

# Windracer<sup>®</sup>

Forschungszentrum Karlsruhe  
in der Helmholtz-Gemeinschaft

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**First measurements with the new  
Karlsruhe Doppler Lidar**



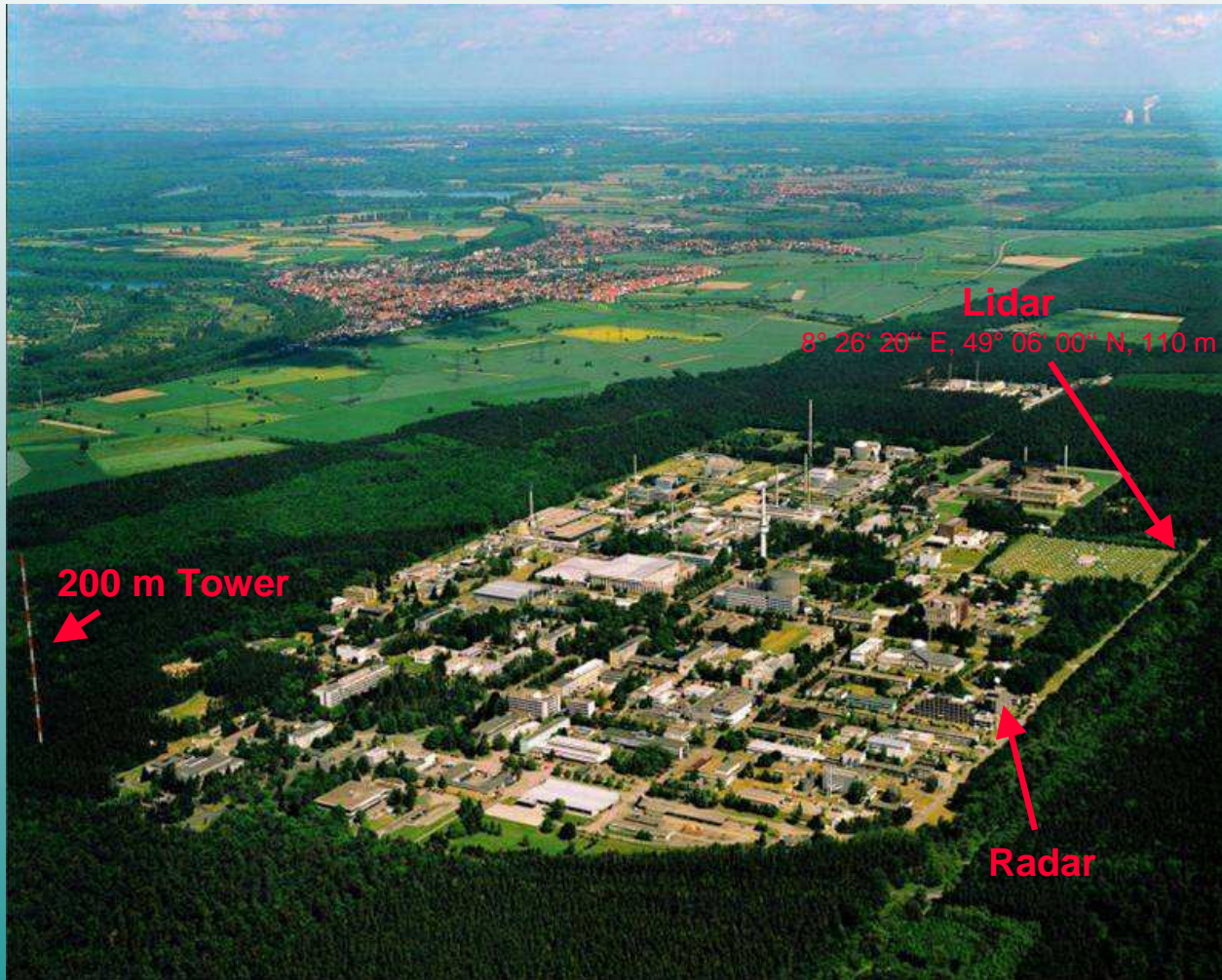
June 03, 2004



we became lidar enthusiasts



## Installation Site



# Lidar System

## CLR Photonics Wind Tracer 2 $\mu\text{m}$ Doppler-Lidar MAG 1A Transceiver

### Laser:

Wavelength	2.0225 $\mu\text{m}$ (eye safe)
Pulse energy	2 mJ
Pulse width	425 ns
Pulse repetition frequency	500 Hz

