Vegetation dynamics and water balance in the Bolivian Altiplano: recent findings

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According to the report on Climate Change (IPCC,2014) South-American is at high risk of increase in the frequency of extreme weather events such as "El Niño" or "La Niña", decreases in food production and its quality and, of course, the increase of the annual temperature average. The present research focuses on one of the most vulnerable areas, the Lake Poopo's catchment, in the Andean Altiplano.

The Andean Altiplano straddles the border between Peru and Bolivia. At an average terrain elevation of 4,000 metres above sea level, the Altiplano is located between two branches of the Andean Mountain range. Two large lakes are found in it: Lake Titicaca at the North, and Lake Poopo at the South.
Hydrological studies of the Lake Poopo catchment reported a high correlation between the lake's water surface and the annual precipitation. In the last 17 years, the lake's surface has decreased drastically, even in wet years, defying the correlation. Different reasons have been postulated: enhanced evaporation and evapotranspiration (ET) water losses due to climate warming, expansion of cultivated areas, increase of water abstractions for urban and mining uses, etc. Using remote sensing data, a recent study documented an increase in ET in the lake Poopo cathment for the period 2000-2014. This study explores the relationship between the ET increase and the vegetation dynamics in the area for the same period (2000-2014). The vegetation vigor was map using the Soil Adjusted Vegetation Index (SAVI) calculated from image time series of the MODIS sensors and the Landsat mission. The spatial analysis of the vegetation evolution revealed spatial and temporal patterns of agricultural practices related to the water consumption.

There has been used 650 images to estimate the ET and 240 images to estimate changes in vegetation.
One of the software used it has been Google Earth Engine, that is why such extensive data collections have been processed.

The results show an increase in the vigour of the vegetation of 13% in the study area for the period 2000-2014 and an increase of the ET of 26% for the same period.

The quantification of the associated water use is currently under investigation.