

Vaisala Ceilometer CL31



Vaisala Ceilometer CL31 - main features

- 0...25,000 ft (0...7500 m) range
- Enhanced single lens optics
 - excellent accuracy for the whole range
 - high performance in all weather
- DSP based fast electronics
- Extensive self monitoring functions
- Automatic trouble shooting aids
- Eye safe diode laser lidar



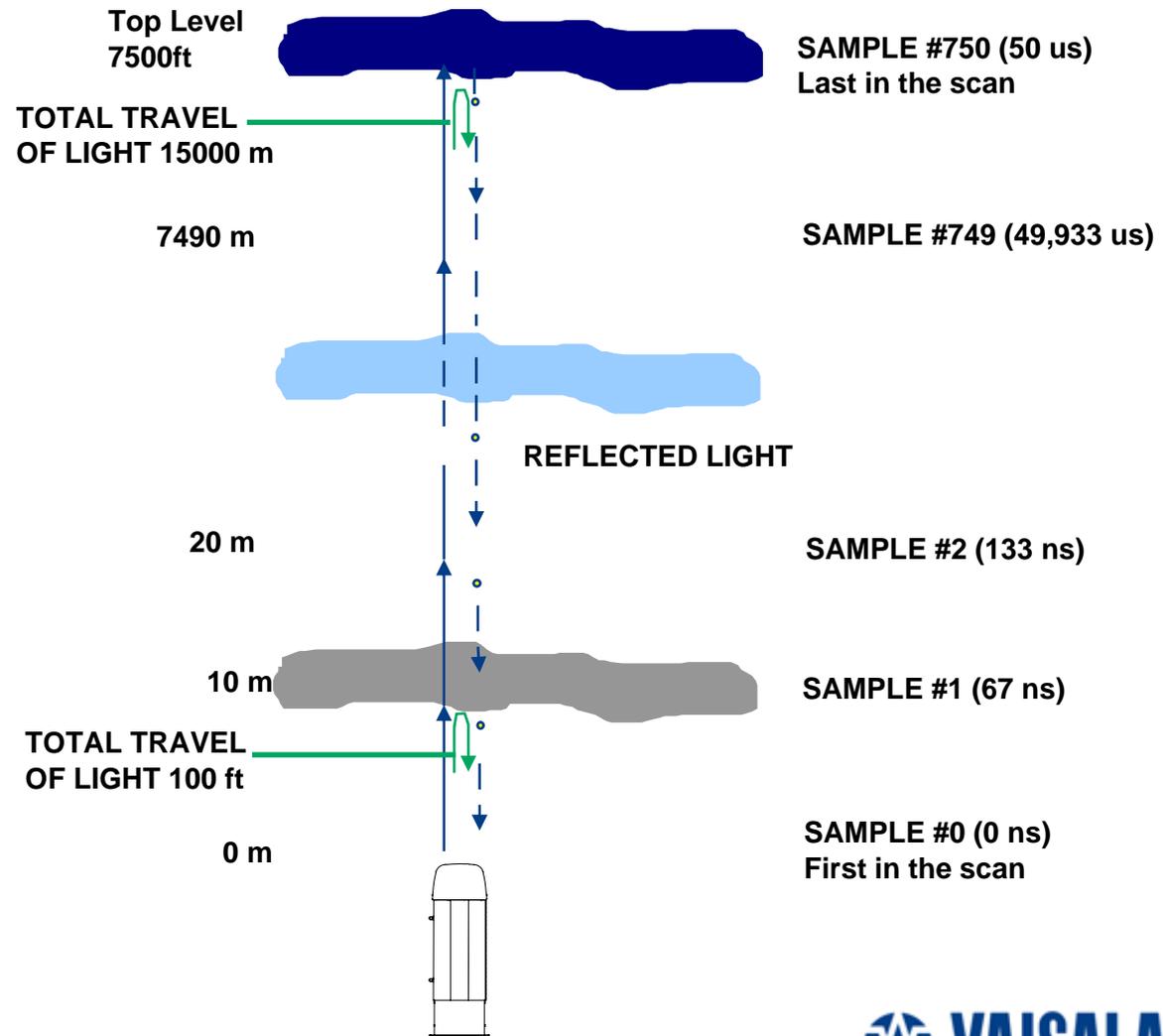
Vaisala Ceilometer CL31



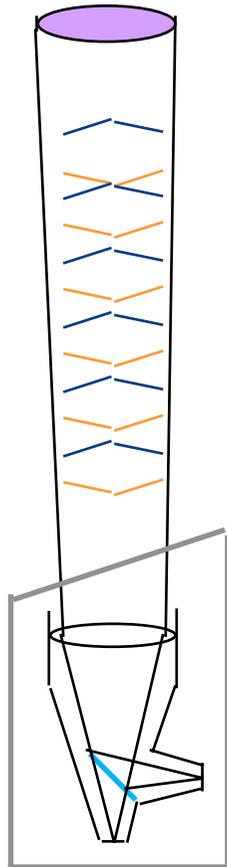
LIDAR operating principle

LIDAR = Light Detection And Ranging

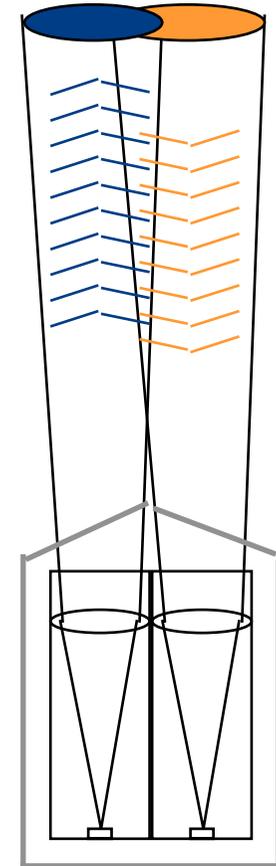
- Short (100 ns) pulse of light is transmitted into air