### Receiver:

Bandwidth:	50 / 100 MHz
Sampling frequency	100 MHz
Resolution	8 bit

### Scanner:

Beam diameter	8 cm
Azimuth (range, step, speed)	360°, 0.01°, 25° s <sup>-1</sup>
Elevation -"-	190°, 0.01°, 25° s <sup>-1</sup>

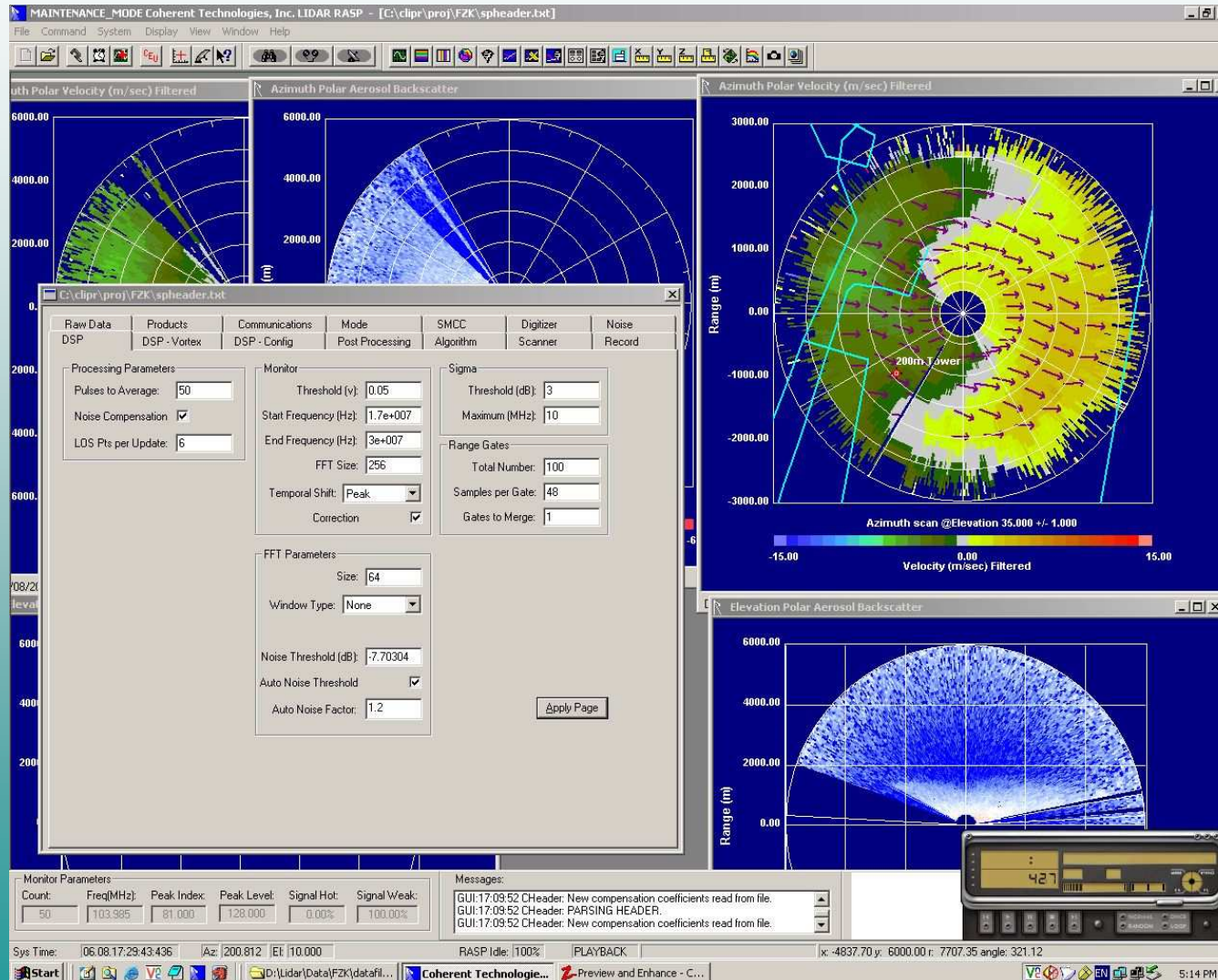
### Output:

