Vertical transport of black carbon over East Asia during the A-FORCE aircraft campaign

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The Aerosol Radiative Forcing in East Asia (A-FORCE) aircraft campaign was conducted over East Asia in March-April 2009 [1]. We examined vertical transport mechanisms of black carbon (BC) aerosols and their transport pathways over East Asia in spring using the modified version of the CMAQ model and simulating the A-FORCE aircraft campaign. Comparisons of the model results with the A-FORCE observations show that the model reproduces relatively well the vertical distributions of mass concentration and transport efficiency of BC, including their latitudinal gradients and dependences on precipitation that air parcels had been experienced during transport. During the A-FORCE period, we find two types of pronounced upward mass fluxes of BC from the planetary boundary layer (PBL) to the free troposphere (FT) over northern-eastern and inland-southern China. The major uplifting mechanism of BC over northern-eastern China is the cyclones with modest amounts of precipitation. Cumulus convections and orographic lifting along the high-altitude mountains play an important role for the upward transport of BC to the FT over inland-southern China, in spite of the large amounts of precipitation. In addition to the outflow in the PBL over the midlatitude, the upward transports over northern-eastern and inland-southern China, followed by the westerly transports in the lower and the middle FT, respectively, make major contributions to the exports of BC from East Asia to the Pacific in spring.

[1] Oshima *et al*. (2012) *J. Geophys. Res.*, **117**, D03204, doi:10.1029/2011JD016552.

Precipitation and stability behaviour of calcium sulfate: the role of salinity temperature and reaction time

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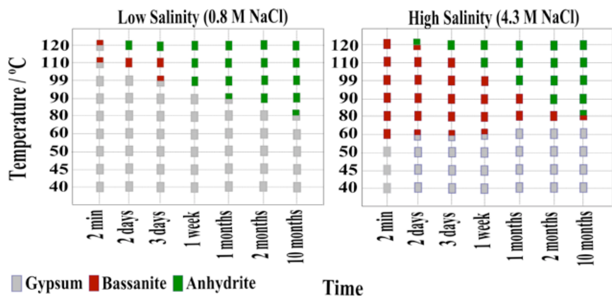
A marked inconsistency exists between the phase diagram of calcium sulfate and its crystallization behaviour [1]. To gain a better understanding on the precipitation dynamics and stability region of each phase (gypsum, bassanite and anhydrite), a series of precipitation experiments were carried out from 40 to 120 ºC, at three salinities (0.8, 2.8 and 4.3 M NaCl) and different reaction times (from 2 min up to 10 months).

Salinity and temperature strongly influence the type and stability of the precipitate. No primary anhydrite precipitation occurs and with increasing salinity bassanite precipitation prevails and its stability is strongly enhanced (up to 10 months at 80 ºC). Phase transition occurs through dissolution of the less stable phase and subsequent recrystallization of the more stable phase. This process is controlled by the differences in surface free energy and step kinetic coefficients between the three phases [2-4].



[1] Van Driessche *et al*., *Science* 336, 2012 [2] Van Driessche *et al*., *Cryst. Growth Des*. 10, 2010 [3] Morales *et al*., Am. Min. 97, 2012. [4] Morales *et al*., *Cryst. Growth Des*. 12, 2012.

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