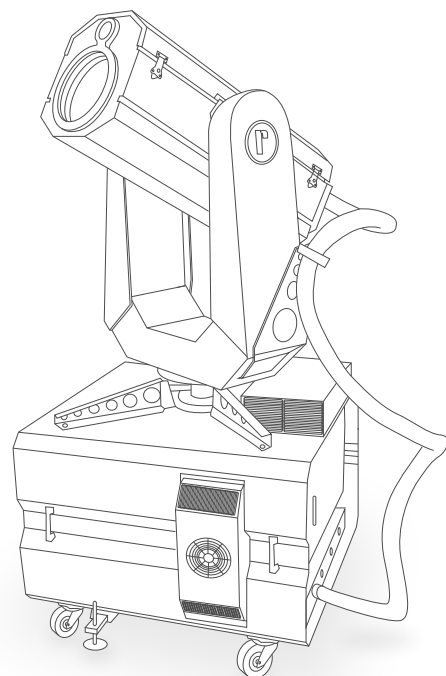
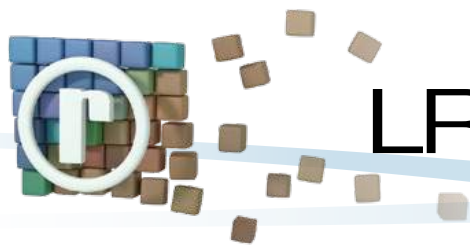


# 3D Aerosol LIDAR

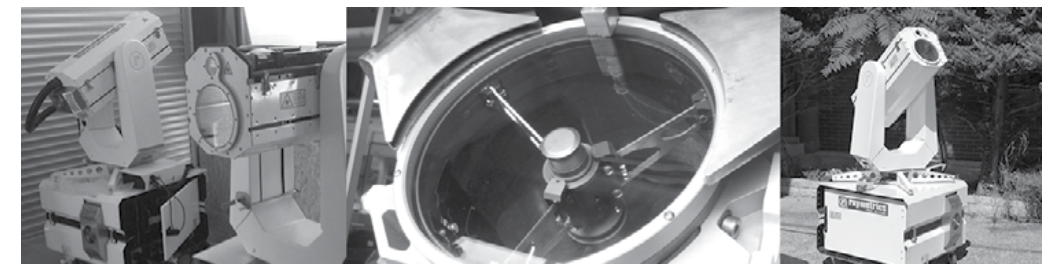
Aviation | Mining | Meteorology

*LR111-ESS-D200*





# LR111-ESS-D200



## 3D Scanning Aerosol LIDAR

### Introduction

Raymetrics' 3D Scanning Aerosol LIDAR is an active laser remote sensing instrument designed to provide a variety of important information about the atmosphere. Aerosol LIDARs measure the particles, not of movement of particles as with wind Doppler LIDARs. This allows for applications including remote visibility (SVR, RVR, VOR), fog detection, remote cloud base height and more. With full 3D scanning capability, a powerful laser and a large telescope, Raymetrics' LR111-ESS-D200 is probably the most powerful eye-safe 3D scanning LIDAR on the market.

### Hardware

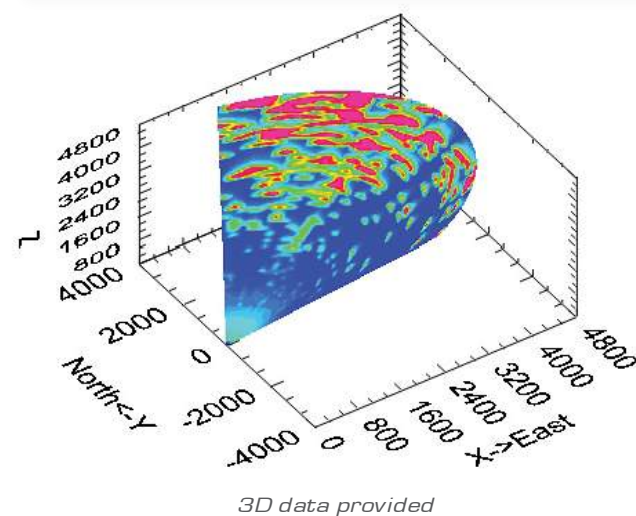


### Software

Software provided for...

