Global Vegetation Assessment in the Last Two Decades

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Introduction

- Vegetation is key surface characteristic for land surface modeling and essential Climate Variable as defined by GCOS. Terrestrial vegetation plays an important role in controlling the CO_2 concentration through photosynthetic reaction.   vegetation model include fundamental processes on different levels (photosynthesis, respiration, allocation, disturbances). Vegetation type affects biogeochemical processes e.g., Global C and N Cycles

- The variations of rainfall and temperature is dependent on vegetation distribution. Normalized Difference Vegetation Index (NDVI) from NOAA's Advanced Very High Resolution Radiometer (AVHRR) instrument can be used to assess climate in semi-arid zones where rainfall records are scarce or difficult to obtain in a timely fashion.

- NDVI can be used for assessment of fire risk. Forest fire risk estimates were based on the decrease of NDVI values during the summer in areas subject to summer drought.

## Normalized Difference Vegetation Index (NDVI)
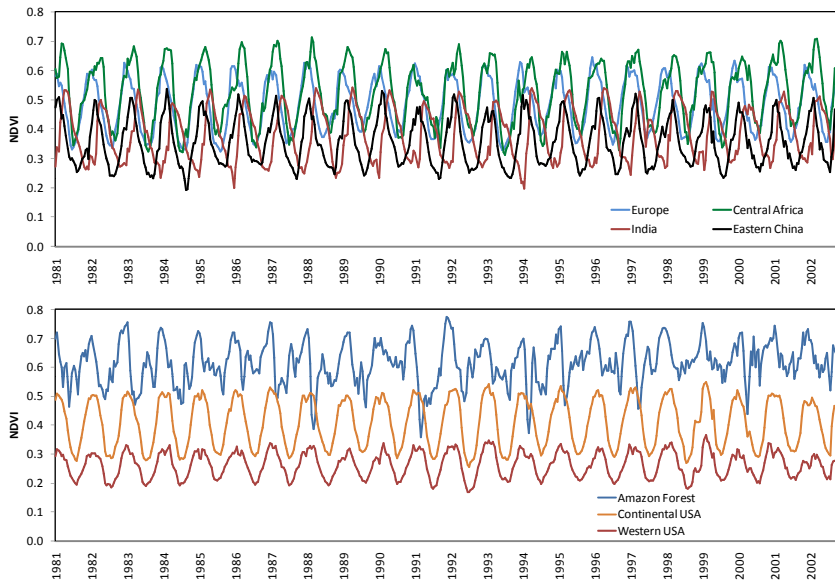
Forest Fire in Western USA
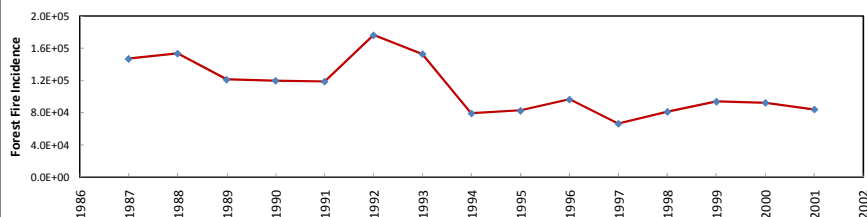
Remote Sensing Vegetation (NDVI) Data Sets

- NDVI is defined as normalized difference between the reflectance in the visible (red) and the near infrared band. The visible (red) band represents the absorption band of chlorophyll and NIR represents a maximum of vegetation reflectance related to the mesophyll structure. NDVI is considered to be a function of the vegetation strength.

- The GIMMS (Global Inventory Modeling and Mapping Studies) data set is a normalized difference vegetation index (NDVI) product available for a 22 year period spanning from 1981 to 2003. The data set is derived from imagery obtained from the Advanced Very High Resolution Radiometer (AVHRR) instrument onboard the NOAA satellite series 7, 9, 11, 14, and 16. This is an NDVI dataset that has been corrected for calibration, view geometry, volcanic aerosols, and other effects not related to vegetation change.

- Daily daytime Advanced Very High Resolution Radiometer (AVHRR) 4-km global area coverage data have been processed to produce a Normalized Difference Vegetation Index (NDVI) 8-km equal-area dataset for all continents except Antarctica.
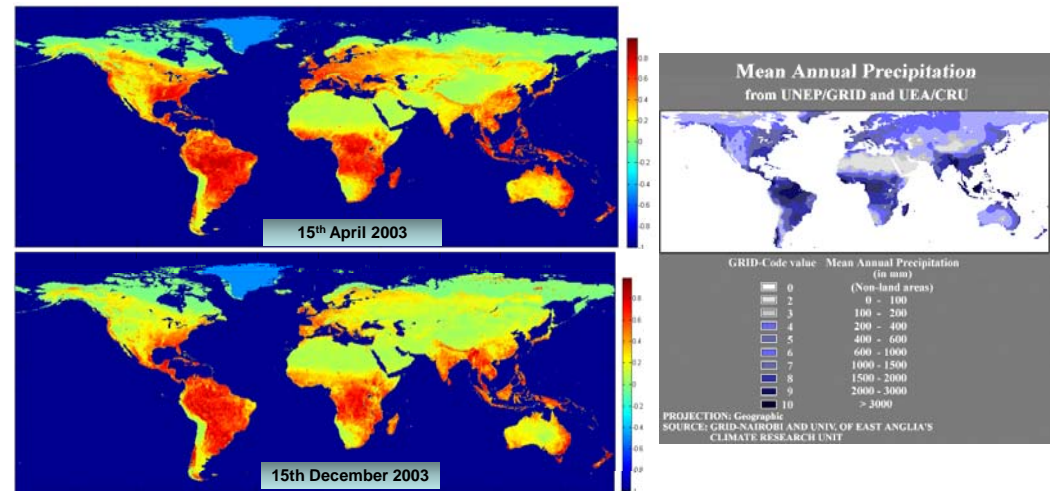
Summary

- The average NDVI in US is lower in 2000 to 2003, which relates to lower average precipitation during these periods.
- The average NDVI in Central Africa is higher in 2001 to 2003, which relates to higher average precipitation during these periods.
- The global vegetation distribution is closely matching with global precipitation distribution.
- Forest fire events in western USA has been observed higher during lower NDVI period. Change in NDVI can be used as a risk indicator for forest fire.
- In this study, we did not observed temporal decrease in NDVI values in last two decades.

References:
- Tucker, C.J., J.E. Pinzon, and M.E. Brown (2004), Global Inventory Modeling and Mapping Studies, NA94apr15b.n11-VIg, 2.0, Global Land Cover Facility, University of Maryland, College Park, Maryland, 04/15/1994.
- Tucker, C.J., J.E. Pinzon, M.E. Brown, D. Slayback, E.W. Pak, R. Mahoney, E.F. Vermote, E. N.E.L. Saleous, (2005). "An extended AVHRR 8km NDVI dataset compatible with MODIS and SPOT vegetation NDVI data." International Journal of Remote Sensing, 26, 4485-4498.