Range gates	120
Range (min, max)	400 m, >8500 m
Range resolution	80 – 100 m
Velocity range:	$\pm 20$ / $\pm 40$ m s <sup>-1</sup>
Velocity resolution	0.6 m s <sup>-1</sup>
Update frequency (LOS)	10 Hz





## System Control



**Windows 2000 GUI**

for complete

**system control**

and

**data visualization**

**local or remote**

## Intercomparison Measurements

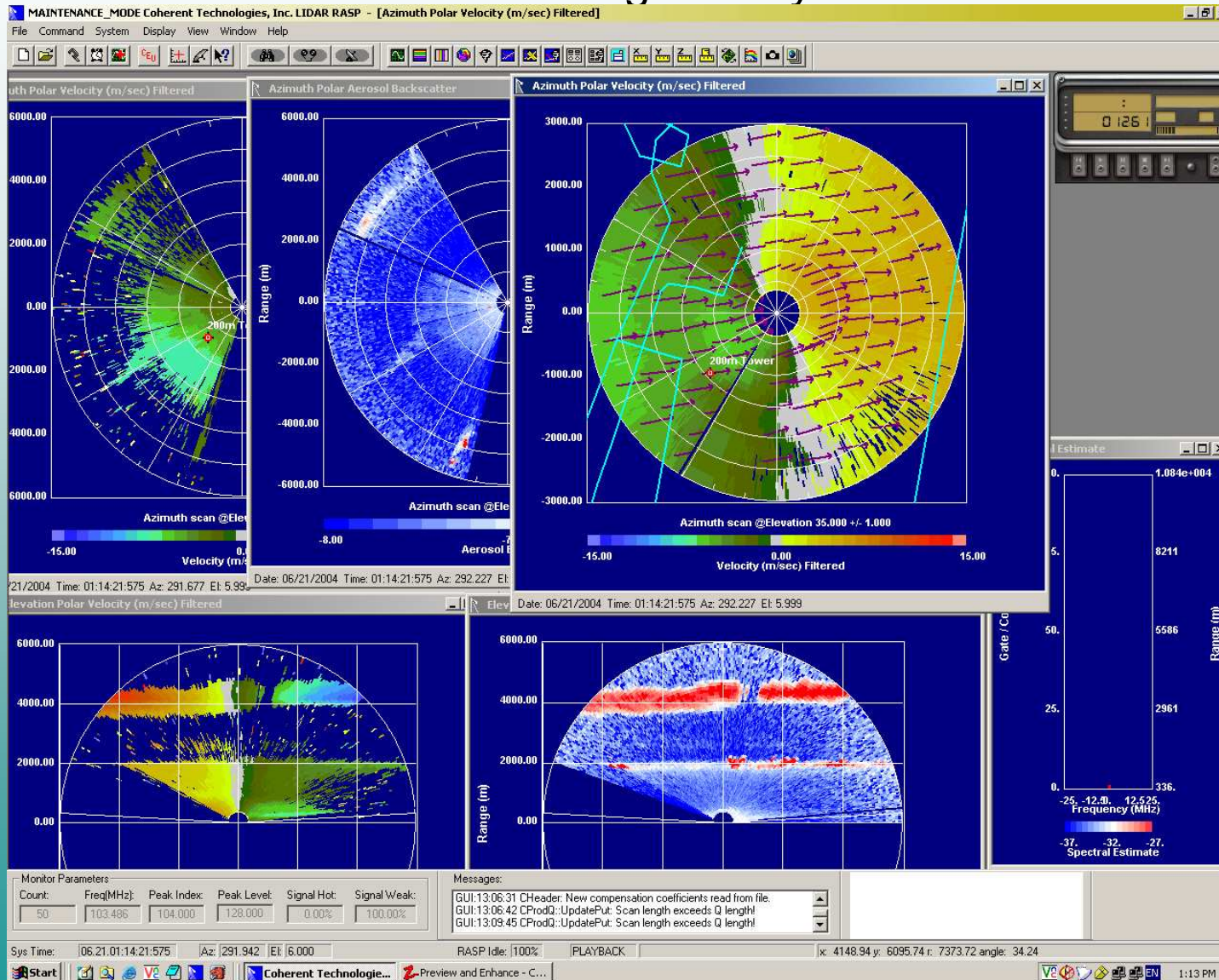
July 02 – 10, 2004

- Lidar  
different scan strategies, continuous
- Tethered balloon  
only July 05. – 07, up to 600 m
- Sodar  
continuous, up to 600 m
- 200 m tower  
continuous, **20 Hz** for July 06 -10  
anemometers at 2, 20, 30, **40**, 50,60,  
80, **100**, 130, 160, and **200** m
- Wind profiler  
continuous
- Radiosondes  
only July 06 - 07, 9:00am to 9:00pm  
every 1.5 hours at Bruchsal

