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The importance of biomass burning feedbacks: Focus on CALIOP-based estimates of smoke plume injection height

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Theme: Forests, Biodiversity and Terrestrial Ecosystems. I have been invited to contribute an abstract to the "Remote Sensing of Wildfires" special session organized by Vince Ambrosia (Vincent.G.Ambrosia@nasa.gov).

KEY WORDS: Fire, remote sensing, aerosols, climate, feedbacks

There is a significant connection between biomass burning (BB) emissions, the terrestrial environment and the atmosphere, which has strong implications for feedbacks to the climate system and Air Quality. BB has the potential to alter numerous land and atmospheric processes that, in turn, feedback to and interact with the climate system (i.e. black carbon on spring Arctic ice, land-vegetation cover change alters albedo).

Specifically, the heights to which BB smoke is injected governs short- or long-range transport, which influences surface pollution, cloud interaction (altered albedo), and modifies patterns of precipitation (cloud condensation nuclei). We are working with the CALIOP science team and other Applied Science partners, primarily the Environmental Protection Agency and regional partners, to generate BB plume injection heights using multiple platforms, sensors and models (CALIOP, MODIS, NOAA HMS, Langley Trajectory Model) that will provide value to national and international scientific and air quality communities, the CALIPSO science and algorithm teams, and to public land, fire, and air quality management and regulations communities.

Specifically, we have: (1) developed a methodology that links BB injection height and CALIOP air parcels to specific fires, the variables that control these dynamics, which include ecosystems, fire-specific and meteorological variables; and (2) defined the daily evolution of smoke plumes for specific fires. Statistics that link fire behavior and weather to plume rise are crucial for verifying and enhancing plume rise parameterization in local-, regional- and global-scale models used for air quality, chemical transport and climate.