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Monitoring environmental change in the Andes based on low resolution time series analysis

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Environmental change is an important issue in the Andes region and it is unknown to what extent the ongoing processes are a consequence of human impact and/or climate change. The objectives of this research are to study vegetation dynamics in the Andes region based on time series analysis of SPOT-Vegetation, NOAA-AVHRR and MODIS derived NDVI at low spatial but high temporal resolution, and to recognize to which extent this variability can be attributed to either climatic variability or human induced impacts through assimilation of satellite derived NDVI and rainfall data. Monthly rainfall estimates were available from the European Centre for Medium-Range Weather Forecasts (ECMWF) through MeteoConsult and the Monitoring Agricultural ResourceS (MARS) unit. Deviations from the 'average' situation were calculated for the NDVI time series using the Standardized Difference Vegetation Index (SDVI) and for the precipitation time series using the Standardized Precipitation Index (SPI). Correlation analysis between NDVI and SPI is performed in order to identify the temporal scale at which the environment is most sensitive to precipitation anomalies (best lag). Trends in SDVI and SPI are investigated using least square regression, taking into account the accumulated rainfall anomalies over the best lag. Hot spots of human induced environmental change are detected by subtraction of the precipitation induced signal on vegetation dynamics. The model can be used to predict possible effects of climate change in areas most sensible to trends in precipitation.