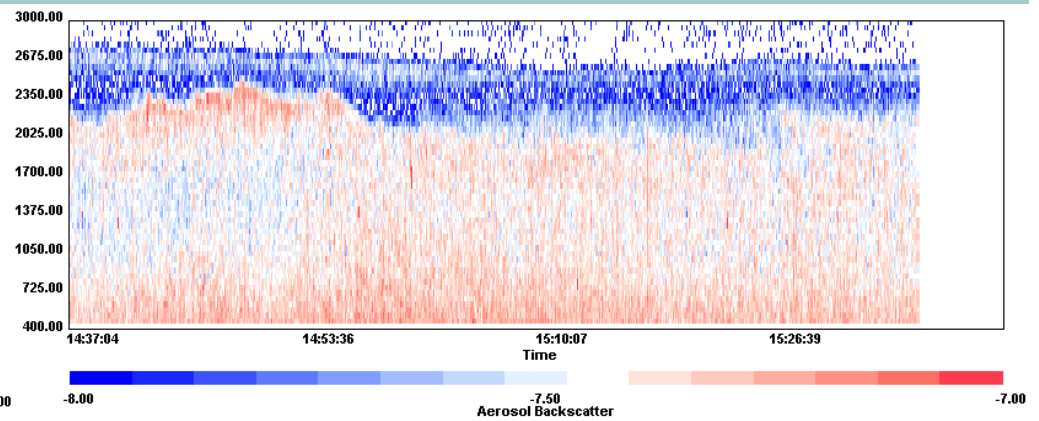
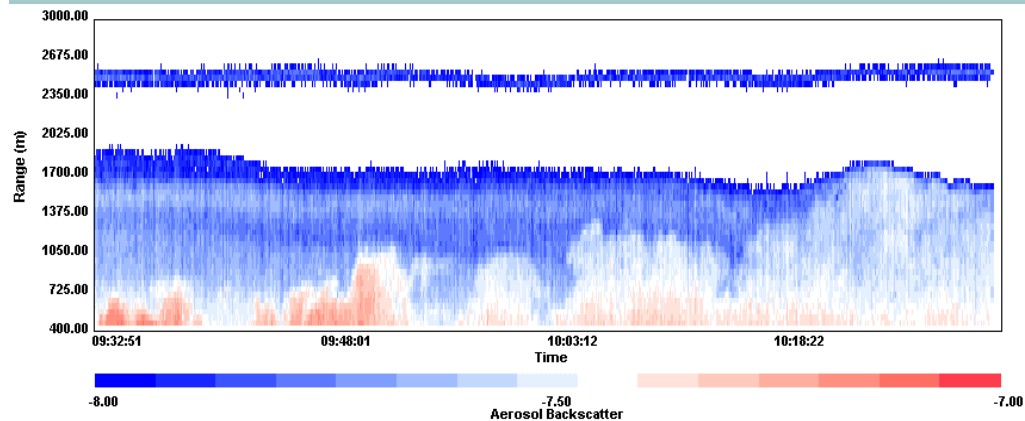
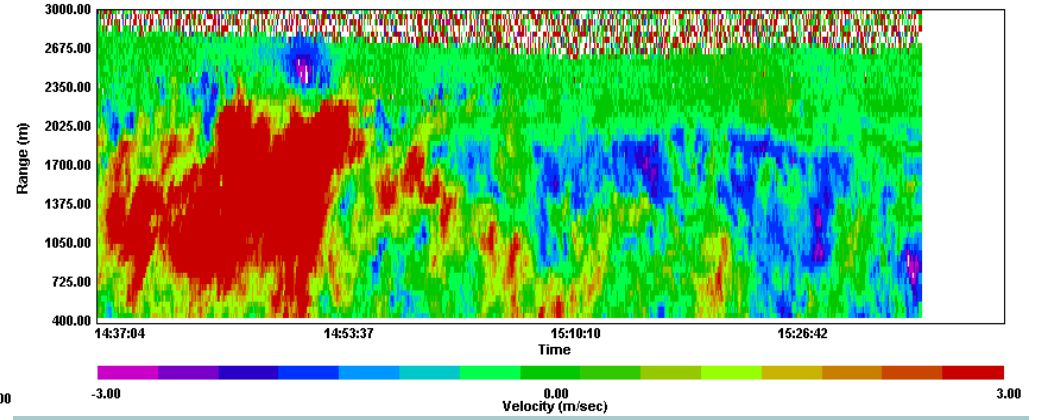
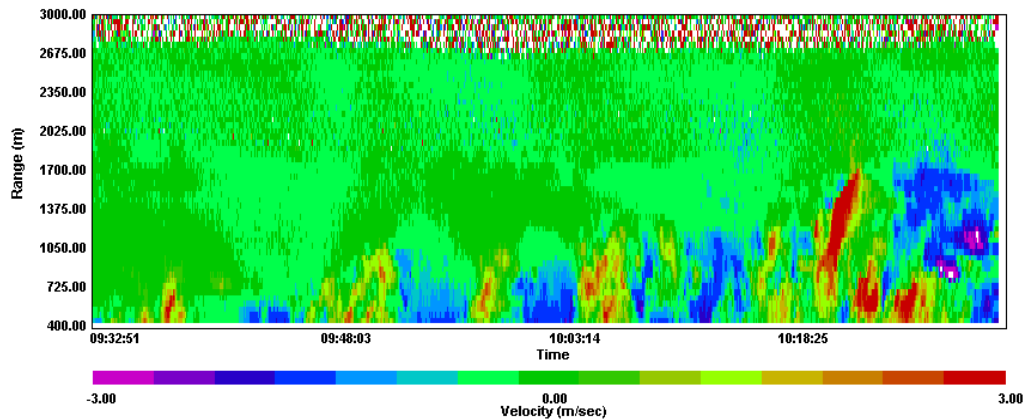




