1.1 An experiment with the atmosphere-biosphere model Eta/SSiB on the Amazon deforestation.

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Resumo

An experiment to investigate the impact of the Amazon deforestation on the South American climate was performed with the regional Eta model coupled to the simplified version of Simple Biosphere model (SSiB). The model domain covered all South America up to 50 oS. The initial and lateral boundary conditions were provided by NCEP analyses. Nine one-month integrations during November 1997 were done. The control integration had realistic vegetation mask. The others had the vegetation type over the Amazon changed from rain forest to savannah and grassland.

Changing rainforest to savannah produced large decrease of precipitation in central and eastern Amazon. It also increased the canopy air temperature by more than 1 oC in the whole Amazon basin, with values of more than 5 oC in eastern Amazon.. The differences also show increase of precipitation over the Rio de Janeiro area around 22 oS. This region is located to the south of the area with decreased precipitation. The stationary and transient moisture transports were affected by the vegetation change, not only over the continent but also over the Southwestern Atlantic. This affected the simulated South Atlantic Convergence Zone (SACZ), which depends on the Amazon precipitation and is responsible for the precipitation maximum over southeast Brazil during the austral summer. The upper level circulation was influenced by the reduction of precipitation and the Bolivian High was not formed. Changing vegetation type from rainforest to grassland lead to patterns similar to those found previously, but the precipitation decrease in most of the Amazon region was smaller. This is due to the higher bare soil moisture flux provided by the grassland in relation to the savannah. The experiment shows that modifications in the climate of the Amazon and other areas over South American may occur in Amazon deforestation scenarios.

Area averaged atmospheric moisture budget (mm day^{-1}) over the Amazon.
(280°E-310°E, 15°S-5°N).

Integration	Divergence of vertically integrated moisture flux	Evapotranspitation	Precipitation	Time rate of change of moisture
Control	-0.25	5.73	5.30	
Member 1	-1.06	2.87	3.02	
Member 2	-0.69	2.65	2.24	
Member 3	-1.32	2.07	2.46	
Member 4	-1.57	3.08	3.73	
Member 5	-0.76	4.45	4.44	
Member 6	-0.71	4.39	4.31	
Member 7	-1.40	3.13	3.59	
Member 8	-0.31	5.23	4.77	

Area averaged atmospheric moisture budget (mm day^{-1}) over Southeast South-America.
(305°E-320°E, 30°S-15°S).

Integration	Divergence of vertically integrated moisture flux	Evapotranspitation	Precipitation	Time rate of change of moisture
Control	-4.03	3.91	6.54	
Member 1	-3.87	3.92	6.56	
Member 2	-3.08	3.94	5.78	
Member 3	-3.28	3.65	5.71	
Member 4	-4.16	4.12	6.93	
Member 5	-3.92	3.91	6.44	
Member 6	-3.95	3.76	6.39	
Member 7	-3.47	3.57	5.69	
Member 8	-4.87	3.95	7.38	