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Precipitation and seasonal variation of surface temperature-controlling factors in the Sonoran Desert, North-West Mexico.

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This study is focused on seasonal cycle of precipitation and parameters, which control surface temperature in the Sonora desert (North-West Mexico). The understanding of this process is important for monitoring of desertification. This is so because in a certain year, the time span of the period, during which the radiation factor is predominant, is an important factor in the desertification process. One indirect characteristic of prevalence of the radiation factor is Normalized Difference Vegetation Index (NDVI), which is an indicator of green phytomass. We also used monthly means of albedo and surface temperature data (Global AVHRR-Derived Land Climatology) prepared by NOAA/NESDIS (National Environmental Satellite, Data, and Information Service) and NGDC (National Geophysical Data Center).

The most significant feature of the summer precipitation in the Sonoran desert is the abrupt change of moisture conditions, with a maximum in August. The main features of the ratio between albedo and surface temperature are discussed in terms of analysis of monthly means (albedo, temperature, NDVI) in the state of Sonora, in particular, within the box 30-31N, 112-113W.

The analysis of synchronous time series of albedo, surface temperature and NDVI has shown that the dominating temperature-controlling factors can switch within the year in the study area. The radiation factor is dominant in dry months (April – May) and the surface temperature is negatively correlated with albedo. This can cause generation of positive albedo-precipitation feedback, which in turn contributes to the desertification process.