# Measurements during Cloudy Conditions



# Measurements during Convective Conditions

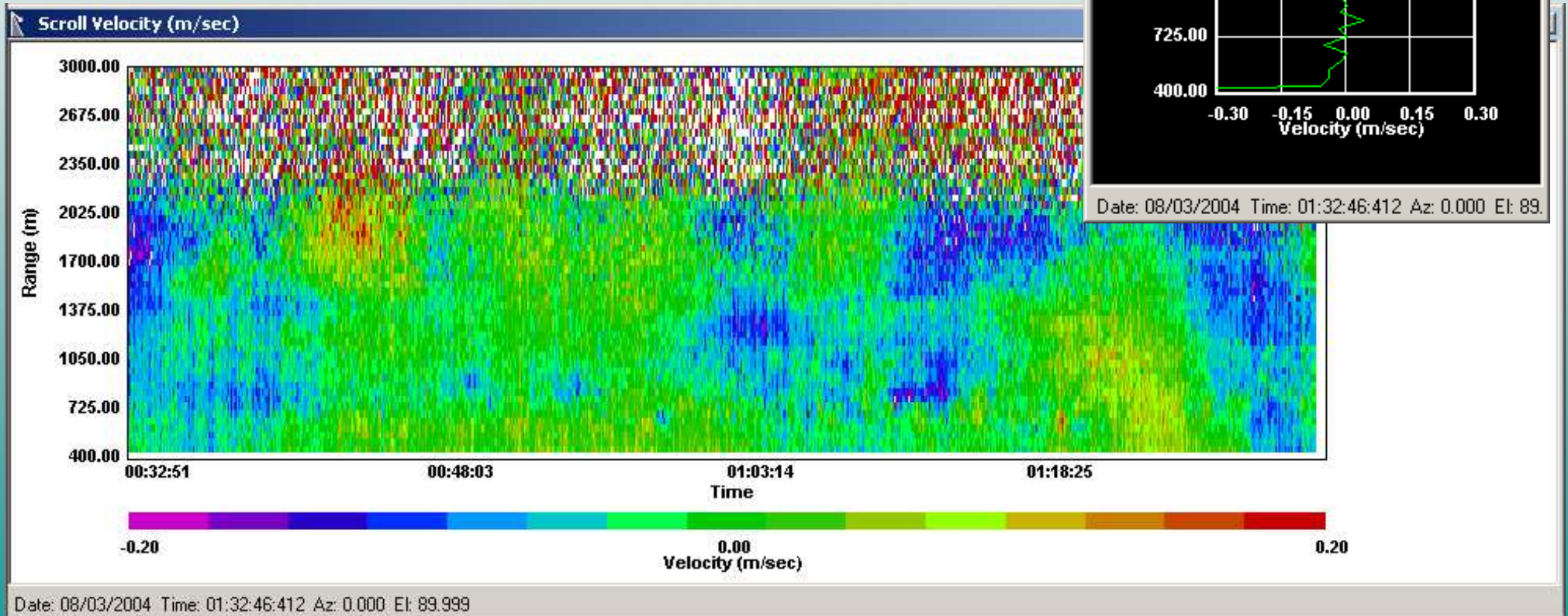


