Minerals of Pt_3Sn-Pd_3Sn-Pd_3Pb-Pd_3As-Pd_3Sb system in PGE-Cu-Ni and PGE ores of the Norilsk region

S.F. SLUZHENIKIN AND A.V. MOKHOV

IGEM RAS, Staromonetny 35, Moscow 119017 Russia (*correspondence: nlo_s@mail.ru)

All minerals of the system – rustenburgite Pt_3Sn, atokite Pd_3Sn, zvyagintsevite Pd_3Pb, guanglinite Pt_3As and unnamed mineral with Pd_3Sb composition were found in Norilsk ores. A wide isomorphizm between Pt and Pd is established in the system, in particular within Pt_3Sn-Pd_3Sn series. The minerals very often contain Au as an admixture up to 6 wt.% (Fig. 1). An almost complete isomorphism between Sn, Pb, As и Sb is found. Chemical isomorphism is expressed in terms of zonal occurrences of the minerals during successive growth and replacement.

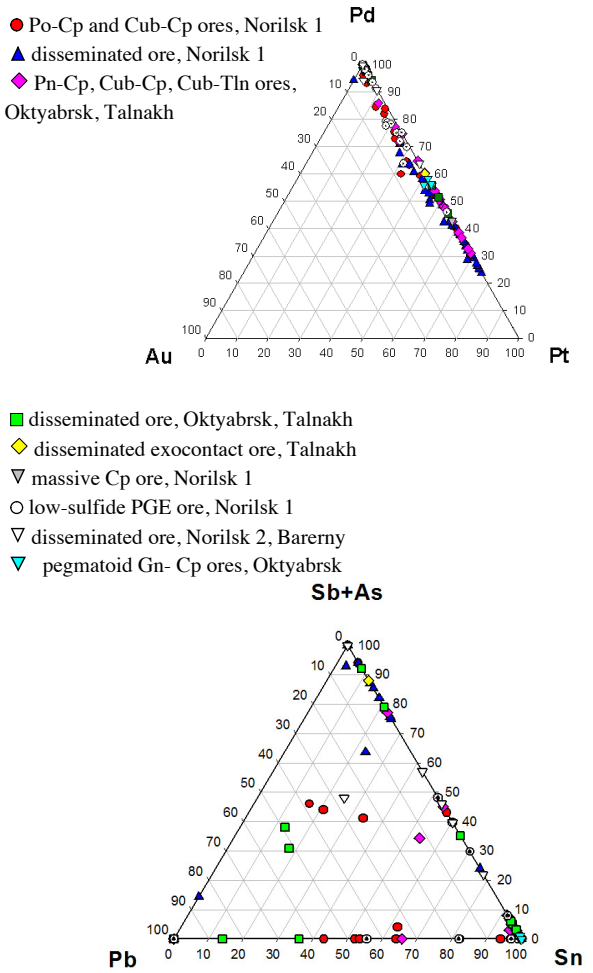

Figure 1: Chemical composition of Pt_3Sn-Pd_3Sn-Pd_3Pb-Pd_3Sb-Pd_3As minerals from Norilsk ore.

Does aerosol alter entrainment mixing in warm cumulus?

J.D. SMALL[1,2], H.H. JONSSON[3] AND P.Y. CHUANG[1]

[1]Earth and Planetary Sciences, University of California Santa Cruz, Santa Cruz, CA, 95064, USA (*correspondence: pchuang@ucsc.edu)

[2]NASA/JPL, Pasadena, CA, 91109, USA (Jennifer.Small@jpl.nasa.gov)

[3]Center for Interdisciplinary Remotely Piloted Studies (CIRPAS), Naval Postgraduate School, Marina, CA, 93933, USA (hjonsson@nps.edu)

We analyze the cloud microphysical response to entrainment mixing in warm cumulus clouds observed from the CIRPAS Twin Otter during the GoMACCS field campaign near Houston, TX in summer 2006. Cloud drop size distributions and cloud liquid water contents from the Artium Flight phase-Doppler interferometer in conjunction with meteorological observations are used to investigate the degree to which inhomogeneous versus homogeneous mixing is preferred as a function of height above cloud base, distance from cloud edge, and aerosol concentration. Using four complete days of data during which 101 non-precipitating cloud penetrations (minimum 300 m in length), we find that inhomogeneous mixing primarily explains liquid water variability in these clouds.

While theory predicts the potential for aerosol to affect mixing type via changes in drop size, over the range of aerosol concentrations experienced (moderately polluted rural sites to highly polluted urban sites), the observations, while consistent with this hypothesis, do not show a statistically significant effect of aerosol on mixing type. Instead we find two non-aerosol effects primarily control the microphysical response to entrainment mixing. First, we show that there is a tendency for mixing to be more homogeneous towards cloud top, which we attribute to the combination of increased turbulent kinetic energy and cloud drop size (due to condensational growth) with altitude which together cause the Damköhler number to increase by a factor of between 10 and 30 from cloud base to cloud top. Second, we find that cloud edges appear to be air from cloud centers which have been diluted solely through inhomogeneous mixing. We give plausible explanations for this second effect, but none thus far has been demonstrated using the observations.

Lastly, we discuss the possible ramifications of these observations on other key cloud properties, in particular warm rain formation and cloud albedo.