- Receiver monitors the light backscattered by aerosols
- Altitude of backscatterer is given by time (speed of light is 30 cm/s ~ 1ft / ns)
- Several profiles are summed to increase signal to noise ratio



Benefits of single lens optics

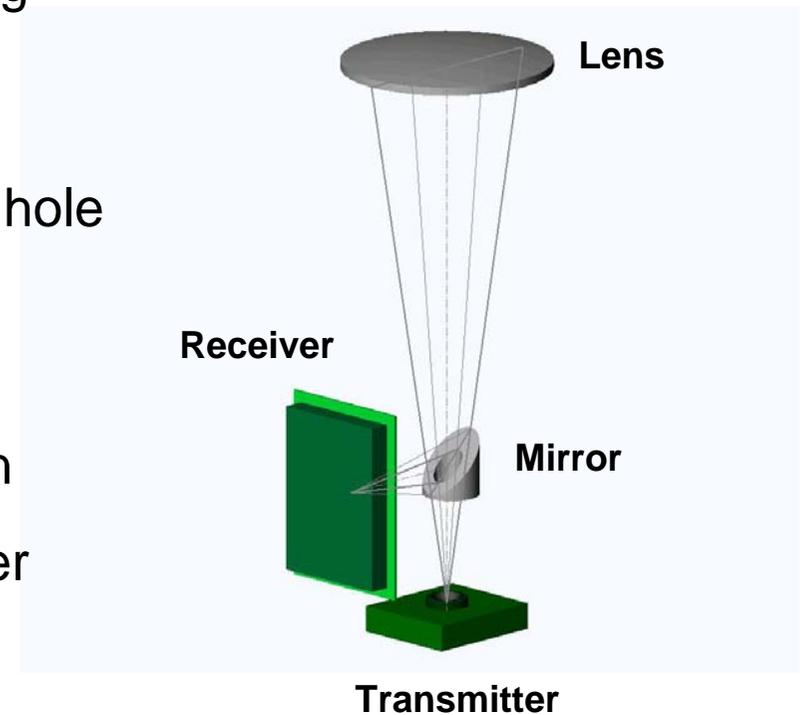


- Strong and stable signal even from the safety critical low altitudes => measurement range starts virtually at 0 altitude
- Good overlap of laser beam and receiver field of view decreases effect of multiple scattering, leading to more consistent operation during precipitation and fog
- Robust against changes in mechanical alignment
- Compact mechanical design



