

# SNOW ICE MASS BALANCE APPARATUS

Providing reliable, long-term data gathering  
& monitoring solutions, which help understand  
changes in sea ice, river ice & snow





Photo credits: Scottish Avalanche Information Service

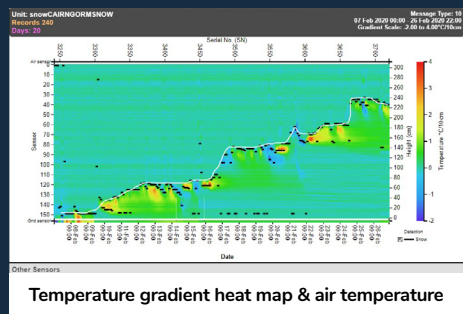
# SAMS enterprise & SAIS trials technology to support avalanche forecasting

**SIMBA** comprises an autonomous platform and a chain of digital temperature chip sensors.

Temperature readings made every 2cm accurate to +/- 0.0625°C in this example taken every 2 hours returned via GSM network to our server for display. This provides high resolution temperature gradients, snow accumulation & degradation and wet and dry snow. The following data from SIMBA is associated with an avalanche event, which occurred during February 2020 in Strath Nethy on the North-East side of Cairngorm, Scotland.

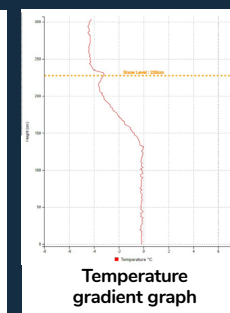
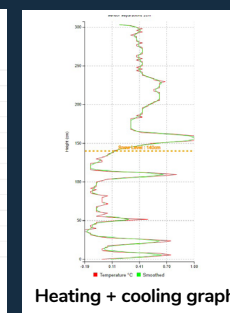
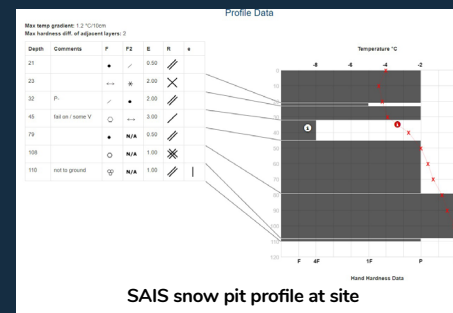


The location of the SIMBA, human triggered size 2 avalanche on 26th February 2020 and the SIMBA data showing the snow build up



from 10th February with strong temperature gradients noted on the 23rd of February which were then buried by wind slab.

A custom developed computer algorithm to calculate snow depth and basic properties (wet/dry) and using the unique additional feature of SIMBA; the heating/cooling cycle knowledge of the internal structure of the snowpack can be gained.



The SAIS snow pit profile at 10am & SIMBA heating cooling cycle & temperature profile at 4am on the 26th of February. Beside it the heated & cooling cycle is also shown. A significant layer approximately 150cm to 160cm is observed. This corresponds to a low density layer which is not apparent in the temperature profile taken a few minutes earlier. In the former the main feature is a layer of wet snow seen between the ground and 140cm.

Above that there is a relatively uniform temperature gradient through the dry snowpack. The softer, low density layer between about 150cm and 160cm does not appear. Given the snowpack is about 230cm deep at this time, this corresponds to about 70cm below the surface.

Around 7 hours later (11am on the 26th) an avalanche was triggered by a walker about 100 metres off to the side of the SIMBA. The avalanche propagated across the slope, and the debris hit the SIMBA.

## CASE STUDY



SIMBA data has been used extensively in Polar science for over a decade by leading climate scientists in over 55 peer reviewed papers. Scan for more information about SIMBA tech spec and full case study.

## SAIS BLOG



In 2017 SAMS Enterprise started a number of trials, which ran for years, to develop and refine the application of SIMBA as a tool with the support of the Scottish Avalanche Information Service (SAIS). Scan to find out more about SAIS.

## QUALITY DATA

- Unique sensing through active heat cycles
- Proven 10 years in polar regions to deliver sea ice data
- Custom web interface
- Temperature readings: Raw, high res, active sensing, ambient air
- Snow and ice accumulation/melt rates
- Detects the interface between water, snow, ice and air

## APPLICATIONS

- Climate research
- Protecting communities through flood and avalanche detection
- Safeguarding infrastructure

## REMOTE

- Remote user configuration of sampling settings via email or text
- Low power design with long battery life and low maintenance
- Barometric pressure, GPS positioning
- Data sent via GSM or Iridium
- Fixed station, semi or fully mobile system

**"SIMBA is an excellent tool to monitor snow conditions in real time in remote or hazardous locations from the comfort of your office."**

Dr Blair Fyffe - Snow Scientist



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Contact us at [simba@sams-enterprise.com](mailto:simba@sams-enterprise.com)  
to find out more!