IRI
Uruguay Agriculture III
Droughts and the Factors That Make Them

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>> Andrew: The importance of monitoring drought is indispensable for countries whose economic viability is strongly tied to agriculture.

>> Andrew: In Uruguay, an example of such a country, decision support tools that specifically address response strategies to drought will become increasingly useful to farmers, insurance providers, and policy makers as they navigate more volatile climate variabilility in the future.

>> Andrew: Here at the International Research Institute for Climate and Society node, we partnered with the Instituto Nacional de Investigación Agropecuaria in Uruguay for this final term of the Uruguay Agriculture project.

>> Andrew: The preceding project terms produced a Drought Severity Index tool based on the methodology of Rhee et al. (2010) and compared it to remotely sensed drought indices as well as in-situ soil water balance data.

>> Pietro: So for this project we tried to monitor the drought severity in Uruguay and we use three datasets to estimate the precipitation using the NOAA CMORPH product and we estimate the land surface temperature using MODIS sensor at 1 kilometer spatial resolution and finally we try to estimate moisture content in the vegetation using MODIS at 250 kilometer spatial resolution, which is a combination of the shortwave infrared and the near infrared to estimate water content in the vegetation.

>> Andrew: With numerous other precipitation based drought monitoring tools, what makes this DSI more useful?

>> Pietro: So we developed this drought severity index in Uruguay in order to estimate drought conditions and not only in terms of precipitation but we also wanted to know how the temperature impacts the vegetation and basically its the crops and pastures and we monitor the vegetation moisture to see how the vegetation can be resilient to drought conditions so by integrating precipitation, temperature, and vegetation we have a better index of drought in Uruguay.

>> Pietro: So this new drought severity index is composed by three components: precipitation, temperature, and vegetation moisture and so we can have drought conditions because there is lack of rain but the vegetation can be resilient, certain species can be resilient to drought so, we want to understand better how the vegetation is interacting with the precipitation and the temperature to improve the drought severity index.

>> Jerrod: Since the drought severity index is based on three components, the first attempt to make an easy to read display of the components was to put the components onto a ternary diagram.

>> Jerrod: This proved to be ineffective as the ternary diagram would not show all the possible scenarios also, the placement of the points did not have any discernible pattern on the triangle due to the normalization of the components.

>> Jerrod: A 3D scatterplot of all possible scenarios for the drought severity index explains why. When the three components are plotted against each other it can be seen that different concentrations of each component can present themselves on the same part of the triangle even if one scenario shows complete drought and another shows no drought at all.

>> Jerrod: It was determined that the best solution for displaying the components of the drought severity index was to show a time series for each of the components when you clicked on an interactive map of Uruguay.

>> Jerrod: This gives the ability to see the values for the past year of each component leading up to the present for the pixel of interest the end-user selects, which in turn allows for end-users to better understand the principle driver behind droughts in their specific region of interest.

>> Jerrod: This information is useful to land managers and policy makers to understand the resilience of vegetation during drought periods in specific areas leading to better drought mitigation practices and emergency response strategies.

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