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A process model of vegetation-atmosphere interactions in drylands

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The interaction between vegetation and the atmospheric-hydrologic system in drylands is characterized by a number of different, possibly competing, feedback mechanisms. Here, we discuss a minimal model describing some of these processes, namely: (i) the effect of the biogenic crust on infiltration in the soil, (ii) the shadowing effect of vegetation cover and its influence on evaporation, (iii) the soil-moisture precipitation feedback, and (iv) the variation of the surface albedo due to the presence of vegetation. We study the stationary states of the coupled vegetation-soil-atmosphere system and the effects of precipitation intermittency induced by a variable atmospheric moisture flux convergence. We also provide an assessment of the importance of the different feedback mechanisms mentioned above.