Morning conditions with starting convection

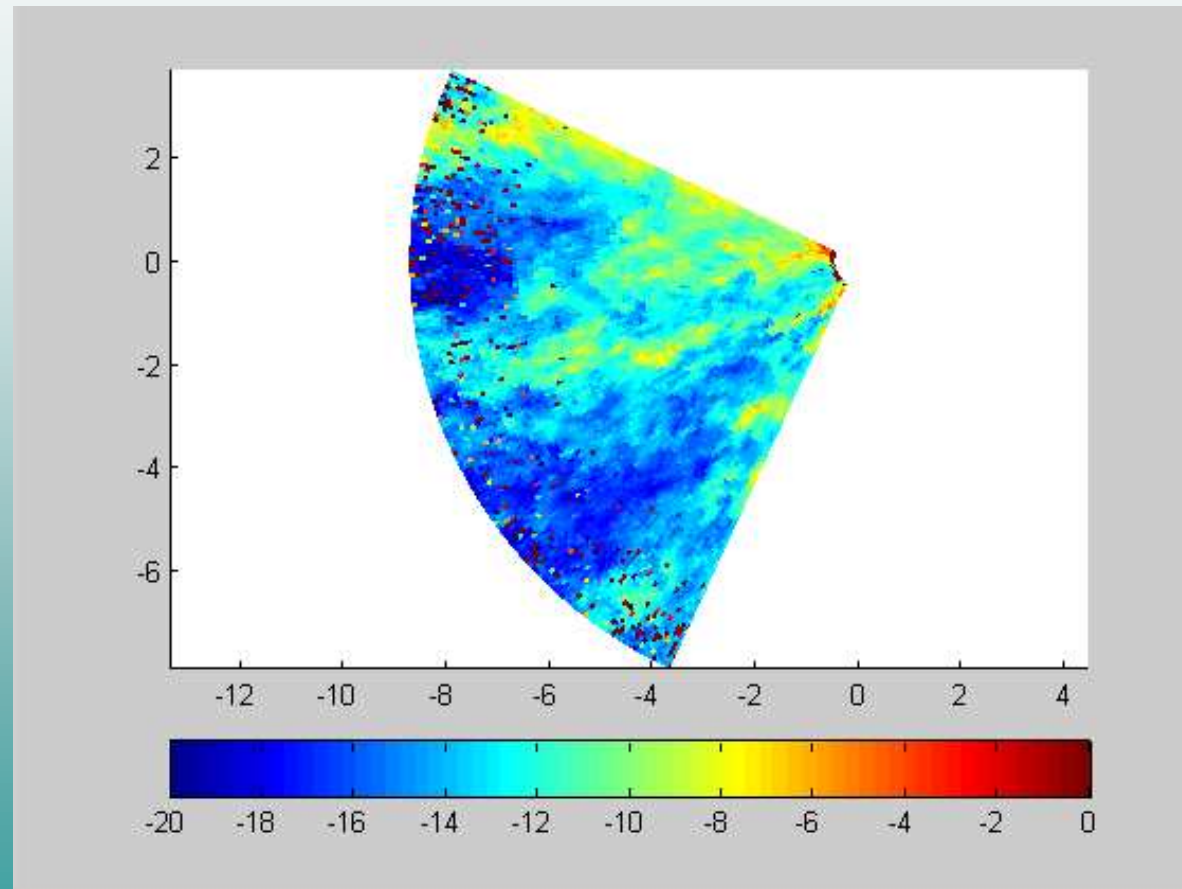
Fully developed convection in the afternoon



