3) **ORAL**

Advanced Application of Remote Sensing

Measuring Vegetation Aerodynamic Roughness Over the Amazon Basin

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Abstract

The aerodynamic roughness length (Z_0) is an important parameter to determine the vertical gradients of mean wind speed and the conditions for momentum transfer over a vegetated or bare rough surface. Over vegetated surfaces, the aerodynamic roughness length has a simple one-to-one relationship with the *rms* height of the vegetation at the top of the canopy. Once this roughness length is determined for a surface, it does not change with wind speed, stability or stress. During the LBA experiment the Regional Atmospheric Modeling System (RAMS) with flexible horizontal and vertical resolution will be used in conjunction with other models to simulate the atmospheric circulation and trace gas concentration and transport at various scales. This model is suitable to determine the effect of surface roughness parameter at trace gas transport both at local level for LBA study areas and on at the regional level for the entire Amazon basin. In this paper, we present the estimation of this parameter from two sources: 1) From a sample SRTM (Shuttle Radar Topography Mission) data over one of the LBA study areas. The cross correlation between two interferometric SRTM images will be used to estimate the rms height of the vegetation at 90 m resolution and relate that to aerodynamic roughness. This methodology will be applied to the entire SRTM data (when it becomes available) to estimate the roughness length over the basin. 2) Various statistical moments of the JERS-1 image mosaic in fusion with other regional data sets will be used in a semi-empirical model to estimate the vegetation roughness length over the entire basin at 1 km resolution. Both parameters will be integrated into the RAMS model to demonstrate the effect of spatially explicit roughness length on trace gas transport simulations and to test the impact of errors associated with the estimation process.