

Bannerclouds at Mount Zugspitze in Germany



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Intro

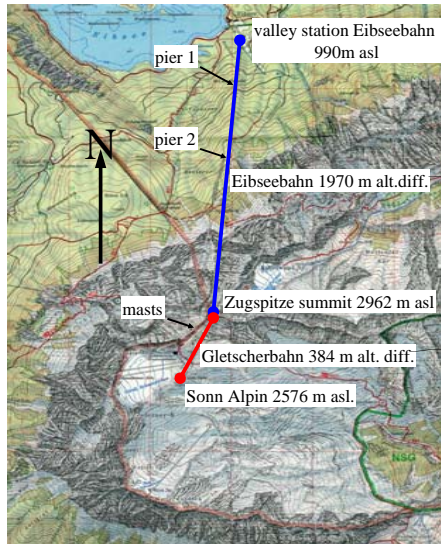
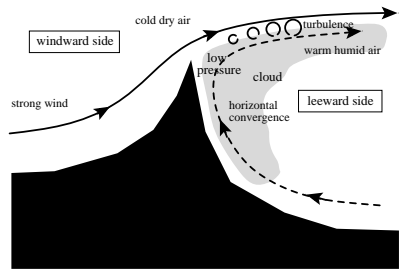


Banner clouds are clouds resembling a banner or flag which form on the leeward side of ridges or peaked mountains. While the windward side of the mountain remains cloud free the cloud forms only on the leeward side.

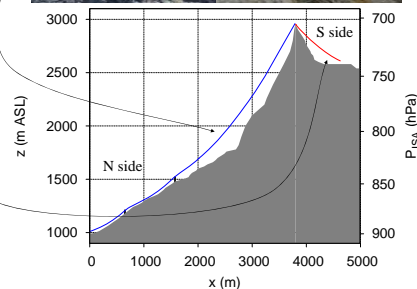
Mount Zugspitze (2962m asl) in the German Alps is served from three sides with cable cars. This and the infrastructure on the top of the mountain gave us the opportunity to perform continuous measurements.

Continuous Measurements

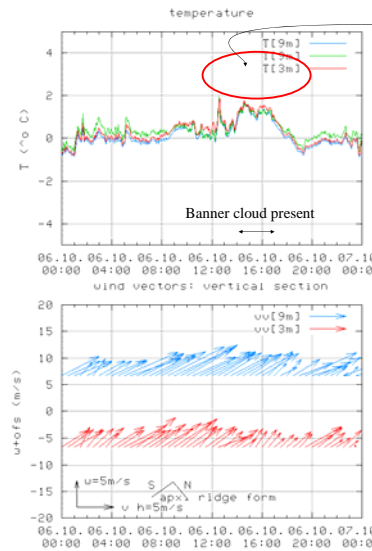
- The cable cars on the northern side (Eibseebahn) and on the southern side (Gletscherbahn) of the mountain were each equipped with temperature (T), humidity (rH) and pressure (P) sensors. The cable cars make every day between 18 and 70 rides giving nearly continuous measurements. Measures are corrected for the inertia of the sensors with the method described in Poster EGU2007-A-10058;
- Two masts were set up at the ridge west of the summit and equipped with wind (v), T and rH sensors to measure the conditions close to the point of confluence of windward and leeward air.
- A webcam at the DWD Station at the summit takes every 5s an image. Images are cut to movies giving information about formation and development of banner clouds. These movies were used to derive a definition of banner clouds (Schween et al. 2006)



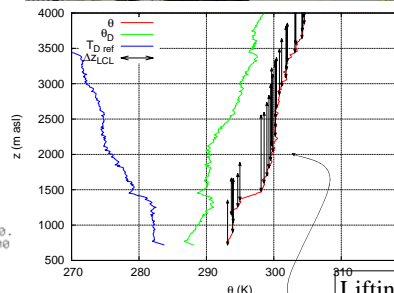
N-Mast S-Mast



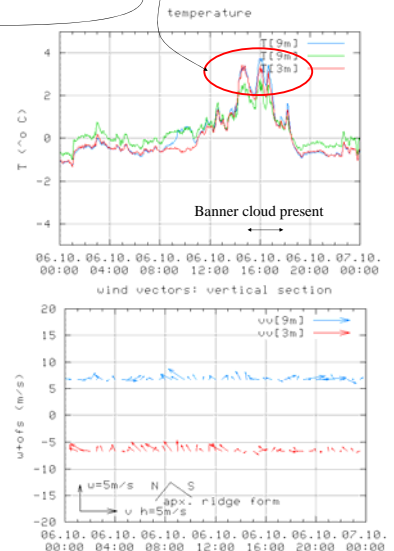
S-Mast



6.10.2005 16:41



N-Mast



air inside cloud is warmer than windward air

Lifting condensation levels (LCL) from radiosounding

Results

- Banner clouds do not form only on peaked mountains like the Matterhorn but also on ridges as the one at mount Zugspitze shown here.
- Banner clouds occur mostly during postfrontal situations with slightly stable stratification.
- The cloud forms due to forced lifting.
- Windspeeds at the ridge were during banner cloud episodes at minimum 3 m/s
- Vertical and horizontal extent of the cloud seem to depend strongly on wind speed, stratification and humidity distribution.
- The air inside the cloud is by several K warmer than the air from the windward side flowing above the cloud.

References

- Schween J.H., Küttner J., Reinert D., Reuder J., Wirth V. 2006 Definition of "banner clouds" based on time lapse movies, ACPD 6 vol.5, pp 9995-10019, www.copernicus.org/EGU/acp/acpd/6/9995/acpd-6-9995.pdf
- Schween, J.H. 2007, A method to overcome the problem of 'slow' sensors, Poster EGU2007-A-10058 at the EGU general assembly 2007

Acknowledgements

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