# Vertical Wind Speed at Night



## High Wind Speed Conditions



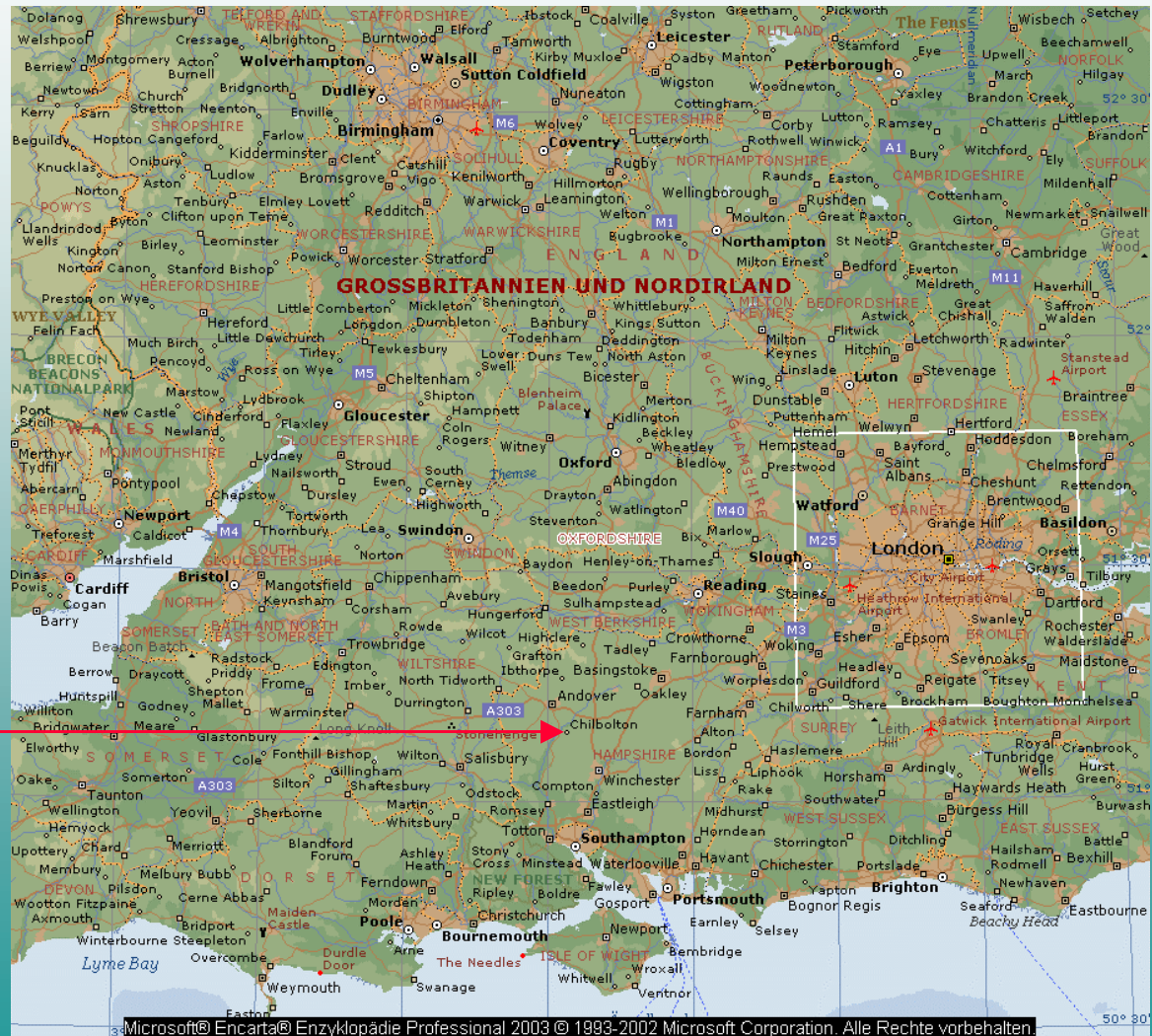
June 23, 2004



## To do

- Extend ASU-Matlab scripts to get access to the measurement data, implement post-processing routines and create usable graphical output
- Combine radar- and lidar data to get 3-D wind field around and within convective clouds
- Investigate wind field, turbulence structure and boundary layer features for blue sky and cloudy conditions
- Combine high frequency wind data from Karlsruhe Doppler-lidar with DIAL and/or Raman water vapor data to calculate profiles of turbulent fluxes
- Do measurements for aerosol propagation to compare with modeling results
- Try to calculate horizontal wind vector by tracking structures in the wind field

## Future Projects



1st Lidar deployment  
June – August 2005