

3.007 Biogenic New Particle Formation: Recent insights from lab and field.

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Abstract:

In this presentation, I will discuss recent laboratory and field measurements that elucidate the species and mechanisms responsible for the formation of new aerosol particles from biogenic volatile organic compounds (BVOCs). These studies were performed using instruments and facilities developed in my laboratory specifically for the study of nanoparticle composition and of low volatility gases that contribute to growth. Laboratory measurements have focused on two important aspects of biogenic new particle formation. The first is nitrate radical-initiated oxidation of monoterpenes – a process that shows remarkable variability in nanoparticle growth rates for many monoterpenes that are commonly emitted from plants, including α -pinene, which is found to contribute very little to nanoparticle growth, and β -pinene and Δ^3 -carene, which react to form readily condensable compounds. The second laboratory study focuses on the dependence of relative humidity in the formation of low volatility, highly oxidized multifunctional organic compounds from the oxidation of monoterpenes. Recent field observations have focused on the growth of nanometer-sized particles in the Amazon Basin of Brazil, where we compared the composition of nanoparticles during periods with clean background air with periods that were influenced by urban emissions. Finally, recent measurements from the Finnish boreal forest indicates that further attention should be given to the sources and role of non-terpenoid organics and the possible contribution of transported marine compounds in new particle formation.