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32 Years of Stratospheric Aerosol Measurements at Garmisch-Partenkirchen (1976-2008)

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In 1973, a powerful backscatter lidar was installed at Garmisch-Partenkirchen (Germany) and has almost continually delivered backscatter coefficients of the stratospheric aerosol since 1976. The lidar was first operated with a ruby laser (694 nm), since 1990 with a frequency-doubled Nd:YAG laser (532) nm. A 0.52-m-diameter Cassegrain telescope collects the backscattered light. The time series is dominated by signals from the particles injected into the stratosphere by major volcanic eruptions, in particular those of El Chichon (Mexico, 1982) and Mt. Pinatubo (Philippines, 1991). The volcanic aerosol disappears within about five years, the removal from the stratosphere being modulated by the phase of the quasi-biennial oscillation [Jäger, 2005].
During the long-lasting background period since the late 1990s the stratospheric backscatter coefficients have reached a level even below that observed in the late 1970s. This suggests that the predicted potential influence of the strongly growing air traffic on the stratospheric aerosol loading is very low. Some correlation may be found with strong forest fires [Fromm et al., 2008]. Therefore, we plan to intensify investigations on the impact of the increasing number of fires on the stratospheric background aerosol.
An interesting temporary aerosol event was observed in December 2006. Up to 30 km the stratosphere was loaded with aerosols for a few days. No volcanic eruption or wild fires could be identified during the two months preceding these observations. Since very cold temperatures prevailed, we tentatively suggest the presence of a vertically highly extended polar stratospheric cloud as the most likely explanation. This interpretation is further supported by the rather short period during which this observation could be made, and its confinement to Central Europe where the lowest stratospheric temperatures were reported. More work is needed to harden this conclusion.

References:
H. Jäger, J. Geophys. Res. 110 (2005), D08106, doi: 10.1029/2004JD005506, 9 pp.
M. Fromm et al., J. Geophys. Res. 113 (2008), D08203, doi: 10.1029/2007JD009147, 19 pp.