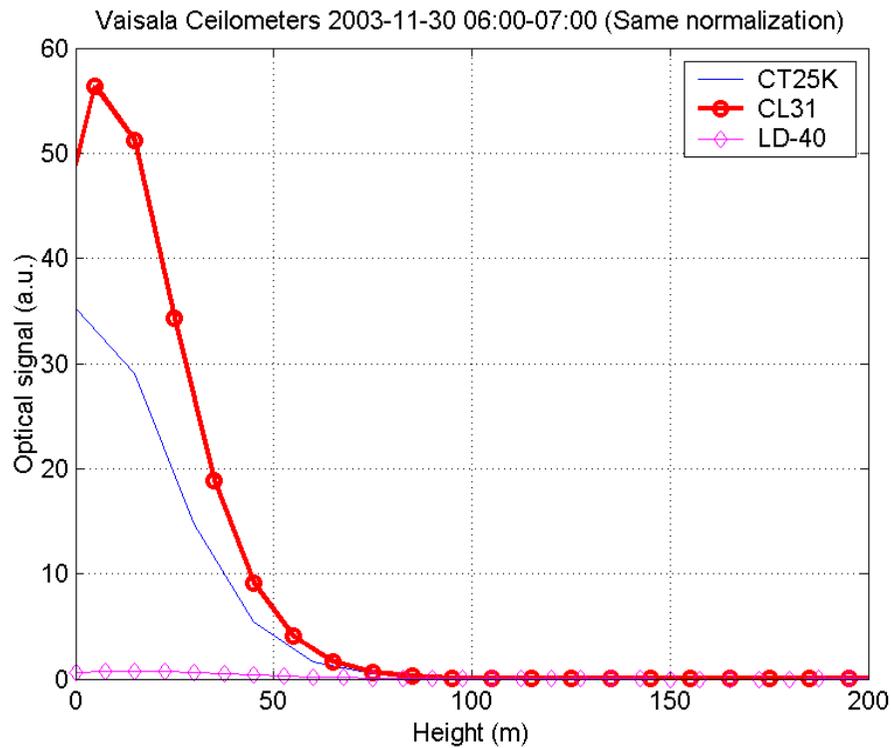
Enhanced single lens optics

- Lens divided into transmitting and receiving areas
 - middle of the lens focuses the outgoing laser beam and outer part collimates backscattered light onto the receiver
- Division made by an inclined mirror with a hole
- No complicated cross talk compensation techniques needed
- Robustness against window contamination
- Coaxiality of transmitted beam and receiver field of view provides robustness against changes in mechanical alignment

