Transitions Case Study – Fire Forecast Tool in Alaska

With funding from NIDIS Coping with Drought initiative, the Alaska Center for Climate Assessment and Policy has developed a tool to predict annual fire severity in Alaska through collaboration with other RISAs, CPC, and fire managers in Alaska (http://ine.uaf.edu/accap//research/season_fire_prediction.htm). Predictive capacity for Alaska fire historically falls behind what is available in the lower 48 states. Increases in wildfire frequency, severity, duration, and total area burned are among the most significant expected ecological effects of climate warming in the region (Kasischke et al 2010). Two of the three most extensive wildfire seasons in Alaska's 50-year record occurred in 2004 and 2005 and 60% of the largest fire years have occurred since 1990 (Kasischke et al. 2006). Estimates of Alaska fire potential are important nationally since Alaskan labor resources are committed for national dispatch and aviation and equipment resources are also shared nationally. In the past, this resource sharing was possible because peak demand for fire suppression resources occurred in June in Alaska and in August and September in the lower forty-eight states. As climate change increases the frequency and intensity of extreme fire seasons in Alaska, we can expect that simultaneous demand for fire suppression resource in Alaska and the co-terminus U.S.A. to occur more frequently. Therefore, improving climate modeling and climate based fire prediction specific to Alaska is an important component of meeting national demand for fire suppression resources.

Designed in close collaboration with fire managers from a range of state and federal agencies participating in the Alaska Wildland Fire Coordination Group, this prototype project takes advantage of the strong weather/fire link in Alaska to produce estimates for the severity of the 2009 and 2010 fire seasons. The approach is to sequentially fit a predictive model for annual area burned in Alaska after the data for each month (March-June) become available. As with any modeling process there are a number of different decisions that must be made regarding model complexity, selection of explanatory variables, spatio-temporal resolution of interest, and others. One of the key results of Duffy et al. (2005) was the identification of the approximate spatial and temporal resolution that displays the strongest linkage between climate and fire. This work keeps the focus on linkages at an annual timescale across interior Alaska for the time period of 1950-2010. Explanatory variables used in this analysis are monthly teleconnection indices and monthly temperature/precipitation. The teleconnection data are available from NOAA Climate Prediction Center. The temperature and precipitation data are assembled following the methods of Duffy et al. (2005) using data from the NOAA National Weather Service. Predictions are made monthly from March through June. We have recently expanded this experimental project to utilize information from the CPC Long Lead Forecast (LLF) to produce a forecast of fire activity in Alaska for the upcoming year that compliments the existing approach.

The prototype fire prediction tool has been tested and improved with feedback from users and is now ready for transition from development and trial into operations. While continued research can be done to refine the spatial extent of the predictions, the model has been developed and basic algorithms have been created for this seasonal fire decision-support tool. Transition to operations would entail a briefing on model and tool design, inputting NOAA data from NWS and CPC, running the model, and ensuring the output is accurately displayed on the website. With strong communication and collaboration, this could be achieved in a relatively smooth transition. As a NOAA grant, ACCAP is not in the position to ensure the long term sustainability of the tool and attempting to maintain the tool over time would preclude ACCAP from developing new innovative tools that respond to evolving stakeholder needs, such as our current project on sea ice prediction. This fire prediction tool for Alaska is a prime example of how RISA expertise in user interactions, research, and innovation can be applied to create a decision-support tool that can then be operationalized on an agency level, for example through the National Climate Service, or NCEP.

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