Modeled response in radiative properties of shallow convective clouds due to perturbations in meteorological state variables and atmospheric aerosol loading

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In order to quantify aerosol indirect effects in observational data it is necessary to minimize the impact from other cloud-controlling variables. The vast amount of meteorological data from operational atmospheric analysis data (or re-analysis data) combined with retrieved aerosol characteristics from satellite, provides and opportunity to compare cloud properties under similar meteorological conditions but with a different aerosol signature. However, even when keeping meteorological variations at a minimum with respect to a mean atmospheric state, the sensitivity of clouds to small perturbations around this mean state is not well known [1]. Hence small variations in meteorology may correlate both spatially and temporally with small variations in the aerosol concentration which could explain a certain fraction of the observed relationship between aerosols and clouds.

The aim of the present study is to 1) identify the sensitivity of cloud fraction and cloud albedo to small perturbations in meteorological conditions and compare this to the sensitivity induced by increasing aerosol number concentrations and 2) estimate the range of variability in observational data of meteorological variables permitted to determine a clear and unambiguous signal in cloud fraction and cloud albedo due to aerosols. A cloud-resolving model is used to simulate a large ensemble of isolated shallow convective clouds where the vertical profiles of zonal wind, temperature and water vapor mixing ratio as well as initial profiles of accumulation and Aitken mode aerosols are perturbed.

[1] Stevens and Feingold (2009) *Nature* **461,** 607–613.

Hydrothermal Co-Ni mineralization, associated with serpentinized peridotites: Bou Azzer, Morocco

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The Co, As (Ni, Ag, Au) ores of the Bou Azzer district comprise an unusual type of vein-style deposit, associated with mantle peridotites of a Neoproterozoic ophiolite. Two types of Co-rich mineralization are exploited: (1) Veins located at the contact between sepentinites and wall rocks; (2) Veins in dioritic wall rocks, extending up to 400m from the serpentinites. From early to late, the mineral succession in both types is : (1) Ni-arsenides (rammelsbergite, para-rammelsbergite); (2) Co-arsenides (safflorite, skutterudite), in some cases with native gold; (3) Fe-Arsenides (löllingite); (4) sulfoarsenides (gersdorffite, cobaltite, arsenopyrite); (5) sulfides and sulfosalts (chalcopyrite, sphalerite, terahedrite, tennatite), in some cases with native bismuth and silver; (6) chlorite with molybdenite with minor brannerite and late native gold. The gang minerals are essentially quartz, calcite and dolomite. Fluid inclusion studies indicate complex brines belonging to the system (Na, Ca, K, Ba, Cl). Equivalent weight salinity ranges from 34. 5 wt. % and 40. 5 wt. %. Homogenization temperatures range from 225 °C to 195°C. Co and Ni are proposed to have been leached from the serpentinites. However, the origin of the arsenic is poorly constrained. Derivation from the mantle rocks would imply very high fluid-rock ratios. Alternatively, As could be derived from crustal rocks underlying the ophiolite.