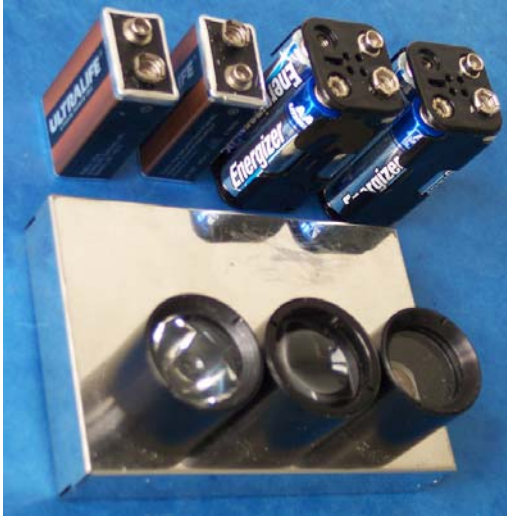
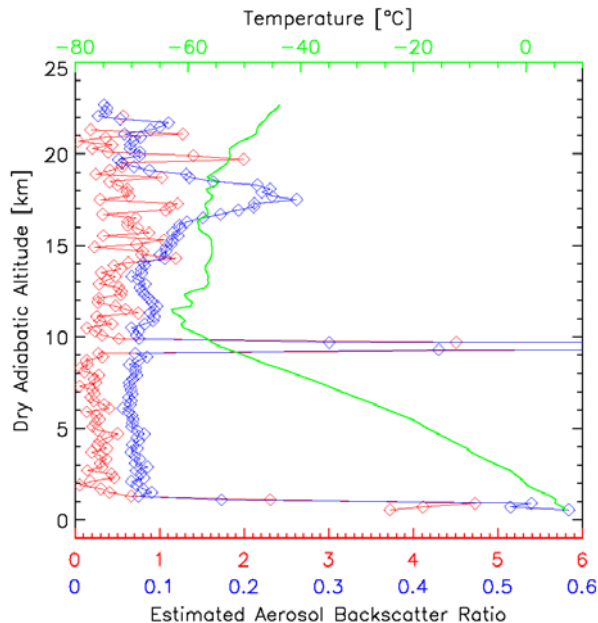


COBALD



The COBALD (Compact Optical Backscatter Aerosol Detector) instrument is a lightweight backscatter sonde designed to be flown on operational weather balloons. It uses two high power LEDs in the blue and near infrared spectral range and detects the backscattered light from air molecules, aerosol or cloud droplets. This allows retrieving information of aerosol (or cloud) particle size and number density. In the current configuration it is hosted by a Swiss radiosonde (SRS-C34, meteolabor AG, Wetzikon) integrating the COBALD data in its telemetry.

The diagram shows altitude profiles of temperature (green) and sonde signals (blue channel in blue, infrared channel in red) that were recorded during a test flight launched from Zurich. Below 1 km the planetary boundary layer is prominent. Close to the tropopause near 10 km a thin cirrus cloud was traversed. From the backscatter data its surface area density can be estimated to be in the order of $100 \mu\text{m}^2 \text{cm}^{-3}$. Between 15 and 20 km the blue channel reveals an aerosol layer whose existence is confirmed by satellite observations and which is likely to originate from volcanic activity.



COBALD specifications

Feature	Specification	Remark
optical wavelengths	455 nm & 870 nm	color index range from 1 to 15
backscatter intensity dynamic range	10^4	covers range from aerosol (0.1 ppb cond.) to thick anvil outflow (100 ppm ice)
time resolution	1 s	0.05 s to 3 s selectable
dimensions	$17 \times 14 \times 12 \text{ cm}^3$	includes 3 cm of thermal insulation on each side
weight with batteries	500 g	suited for piggyback in many applications
power supply	$8 \times \text{LR61 (1.5 V size AA)}$ $2 \times 6\text{LR61 (9V)}$	ensures 3 h of operation
data interface	19.2 kbit/s, logic level RS232	settings for SRS-C34 radiosonde, can be adapted to other telemetry requirements
altitude range	0 to 30 km	corresponds to operational weather balloon sounding range