STUDENT SPOTLIGHT
Clark Seipt: Helping Farmers, One Climate Forecast at a Time

by Jessica Horton, PSIEE Writing Intern

The times they are a-changin' — and so is the climate. Luckily, for the farmers in the Pampas region of Argentina, where a distinct El Niño Southern Oscillation (ENSO) signal has been shown to have a large effect on the area's climate, these changing times have also been characterized by advances in climate science and modeling.

These advances currently allow unprecedented skill in the prediction of seasonal-to-interannual climate variability. However, due to lack of complete predictability there is still an uncertainty that these farmers face each growing season.

It is this uncertainty that Clark Seipt is working to minimize by helping the Pampas farmers, a group that plays a significant role in the cash economy of the global market, to capitalize on current climate forecasting technology.

Seipt came to Penn State in 2005 to pursue her graduate degree in Geography and became involved in a research project led by Bill Easterling, now the Dean of the College of Earth and Mineral Sciences, investigating the utility of seasonal climate forecasts for Pampas farmers.

Seipt dove right into the project, and has spent the past three years working with a research team based in the Pampas, which is one of the world's most productive agricultural regions and one where precipitation variability is currently recognized as the region's most marked ENSO-driven influence.

Seipt explains in her thesis that ENSO is understood via investigation of changes in sea surface temperatures and the climatic consequences forced by those changes.

"The Pampas region is affected by seasonal, interannual and even decadal climate variability which manifests in numerous ways," Seipt said. "These consequences and the uncertainty associated with climate variability affect agricultural production and decision-making. Climate forecasts offer information that can help farmers to mitigate potentially negative consequences of such variability or take advantage of potential opportunities. The information can improve decision-making."

Through this research initiative, Easterling and Seipt designed, developed and implemented a conjoint analysis survey investigation of farmers' perceptions of climate forecast utility.

"Conjoint analysis is a methodology," she said. "It's an approach that we applied to this work to evaluate how the farmers look at climate forecasts and decide how useful they are to them. We started in on this project looking at how the farmers perceive the

climate forecasts and how it is they look at them. They're given a forecast and they really evaluate it to see how to apply it to their decision making."

The research team worked with 60 farmers as part of a small case study in order to analyze what characteristics of climate forecasts farmers found to be the most useful. The farmers were given forecasts and each of those forecasts was defined by four different attributes.

"We worked with scientists and farmers in Argentina to find out what the top factors might be," Seipt said. "The factors ended up being mode of distribution, which is how that forecast is delivered; spatial resolution, which is the scale at which the actual conditions are illustrated; lead time, which is how much time they have between when they received the forecast and when the conditions are expected to begin; and performance, which is our attribute to represent accuracy."

Farmers were then presented with a series of "mock" climate forecasts, each of which was a combination of different levels of the four attributes. Using the scale provided, farmers were then asked to score each forecast according to its utility for on-farm management decisions.

Seipt compared the farmers' evaluation of these attributes to a person looking to buy a car. The most important factors that person may take into account before purchasing a car may be price, horsepower and color. When that person goes to look at cars, they have these factors in mind, whether they are conscious of them or not, Seipt said. She explained that this is similar to the thought process farmers have when evaluating which seasonal climate forecasts they feel are the most helpful and can be utilized in the best way.

The farmers evaluated the forecasts and rated them from 0 to 10, based on their utility. Using multiple regression techniques, the research team then analyzed and decomposed the forecast utility scores in order to see which factors were most influential on farmers' utility decisions.

"We found that spatial resolution is really important," Seipt said. Performance — the whole accuracy concept — of course is important, which we knew, but this confirmed it. Lead-time wasn't a priority compared to the other attributes. Farmers were very willing to give up some of that lead time so that they could have forecasts that have higher spatial resolution."

These survey results are the basis of Seipt's master's thesis. The results have also been shared with the Argentine Association of Regional Consortiums for Agricultural Experimentation (AACREA), the Pampas boundary organization with which the team collaborated in the Pampas. Seipt has presented her work at two international conferences, has written articles for AACREA's regional agricultural magazine, and is preparing journal articles for scholarly publications.

"We can't say that if we give them [farmers] a forecast that is more useful based on their responses that they'll actually put it into practice," Seipt said. "But we can say this is what we learned and this is what these farmers are telling us. If you can translate those priorities into priorities for research on the climate science and forecasting end, you're going to start connecting the two. And hopefully that linkage will only get stronger and you'll see that disconnect start to break down."

Seipt hopes that this research will allow the scientific advances to "connect to the farmers on the ground."

"The farmers that participated were really interested in methodology," she said. "They're very excited to hear the results."

The program recently received another three-year grant, and while Seipt will still be in communication with the group, she will no longer be actively involved in the research. Seipt graduated from Penn State in August and now works as a Program Assistant at the International START Secretariat, an organization that focuses on research-driven capacity building in developing countries. ■

Seipt leading a training session for Pampas farmers (above); and soybean harvesting in Pampas region (below).

Photos courtesy: Clark Seipt