ocean". It has previously been established that the transition season surface air is hotter and hence more unstable (Williams and Stanfill, 2002) than the following wet season, supporting the notion that thermodynamics is playing the primary role in setting the vigor of the convection. A possible factor in these apparent discrepancies is the different degree of control over key observables (aerosol, instability, cloud microphysics, rainfall and lightning) in the two studies, and these aspects will be initially addressed toward resolution of the discrepancy. Andreae et al (2004) also conclude with multiple global implications for their local findings—in particular, "substantial effects on the …global circulation systems" and "enhancing planetary scale upper-level waves that affect global climate". No quantitative results in this regard are shown. In judging the validity of such claims, it is important to note that the local regime explored in Brazil in both studies is characterized by pronounced subsidence of the Hadley circulation. As a consequence, from the standpoint of total latent heating, the variations in this regime are decidedly minor players in the general circulation. Radical effects of aerosol are therefore needed to have "substantial" global effects. Suggestions are made for transition season rainfall measurements in years with contrasting smoke prevalence (independently measured), toward quantifying these effects.

15.6: Characteristics of the Precipitating Systems during the 2002 Dry-to-Wet Field Campaign in the Amazon Region.

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This paper will present the main characteristics of the raining systems observed during the 2002 Dry-to-Wet field campaign in the Amazon region. This experiment was set during the pre-wet season in order to understand the transition between the dry to wet raining season and the impact of the aerosols produced by forest burning in the development of clouds. Weather radar, rain gauges, and lightning measurements are used to depict the main precipitation characteristics observed during this field campaign. Preliminary results indicate that Mescoscale Convective Systems (MCS) that propagated over the radar area are responsible for most of the total rain volume and lightning observations. Additionally, a persistent convective diurnal cycle was observed with local convection, and these convective clouds have raining cloud tops ranging from 12 to 18 km top. Some of these raining clouds presented lightning observation. Therefore, this study will try also to investigate the main differences observed during the formation of thunderstorms.

15.7: Airborne and Ground Based Measurement of the Vertical Structure of Cloud Properties

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A new technique for measuring the microphysical properties of cloud droplets was applied by the first time during the SMOCC experiment in Amazonia. A scanning spectrometer system covering wavelengths from 350 to 2500nm was used onboard the INPE Bandeirante aircraft, in parallel with in situ measurement of aerosol microphysical and chemical properties. The system was used to scan clouds from their illuminated side providing profile information of the cloud spectral reflectance. The spectral reflectance is later converted to cloud thermodynamic and microphysical properties. The simplest product of this data is the vertical separation between water and ice droplets. The difference in refractive indices of water and ice in this spectral range is enough for a very significant separation between both phases. A more complex inversion was also applied to the spectral reflectance data in order to provide measurements of the cloud droplet size. Estimates of the droplet size as a function of the cloud vertical structure shows important characteristics of the growing mechanism of the droplets. This vertical structure can be readily associated with the effect of aerosols particles on cloud droplets and precipitation processes. Results from aircraft measurements during the SMOCC campaign in Amazonia and ground based measurements from Mount Evans in Colorado, US, will be discussed and compared.

15.8: O contexto "Green Ocean" visto através da distribuição de gotículas de nuvem e sua representatividade por uma função gama generalizada.

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Este trabalho tem por objetivo avaliar a eficiência dos parâmetros associados a uma função gama generalizada em representar a distribuição de gotículas de nuvens. A função gama tem sido amplamente usada em trabalhos de modelagem de processos de nuvens, em particular, é parte da parametrização de nuvens presente no modelo RAMS. Os dados utilizados nessa avaliação foram obtidos durante o experimento LBA-SMOCC/2002, enfocando a transição entre as estações seca e úmida e o contraste entre as condições de atmosfera poluída e limpa. A partir das medidas das propriedades associadas às distribuições de gotículas de nuvem, distribuições gamas foram construídas com base em parâmetros de forma, assumidos como números inteiros no intervalo de 1 a 20. O parâmetro representativo da medida foi escolhido com base no melhor ajuste encontrado. Como critério de melhor ajuste foi assumido o coeficiente de correlação obtido entre os valores das medidas e da função gama, calculada para as mesmas classes de tamanho. Os resultados

