Correlation between NDVI and the annual groundnut yield in Senegal

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A key strategy to assert and minimize risk in agriculture is to gather information about the factors that may affect
the production. That is why remote sensing measurements have become a fundamental tool in this area. Between
all the existing measurements, the Normalized Difference Vegetation Index (NDVI) is one of the most useful.
The NDVI, which is computed using satellite images, takes into account the physicochemical mechanism of the
photosynthesis in order to quantify the photosynthetic activity of a an area. A natural question that arises from the
risk and hazard management point of view is if this index can help us estimate or even forecast the yield of a given
harvest. Intuitively, this should be possible if a correlation between NDVI and yield is found.

We have focused our study in the country of Senegal, where more than 70% of the work force is em-
ployed in the agricultural sector. Since Senegal is also one of the most important peanut oil producer and exporter,
the crop we have chosen for this research is the peanut. The economic relevance of this product guarantees that a
significant fraction of the soil will be used for this crop.

We have worked with NDVI data computed from satellite images taken with the MODIS instrument of the
Terra satellite launched by NASA on 1999. In order to explore the correlations with agricultural yield, we have
also retrieved production data from the Food and Agriculture Organization (FAO) of the United Nations.

The results we have obtained suggest that a linear correlation between NDVI and yield do exist; moreover,
this correlation can be enhanced if, instead of yearly averages of NDVI, the NDVI corresponding to a smaller time
period -which lies within the growing season - is taken.