# Chemical Models of the Formation and Growth of Jovian Polar Haze Particles

A.J. Friedson (JPL), Y.L. Yung and A-S. Wong (Caltech)

Coupled chemical-aerosol microphysical models are used to investigate the formation and growth of Jupiter's polar stratospheric aerosols. Our starting point is the neutral gas-phase photochemical model for the auroral regions developed by Wong et al. (2000) [Ap. J. 534: L215-L217]. This model produces naphthalene (a hydrocarbon consisting of two aromatic hexagonal rings) with abundances that imply supersaturation between the ~500 and ~200 microbar pressure levels, with saturation ratios approaching ~100 near the bottom of the layer. Application of classical nucleation theory predicts negligible rates of homogeneous particle formation for saturation ratios of ~10 but relatively large rates of ~10^(-4) per cubic centimeter per second for saturation ratios near 100. The latter rate substantially exceeds the minimum rate of ~4x10^(-7) per cubic centimeter per second that we estimate is needed to explain aerosol loading in the polar regions. This result suggests that the polar haze particles may either consist of pure naphthalene or be comprised of a naphthalene core mantled by other hydrocarbon species. In addition to naphthalene chemistry, we are also investigating the polymerization chemistry of heavy polycyclic aromatic and polyyne hydrocarbons and its implications for aerosol formation. The results of these calculations and of one-dimensional models for the formation, growth, and sedimentation of aerosols in Jupiter's polar stratosphere will be presented at the meeting.

This research is supported by a grant from the NASA Planetary Atmospheres Program.

Contributed (poster preferred)