mostram que parâmetros de forma menores (entre 1 e 4), representativos de distribuições mais largas, são predominantes em condições de atmosfera limpa, enquanto que parâmetros maiores (entre 4 e 7), representativos de distribuições mais estreitas, são predominantes em condições de atmosfera poluída. Os espectros de gotículas, representados pela função gama, mostraram alto grau de coerência com o padrão observado para as medidas. Distribuições representativas de ambiente limpo e de cobertura florestal preservada apontam para diâmetros médios maiores, baixas concentrações, formas mais largas e maior crescimento no tamanho com a altura. Por outro lado, distribuições associadas com ambientes sob intensa queima de biomassa apontam para o lado oposto, apresentando diâmetros médios menores, altas concentrações, formas mais estreitas e menor taxa de crescimento no diâmetro com a altura. Os resultados indicam tendências muito parecidas com o conhecido contraste existente entre nuvens marítimas e continentais, que difere por completo o padrão da estrutura de nuvens que predomina sobre os oceanos e continentes. Nesse contexto, os resultados são fortes indicativos de um padrão de comportamento muito semelhante entre oceano e floresta, reforçando a hipótese do “Green Ocean”.

15.9: Global Simulation of the Indirect Aerosol Effect With the ECHAM5 GCM

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The interaction of aerosols and clouds plays an important role for the global aerosol distribution as well as for the cloud distribution and cloud microphysical properties. Changes in cloud distribution and cloud optical-properties in turn affect the global radiation balance. However, the magnitude of these effects remains highly uncertain.
Up to now, most studies of the aerosol-cloud interaction focus either on detailed process modelling on limited spatial and temporal scales or, as most global modelling studies, utilize empirical relations as they do not predict the necessary parameters for process based parameterizations. The new Hamburg (HAM) aerosol model of the ECHAM5 GCM predicts the size distribution, composition, and mixing state of the major global aerosol compounds. The standard cloud scheme of ECHAM5 has been extended by a prognostic treatment of the number concentrations of cloud droplets and ice crystals. This setup allows for a process-based treatment of the aerosol-cloud interaction for long-term simulations on a global scale. We simulate the activation process and the in- and below-cloud aerosol / hydrometeor collision from the simulated aerosol size-distribution and aerosol composition and the hydrometeor size-distribution. Resulting aerosol and cloud fields are evaluated utilizing in-situ and remote sensing measurements from the LBA experiment.

15.10: Biomass burning and implications for the pattern of nitrogen deposition in the Amazon Basin

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Nitrogen deposition has been measured at Fazenda Nossa Senhora in Rondonia during the SMOCC campaing (Smoke aerosols, clouds, rainfall and climate-aerosols from biomass burning perturb global and regional climate) from September 2002 through November 2002, and in Balbina from March, 2000 through December, 2001. Analysis of NO3-, NH4+ and NO2- were performed by ion chromatography in rainwater samples collected by event in a wet only sampler in these two distinct sites.
In the Amazon region, land use changes have produced a 2 fold increase in nitrogen deposition. This increase is linked to biomass burning emissions, which also drive a shift in the composition of nitrogen deposition from nitrate to an ammonium dominated nitrogen deposition budget. In Balbina, a region that could be considered a pristine area, the annual nitrogen wet deposition is 2.9 kg.N.ha-1.yr-1 and dominated by nitrate. However, in Rondonia which is one of the best examples of how fast Amazonian ecosystems are undergoing anthropogenic changes, the nitrogen wet deposition rate of 5.7 kg.N.ha-1yr-1 is dominated by ammonium and similar to values found in very industrialized regions. The strong positive correlation of nitrogen wet deposition and the number of hot pixels found in Rondonia shows clearly that the changes in the nitrogen deposition pattern are linked to biomass burning emissions and consequently to land-use changes.