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CLIMATIC IMPACT OF TROPICAL DEFORESTATION SIMULATIONS

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Two Amazonian deforestation simulation experiments have been performed with the French Spectral GCM EMERAUDE coupled with the ISBA land surface parameterisations of Noilhan and Planton (1989). The deep convection scheme of Bougeault (1985) was used in the first experiment while the Kuo scheme (1965, 1974), including the modifications of Geleyn (1985), was used in the second one. For each experiment the model was integrated with the original soil and vegetation types from the classification of Wilson and Henderson-Sellers (1985) in the control case (ctrl). In the deforested case (def) a hypothetical grass land cover replaced the rainforest over a large surface over the Amazonian region. The main ISBA parameters for forest and grass land are respectively: albedo 12.5% and 19%; roughness length 2 m and 6 cm; active soil column depth 4 m and 2 m; and minimum surface resistance 42 s/m and 75 s/m. The initial soil water content used are that from Mintz and Serafini (1989) climatology for a mid-December situation. The precipitation pattern obtained with the Kuo scheme seems in better agreement with the climatology over the South America Continent than that obtained with the Bougeault one. Over the deforested region the precipitation decreases, following the decreased evapotranspiration, when the Kuo scheme is used while the humidity convergence, of about 50% of precipitation, remains unchanged. An increase of precipitation results from the deforestation when the Bougeault scheme is used as a consequence of the increased humidity convergence. The impact of the increased albedo is compensated by a decreased cloudiness in both simulations. The resulted averaged surface temperature remains almost unchanged, although the daily temperature amplitude is larger in the def experiment. This increased daily temperature amplitude may be explained by the decreased roughness length. An increased runoff results from the lower soil water capacity.