Weekly aerosol cycle at DWD observatory Hohenpeissenberg

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Aerosol parameters are measured at the Hohenpeissenberg Global Atmosphere Watch (GAW) global station since 1995, namely particle- and soot-mass concentration, number concentration, size distribution, scattering and extinction/optical depth and the chemical composition. The major aerosol components are ammonium (NH_4^+), nitrate (NO_3^-) and sulphate (SO_4^{2+}) but also mineral components (Ca^{2+}, K^+, Mg^{2+}) and Cl^-, Na^+ are observed. The concentration of basically all aerosol components in the ambient air at Hohenpeissenberg follows a weekly periodic cycle which is superimposed on the regional background values. The weekly cycle is statistically significant, despite the large scatter of data and the relatively short climatological time series of about 10 years. It also indicates periodic sources and/or sinks or in-phase transport processes. The weekly amplitude is ~20% for the particle number and ~30% for the soot concentration. It reflects the daily emissions which are larger during working days than at the weekend. The total particle mass, which is largely composed of NO_3^- and NH_4 from traffic and farming and is dominated by larger particles, also follows the weekly cycle. Most likely human activities are responsible for this periodicity, as e.g. shown by Bäumer *et al.* [1] for turbidity. Note that also mineral aerosol components (Ca^{2+}, Mg^{2+} and Na^+) show this weekly periodicity although they are typically not attributed to human activities. The same holds for Na/Cl. with mean weekly amplitudes of about 20% (Na^+) and 35 % (Cl^-) lagging the other components' phases with maxima and minima on Fr/Sat and Sun to Tue, respectively. The amplitudes of the alkaline mineral ions Ca^{2+} und Mg^2+ are about 30% with Sunday minima, inverse to the H^+-concentration.

A correspondence of radiative forcing parameters to the rhythm of human activities via aerosol-related processes implies an anthropogenic impact on the climate. Actually the mean scattering coefficient at 550 nm is significantly lower on Thursday (95% confidence interval) opposite to absorption, so there is no significant weekly cycle of the single scattering albedo which would indicate a (man-made) cooling or heating impact of aerosols. The latter findings will be discussed together with air-mass classifications, aerosol profiles, trajectories and radiative transfer simulations.

[1] Bäumer *et al.* (2008) *GRL* **34**.

Dating Quaternary alluvial fans via U-series on pedogenic carbonate and ^{10}Be surface exposure ages

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Seismic hazards scale with fault-slip rates, which may be determined by dating landforms such as alluvial fans that are measurably offset along faults. Coupling of U-series pedogenic carbonate and ^{10}Be exposure dating provides a powerful tool to assess the age and post-depositional development of fan surfaces, as shown by examples from the San Andreas fault system in southern California.

Along the San Jacinto fault, a well preserved fan yields a mean age for pedogenic carbonate of 35 ±2 ka (2σ), and a concordant ^{10}Be depth profile age of 35 ±7 ka, supporting the accuracy of both techniques. Although a "time lag" between fan deposition and accumulation of datable carbonate must exist, it is short here relative to other dating uncertainties.

At Biskra Palms on the San Andreas fault, the mean U-series age of 45.1 ±0.5 ka is older than ^{10}Be exposure ages of surface cobbles [1] and boulders <1 m high, indicating that cobbles and low boulders were exposed by post-depositional lowering of the fan surface. Variable depths in fan soils of a 40-45 ka carbonate horizon indicate heterogeneous surface lowering of as much as 65 cm. Boulders >1 m yield ^{10}Be ages of 45-56 ka that scatter outside analytical errors, perhaps due to variable inheritance.

Along the Elsinore fault, a displaced fan yields a disturbed ^{10}Be depth profile with best-fit age of 32 ±6 ka, younger than the mean U-series age of 41 ±2 ka, also consistent with post-depositional lowering.

U-series dating of pedogenic carbonate provides reliable minimum ages for offset alluvial fans in southern California, thereby providing upper bounds on San Andreas slip rates.

[1] van der Woerd *et al.* (2006) *JGR* **111**, 17.