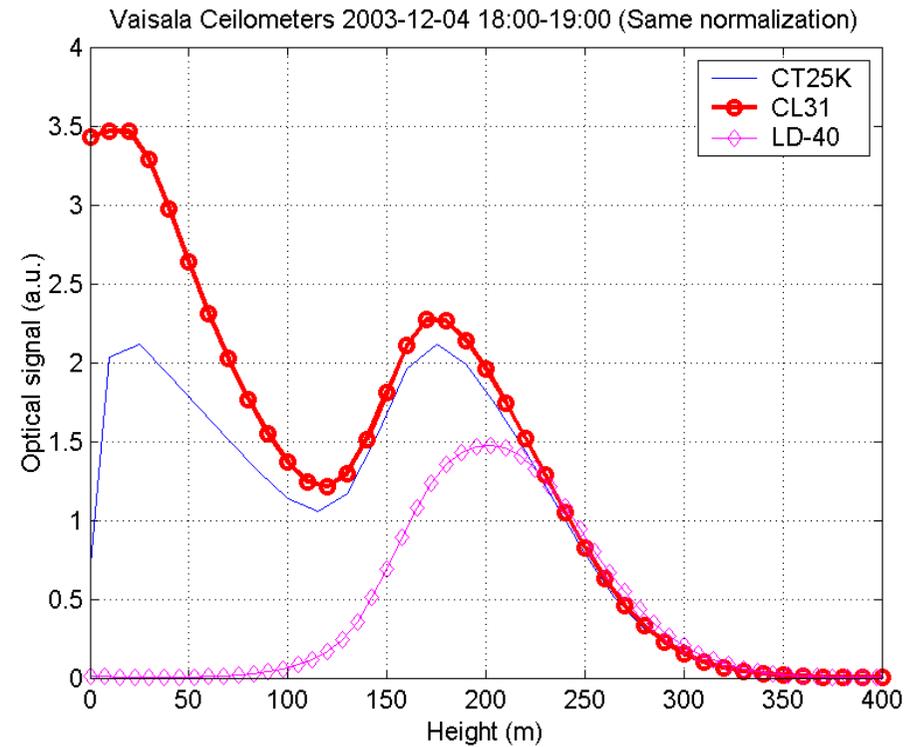


Near range backscatter signal behaviour

Fog



Light rain



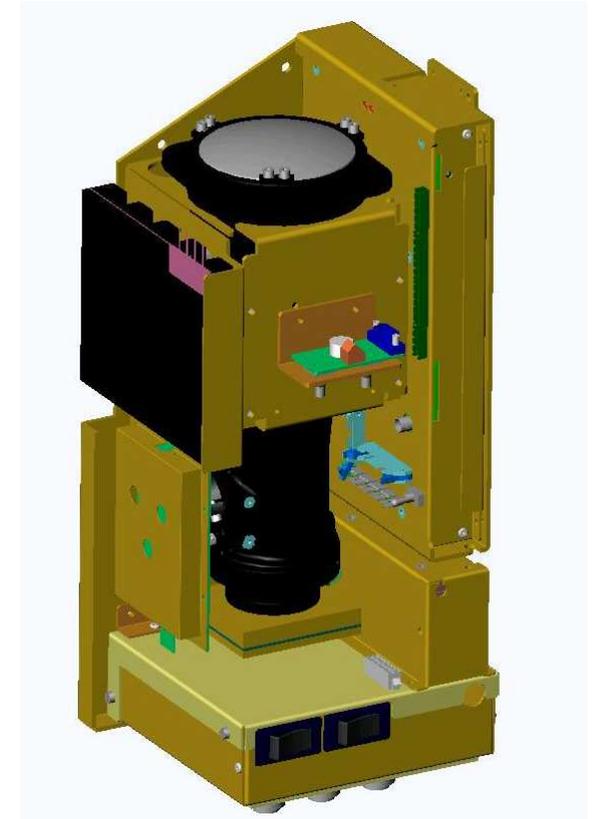
High performance and data availability

