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Aircraft measurement of contrasting cloud microphysical relationships between the dry and wet seasons in Amazon during the GoAmazon campaign

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Cloud microphysical properties are sensitively dependent on the cloud microphysical processes and the environmental (i.e. aerosol and thermodynamic) conditions under which clouds are formed. The entrainment and mixing processes that modulate cloud microphysical relationships may occur differently depending on the environmental conditions. In this regard, the Green ocean Amazon (GoAmazon) campaign provided a unique opportunity to measure contrasting aerosol, thermodynamic, and cloud microphysical properties of the dry and wet seasons. Here we present some important results of the measurement. In general, cloud spatial dimension was larger in the wet than in the dry season, and clouds were more diluted in the dry season. The clouds in the dry season displayed larger relative dispersion with more abundance of small droplets than those in wet because aerosol concentrations were higher and particles in the accumulation mode were larger in the dry season. Cloud microphysical relationships and mixing diagram analysis strongly suggest homogeneous mixing for most cloud segments in both the dry and wet seasons like in our previous studies for marine stratocumulus clouds over the southeast Pacific and for continental clouds in Oklahoma. Uniquely, however, in the dry season the concentration of very small droplets increased in the diluted (perhaps due to entrainment) sections in many cloud segments, which are suggested to be the newly activated droplets during the entrainment and mixing processes. Speculatively, new droplet activation on entrained aerosols would be more likely to occur in the dry season due to more favorable conditions for that: larger accumulation mode particles, higher fluctuations of vertical velocity and larger turbulent dissipation rate. More detail will be presented at the meeting.