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Abstract for an Invited Paper
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**What processes are responsible for the growth of atmospheric nanoparticles?**[1]

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New particle formation is the spontaneous creation of new nanometer-sized particles in the atmosphere. Observations spanning from megacities to isolated forests show that these events can occur frequently and extend for hundreds of square kilometers. While the impacts of these events are not well understood, they are often the dominant source of particles in the remote regions and could play a crucial role in the Earth's climate by regulating the number and activity of cloud condensation nuclei (CCN). This effect of aerosols on cloud properties is recognized in the Fifth IPCC Assessment Report as the largest single contributor to uncertainty in predicting climate change. Since cloud droplet activation normally occurs on particles of about 100 nm in diameter, the key to understanding the impact of new particle formation on climate lies in the ability to predict the growth of newly formed particles. In this talk I will describe recent efforts to understand the species and mechanisms that are responsible for the growth of nanometer-sized particles. I will describe measurements performed with the Thermal Desorption Chemical Ionization Mass Spectrometer, an instrument capable of real time measurements of the molecular composition of nanoparticles as small as 6 nm in diameter at time resolutions of ˜20 minutes. Highlighting observations from Mexico City and the Finnish boreal forest, as well as lab and modeling studies, I will demonstrate the importance of organic acids, amines, inorganic acids, and highly oxidized organic compounds in atmospheric nanoparticle growth.

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