- Instrument Control
- Measurement Scheduling
- Alignment
- Set-up Procedure
- Data Acquisition
- Data Storage (Database)
- Advanced Analysis
- 3D Data Visualization

Note: Integration with software platforms available



### How do LIDARs Work?

The system emits an eye-safe laser beam into the atmosphere. Laser light is scattered by particles in the atmosphere and some is returned to a telescope. Because the speed of light is known, the distance to atmospheric layers can be determined. From the properties of the light, certain atmospheric characteristics can also be determined.

### Key Features

- High energy laser emitting ~30 mJ per pulse at 355 nm
- Large 200 mm telescope designed specifically for LIDARs
- Range up to 10 - 15 km (with excellent Signal to Noise Ratio)
- Remotely controllable with full scanning capability
- Complete software suite including real-time display and measurement scheduling
- Options available for nitrogen Raman at 387nm and Cross-Polarization at 355nm
- In-built industrial grade PC for easy networking
- Eye-safe according to EU standard on laser safety 60825-1: 2007
- Complies with ISO 28902-1:2012 - visual ranging with LIDAR

### Applications

#### Remote Visibility

- SVR, RVR, VOR (Vertical Optical Range)

#### Fog Detection

- Incoming fog bank detection
- Fog cannot bypass as with in-situ sensors

#### 3D Cloud Base

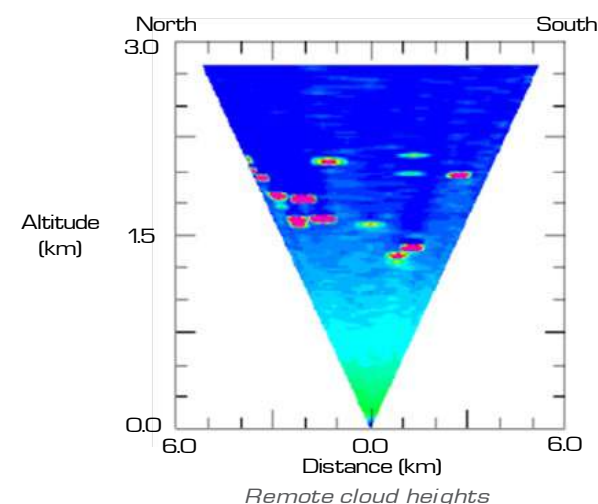
- Remote cloud base - for forecasting
- Total cloud cover - in 3D

#### Volcanic Ash

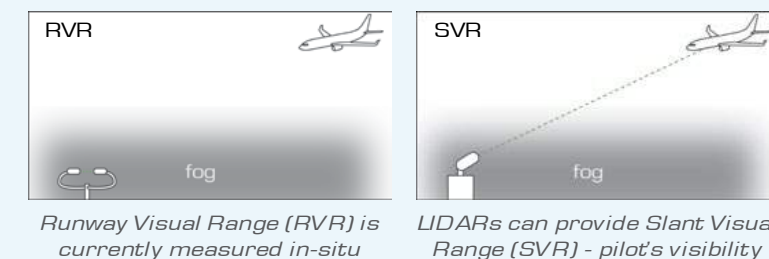
- Definitive volcanic ash identification
- Altitudes of ash layers

#### Aerosol Monitoring

- Partical distinction (fire smoke, anthropogenic pollution, volcanic ash, dust, marine aerosols)
- Planetary Boundary Layer (PBL) - including mixing height, up and down drafts, aerosol loading
- Plumes

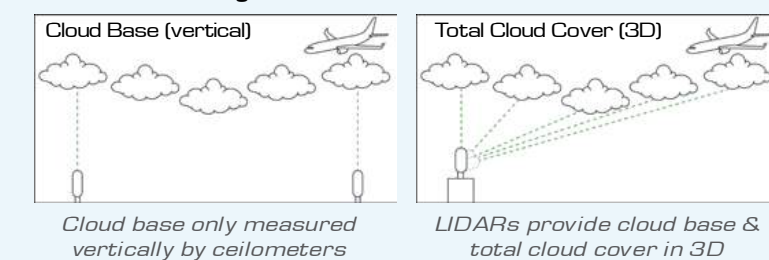


#### CASE 1: Measuring Visibility



- SVR gives a more accurate measure of pilot's visibility
- ISO 28902-1:2012 means LIDAR is now a standard method of measuring visibility