Based on powerful Digital Signal Processor

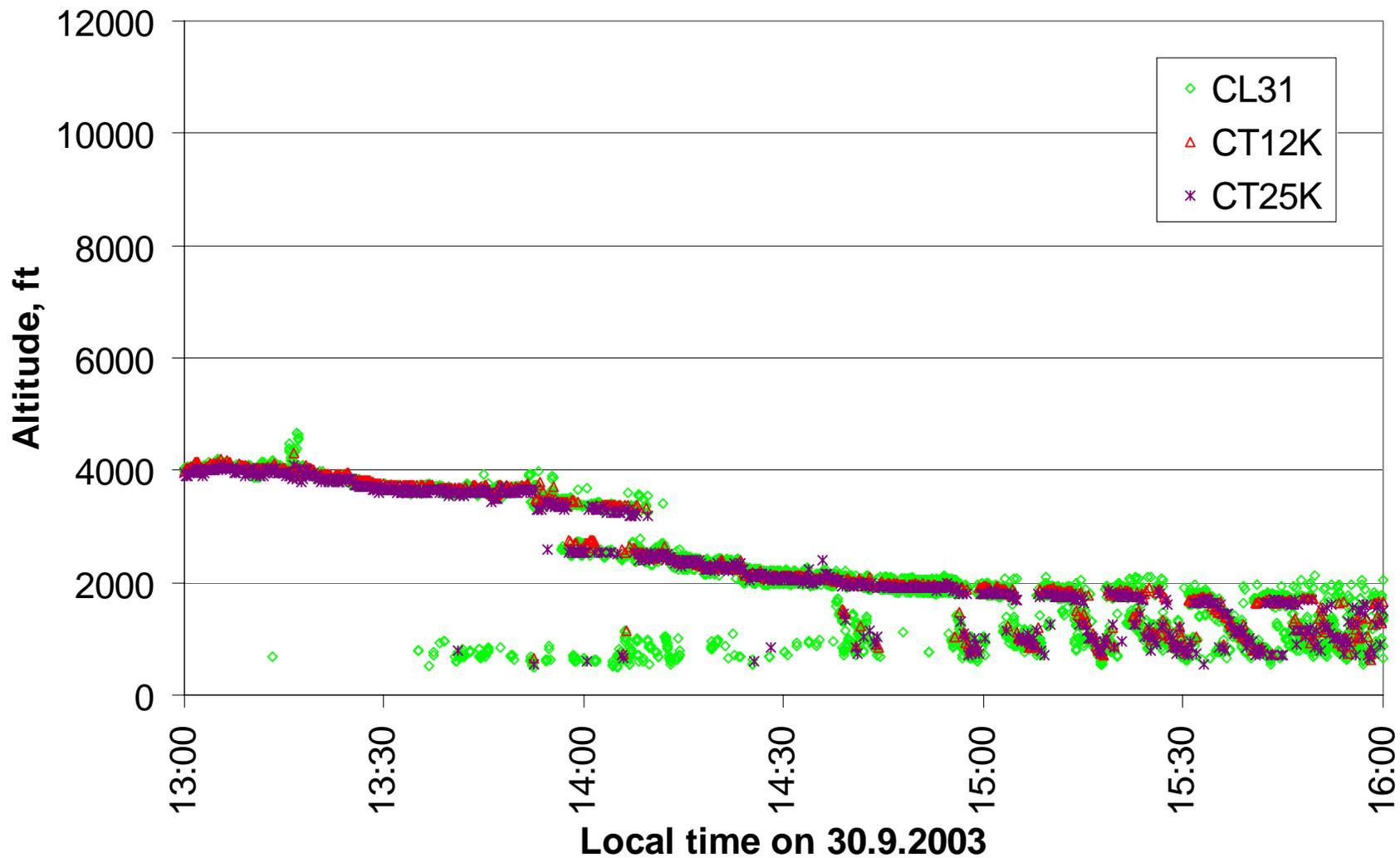
- fast, 2 second measurement cycle
- sophisticated algorithms
- high resolution backscatter profile reporting

