Improved Understanding of the Coupled Dynamics of Terrestrial Water, Ecosystems, and Climate over the Contiguous United States Using NU-WRF/Noah-MP

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Background

Planet Earth has systems and processes working constantly over time, keeping it hospitable. It is quite possible that these systems are not independent of one another: There could actually be dynamic interactions among Earth’s processes.

This study looks at possible dynamics and interactions of precipitation in the United States, Temperature, Leaf Area Index, Normalized Difference Vegetation Index, among other aspects; One can observe a decrease of Leaf Area Index in the American South and Texas, as well as an increase in overall precipitation in these areas.

Methods

This study considered the following:

● Precipitation
● Leaf Area Index
● Normalized Difference Vegetation Index
● Temperature
● Gross Primary Production

This project utilized NCL, a coding language. The algorithm had each code gather satellite collected data, and plot it onto either maps or graphs so that data analysis was possible.

Findings

● There is a clear decrease in vegetation in the American South and in Western Texas, contrasting a significant increase in precipitation in those areas. The American South is still the area with highest NDVI and GPP.
● The Sonoran Desert has seen an increase in precipitation, though the average precipitation is still almost neglectable.
● The Texas area had significant less ET than the rest of the country.
● There is a clear increase in temperature in most of the United States.
● The American South is seeing a decrease in Leaf Area Index, while precipitation, GPP, and NDVI are staying somewhat constant.
● There was a decrease in SCF in Northwestern States, while the rest experienced little to no change.

Conclusions

● Temperatures in The United States are getting hotter over time.
● Texas is the area with least vegetation production, as well as the driest.
● Further research is required to better understand climate dynamics in North America.

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