

SOCRATES

ISS Ceilometer

Preliminary Data Report (March 12, 2018)

NCAR/EOL operated a ceilometer on board the CSIRO RV Investigator as part of a deployment of an Integrated Sounding System (ISS) for the SOCRATES / CAPRICORN field campaign. The primary voyage (CSIRO designation: IN2018_V01) for this deployment set sail from Hobart, TAS, Australia on 11 Jan 2018 into the Southern Ocean and concluded back in Hobart on 22 Feb 2018. The data set also includes measurements made during a trail/shakedown voyage (Dec 7-11, 2017, IN2017_E04) as well as test data in port and in Boulder prior to deployment.

Instrument	Vaisala CL31 Ceilometer	
Data Collection Software	CL-View (version 2.0)	Produces raw (*.DAT) files
Data Processing Software	MLH (version 2.2)	Produces significant level (*.txt) and plots (*.png) files

The ceilometer is a Vaisala CL31 ceilometer, a lidar commonly deployed at airports to report the cloud ceiling (ie, cloud base height) up to 25,000 feet or 7.6 km AGL. In addition to cloud information, it can report a basic backscatter profile which can be used (with caveats) to infer the altitude of backscattering layers.

RAW DATA:

Raw data is recorded using Vaisala software known as CL-VIEW. This produces an ascii file every 6-hours and includes cloud levels and the backscatter profile approximately every 15 seconds. Data is sampled from 10 to 7700 meter with 10 meter resolution, although data below about 40 meters may not be accurately sampled. The data files have names like A8021512.DAT for data dated Feb 15, 2018 (ie, 80215) starting at 12 UTC and running for 6 hours. The format is "CL data message 2" format and is a mix of simple ascii and hexadecimal and is described in detail in the Vaisala CL31 Users Guide.

PROCESSED DATA:

Software known as MLH (Mixed Layer Height) analyses the raw data files to produce png plots and identify significant layers in the gradient of the backscatter profile (Eresmaa et.al., 2006). The plots are both backscatter density and backscatter gradient (file names d2018021512.png and g2018021512.png respectively for data starting Feb 15, 2018 at 12 UTC). The plots run for 4 hours and are generated hourly. The text files report the average height of significant layers every 10 minutes and have names such as 201802151206.txt for the 4 hour period starting Feb 15 2018 at 1206 UTC.

KNOWN DATA ISSUES:

The ceilometer was located on the aft 02 deck of the Investigator. This location was well protected from sea spray, however was downwind of the main smoke stack and adjacent to the backup generator and incinerator which may have occasionally attenuated the signal. The lidar window was regularly inspected and cleaned if necessary so the impact on measurements is expected to be minor.

References:

Eresmaa, N., Karppinen, A., Joffre, S. M., Räsänen, J., and Talvitie, H.: Mixing height determination by ceilometer, *Atmos. Chem. Phys.*, 6, 1485-1493, <https://doi.org/10.5194/acp-6-1485-2006>, 2006.

Integrated Sounding System (ISS):

UCAR/NCAR - Earth Observing Laboratory. (1997). NCAR Integrated Sounding System (ISS). <https://doi.org/10.5065/D6348HF9>
https://www.eol.ucar.edu/observing_facilities/iss

Vaisala CL31 web page:

<https://www.vaisala.com/en/products/instruments-sensors-and-other-measurement-devices/weather-stations-and-sensors/cl31>