Weather, climate, and agriculture

Von Walden (v.walden@wsu.edu) WSU

Given the central importance of climate and weather for REACCH, it is important to clearly define our terms. Both weather and climate concern varying conditions of the atmosphere, but they differ in temporal scale. Weather describes conditions of the atmosphere over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time.

IMPACT

It is important to understand terminology in conversations between scientists and a lay audience. The effects of weather on agriculture are short term; the effects of climate change are long term and may require new adaptation and mitigation strategies.

Our best estimates are that future conditions in the inland Pacific Northwest will be warmer throughout the year, with larger temperature increases in summer. These changes are likely to increase the number of growing degree days and the length of the growing season. While models estimate an increase in annual precipitation, overall decreases in summer precipitation and increased evapotranspiration are likely to decrease water availability during the summer months.

Weather is important for agriculture, as it can be both beneficial and detrimental to crop production. On a year-to-year basis, weather influences the number of growing degree days, length of the growing season, and timing and amount of precipitation and evapotranspiration from crops. These factors can combine in advantageous ways for optimal growing conditions; however, a late spring freeze or lack of moisture during the growing season can severely limit yields and create a host of concerns for growers. Weather also determines the conditions under which pests appear in crops and how they might migrate. Over longer time periods, weather patterns shift, resulting in climate change or variability.

Our ability to forecast how weather changes day to day (weather), year to year, and decade to decade (climate) plays a vital role in keeping agricultural production flexible, adaptable, and cost effective. Research allows us to use models of the earth system to examine how weather variables may vary several decades into the future. Information from these models is "down-scaled" to fine spatial resolution that can then be used by agricultural researchers. Climate changes will differ among locations, just as weather does, so our down-scaling approach is similar to that used for shorter term weather forecasting. We can test these models by using them to project past climates and examine them for accuracy.

Our best estimate is for increases in temperature across the inland Pacific Northwest of about 3 to 4ºF by the mid-21st century and between 4 to 6.5ºF by the late 21st century, with a bit more warming during the summer months. Our best estimates suggest that annual precipitation will increase by about 5 to 15% by the middle and latter half of the 21st century. However, summertime precipitation is expected to decrease significantly. Along with warmer summer temperatures, the result will be a decrease in soil moisture during the late summer months.

Palouse wheat fields in Genesee, Idaho. Photo by Kathy Zenner.

In summary, our best estimates are that future conditions in the inland Pacific Northwest will be warmer throughout the year, with larger temperature increases in summer. These changes are likely to increase the number of growing degree days and the length of the growing season. While models estimate an increase in annual precipitation, overall decreases in summer precipitation and increased evapotranspiration are likely to decrease water availability during the summer months.

Photo by Brad Stokes.