Modular design

- easy troubleshooting and fast service
- modules easily replaced in field
- no re-alignment of optics needed with Tx or Rx replacement



Benefits of fast measurement: detection of thin cloud patches below a solid cloud base



Designed for harsh weather

Tiltable shield

- shield with a blower / heater enable reliable operation in precipitation and in extreme temperatures
- tilting for further protection for precipitation and avoidance of specular reflection from ice crystals
- automatic tilt angle measurement and correction

Easy access door

- fast service access even in rain

Reliable solar protection

- optical filters instead of mechanical shutters



Extensive self-monitoring

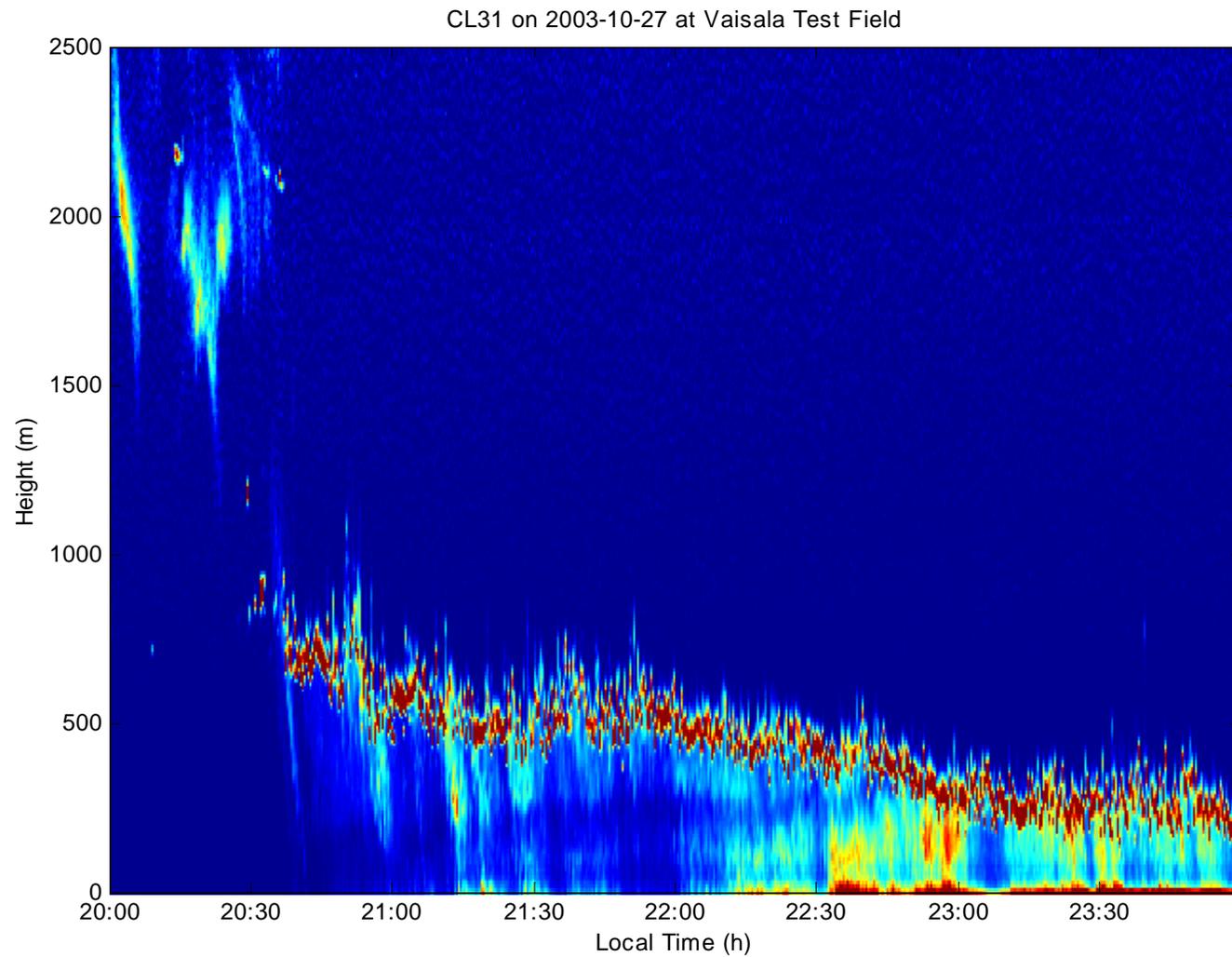
Self-monitoring for reliable operation

- laser power, receiver sensitivity, internal voltages, window contamination, internal temperatures, optical alignment

Automatic fault analysis for low down time

- in case of a fault the suspected module is indicated in the status message and also locally with a LED
- complete status information also available through data line for remote trouble shooting

Ceilometer profile data for data visualization and research



Conclusions

Vaisala CL31 is a new generation laser ceilometer featuring

- based on Vaisala's extensive experience on ceilometers
- reliable cloud detection provided by 2nd generation single lens optics
- powerful DSP providing fast measurement, sophisticated algorithms, and improved backscatter profile reporting
- extensive self diagnostics for reliable operation
- compatible mounting pattern and data messages with previous Vaisala ceilometers for easy upgrade



Technical data I

Measurement range:	0...7.5 km (0...25,000 ft)
Measurement interval:	2...120 s
Reporting resolution:	5 m (10 ft)
Data messages:	Cloud hits (up to 3 layers) and status Cloud hits, status and backscatter profile Cloud hits, status and monitoring data CT12K, CT25K, LD-25/40 emulation
Eye safety:	Class 1M (IEC/EN 60825-1)
Laser:	910 nm diode, pulse frequency 10 kHz
Output interfaces	Data line RS232 / RS485 / modem Maintenance line RS232
Bit rate	RS-lines: 300...57600 Modem: 300...2400, V.21, V.22, V.22bis
Dimensions:	Total: 1190 x 335 x 325 Measurement unit 620 x 235 x 200 mm

Technical data II

Weight:	Total 31 kg Measurement unit 12 kg
Tilt positions:	Vertical or 12° tilted
Input power:	115 or 230 VAC, 45-65 Hz
Power consumption:	Maximum 310 W Measurement unit 15 W Internal heater 100 W Window blower 20 W Blower heater 175 W
Back-up battery:	12V sealed lead acid, 2 Ah
Environmental:	Temperature range -40 ... +60 °C Humidity 0 ... 100 % RH Wind 55 m/s Protection class IP65