#### CASE 2: Measuring Cloud



- Ceilometers use LIDAR technique - they are basic LIDARs
- LIDAR is therefore already the standard method for cloud base
- LIDARs offer increased power, range and capabilities

### Why Raymetrics?

- **EXPERIENCE:** Raymetrics is probably the most experienced atmospheric LIDAR company in the world, (in operation since 2002).
- **GLOBAL REACH:** The company has installed instruments all over the world, including in Europe, North America, China, India, Africa, South East Asia and South America.
- **EXCELLENT CLIENT BASE:** Raymetrics' client list includes such prestigious organizations as the European Space Agency, Meteo France, the German Aerospace Centre (DLR), the German Weather Service (DWD) and the Met Office (UK), which has a network of Raymetrics LIDARs installed specifically for volcanic ash detection. Raymetrics 3D Aerosol LIDARs have been used for meteorological and aviation applications including in Singapore (National Environment Agency), Chile (Dirección Meteorológica de Chile), France (Meteo France), Germany (SESAR project), Greece (Eleftherias Venizelos Airport) and Azerbaijan (Heydar Aliyev International Airport).
- **REPUTATION:** The company has an excellent reputation, particularly amongst the global LIDAR community.
- **POWER:** Raymetrics uses lasers with higher energy-per-pulse than other manufacturers, meaning greater range and better data quality.  
Note: LIDARs work by plotting every individual pulse - meaning energy per pulse is of the highest importance. Data quality can be improved by stacking multiple profiles together, but this does not greatly improve range.
- **SIZE:** Raymetrics uses larger telescopes than most other manufacturers in order to capture more signal.  
Note: Raymetrics telescopes are custom-designed with the focal point inside the telescope, allowing obscuration from the secondary mirror to be greatly reduced, resulting in up to 40% more signal.
- **STANDARDS:** Product complies with ISO 28902-1:2012 - Ground based remote sensing of visual range with LIDAR. Company certified to ISO 9001:2008 standard.

# Specifications

EMITTER	
Laser energy	30mJ per pulse at 355nm
Repetition rate	20 Hz
Beam Expansion	X10
Eye-safe	YES (EU standard on laser safety EN 60825-1: 2007)
Laser Class	IV (within enclosure)
RECEIVER	
Size (primary mirror)	200 mm
Field of view (FOV)	0.25 - 3 mrad (user adjustable)
Overlap	< 200 m (with factory set FOV)
DETECTION UNIT	
Wavelengths detected	355 nm co-polar
Wavelength options (for particle distinction)	355 nm cross-polar 387 nm nitrogen Raman
Spatial resolution	7.5 m
Temporal resolution	1 sec single shot 10 secs multiple acquisition mode (user selectable upwards)
FWHM bandwidth	Approx. 0.5 nm per wavelength
Detection modes	Analogue and photon counting for near and far field measurement
GENERAL	
3D Scanning	357° azimuth, 90° zenith
Internal PC	Industrial grade PC running Windows
Climate control	Heating and Air Conditioning units for both LIDAR Head and Control Unit
Software	Full suite of software supplied for: <ul style="list-style-type: none"> <li>• Instrument Control</li> <li>• Measurement Scheduling</li> <li>• System Alignment and Set-up Procedure</li> <li>• Data Acquisition</li> <li>• Data Storage (Database)</li> <li>• Data Analysis</li> <li>• Data Visualization</li> </ul>
Automation	Remotely operable with measurement scheduling for automation
Warranty	1 year as standard
Training	3 day installation and training course on site as standard
ADDITIONAL	
Effective Range	> 10 - 15 km*
Environmental tolerance	-15 to +45 °C
Dimensions	Approx. 1.8 m x 1.0 m x 1.0 m (HxWxD)
Weight	Approx. 220 kg
Power	110 - 240 V, 50 - 60 Hz (standard domestic power supply). Peak current 25 Amps.

\*Effective ranges depend on atmospheric conditions and integration times.



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