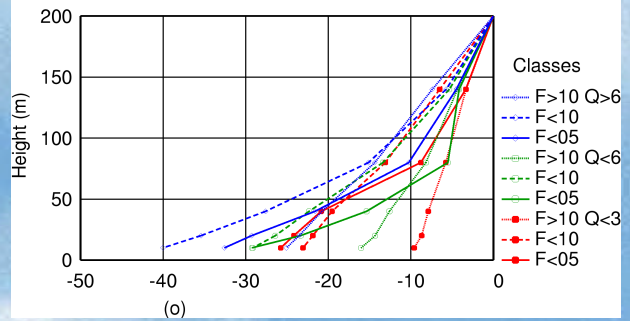
SBL classification Cabauw 1986-1996
Potential temperature differences



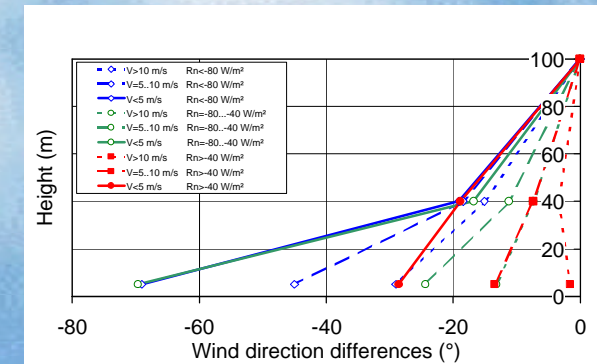
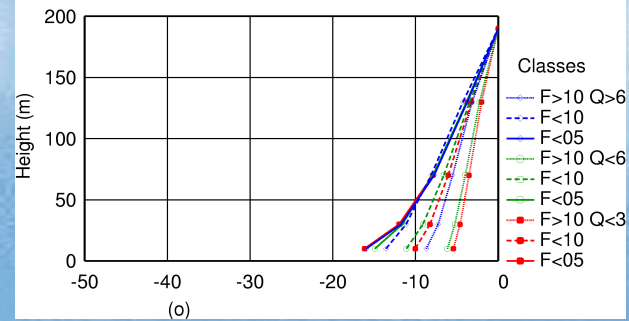
SBL classification ERA40 1986-1996
Potential temperature differences



SBL classification Cabauw 1986-1996
Wind direction differences



SBL classification ERA40 1986-1996
Wind direction difference



Structure of the SBL in measurements and models





Perspectives for CEOP - Phase II and Open Issues



® Cabauw and Lindenberg ready to provide data for CEOP Phase II

Open Issues for Discussion

- future strategy with respect to completeness of CEOP data sets (at least 1D forcing data ? Gap filling ?)
- Treatment of energy budget non-closure
- Treatment of data revisions that might become necessary



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