Environment and organisms - Task #479

Climatic Stationarity

08/24/2012 01:28 PM - Adam Wilson

Status:	New	**Start date:**	08/24/2012
Priority:	Normal	**Due date:**	
Assignee:	Adam Wilson	**% Done:**	100%
Category:	Climate	**Estimated time:**	5.00 hours
Target version:			
Activity type:	Coding/analysis		

Description

Introduction/Methods

The methodology we are developing uses station observations and MODIS data (available 2000-present) to estimate temperature and precipitation back in time as far as 1970. It is important we understand how reliable the 2000-2010 period will be in prior time periods and assess how this procedure will impact our predictions. As a first step to investigate how stationary climate has been, I compared daily mean station values for each variable, for each month. I only included stations with NAs in the GHCN quality control fields and then only kept stations with at least 75% of the observations from both time periods. I then plotted the 1970-2000 (P1) daily means vs the 2000-2010 (P2) daily means. I also plotted the P2-P1 differences in geographic space. See below for these six plots.

Results

Overall there was high agreement between the two time periods. The R^2 values for TMAX and TMIN ranged from 0.88 to 0.97, with most values greater than 0.9. For precipitation, the R^2 values ranged from 0.64 to 0.96. In an earlier phone call I said that the relationship for PRCP was much worse, but this was due to a large number of stations with very few daily observations. Removing stations with fewer than 75% of the observations resulted in a much better relationship.

There are some interesting patterns with most months experiencing warmer, drier conditions in P2, but there also appears to be some shifting of seasons. For example, PRCP in December in P2 was well above P1, while November showed the opposite. This can also be seen by comparing the PRCP anomalies plotted spatially for November and December. It seems that the winter rains have been coming later (on average) to Oregon in P2. A similar pattern is visible in January/Februrary.

Summary

The relatively high correlation between these two periods supports our use of the MODIS era to predict back in time pre-MODIS. Additionally, the climate-aided approaches (including the fusion approach) will account for spatially systematic deviations from the climate surfaces developed during 2000-2010. For example, the anomalies plotted in the attached document are similar (in that they are anomalies) to the surface to be interpolated in the climate aided approach.

Feel free to propose additional ideas of how to explore this issue...

History

#1 - 08/24/2012 01:32 PM - Adam Wilson

See code here:
https://projects.nceas.ucsb.edu/nceas/projects/environment-and-orga/repository/revisions/0924578a4ba91df092cde27e01df3fea9a712ac6/entry/climate/research/climate_stationarity.R

Files

ClimateStationarity.pdf	1.93 MB	08/24/2012	Adam Wilson