Increasing variability in the seasonal weather will impact production.
Climate vs Weather

- Climate determines where we grow a crop
- Weather determines how much we produce
CLIMATE FACTORS

- Inputs
  + Temperature
  + Precipitation
  + Solar radiation
  + Carbon dioxide

- Direct
  - Growth
  - Phenology
  - Yield

- Indirect
  - Insects
  - Diseases
  - Weeds

Soil is the underlying factor as a resource for nutrients and water.
Summer Temperature Change

MultiModel B1 2040s

MultiModel B1 2080s

MultiModel A2 2040s

MultiModel A2 2080s
TEMPERATURE RESPONSES

**Dairy Heat Stress Chart**

Source: University of Arizona

To use this chart, simply match up the temperature on the vertical scale with the day's relative humidity on the horizontal scale.
TEMPERATURE RESPONSES

**Corn**
- Vegetative Optimum Range: 77-100°F
- Reproductive development Optimum Range: 62-72°F
- Failure: 95°F

**Soybean**
- Vegetative Optimum Range: 77-97°F
- Reproductive development Optimum Range: 72-75°F
- Failure: 102°F
TEMPERATURE EFFECTS ON CORN PHENOLOGY

Rhizotron study with warm chamber 6F warmer than normal chamber with simulation of Ames IA temperature patterns.

0  116 bu/A  
34  206 bu/A  
34  218 bu/A
CROP YIELDS DECLINE UNDER HIGHER TEMPERATURES

**Corn**

![Graph showing the relationship between change in maximum temperature and change in yield for corn.]

**Soybean**

![Graph showing the relationship between change in maximum temperature and change in yield for soybean.]

*Note: The graphs illustrate the negative correlation between higher temperatures and crop yield declines.*
PROJECTED PRECIPITATION CHANGE BY SEASON
Observed change in very heavy precipitation

Change (%)

-12% 11% 12% 16% 37% 27% 71% 33%

<0 0-9 10-19 20-29 30-39 40+
EROSION: HOW MUCH IS TOLERABLE
CLIMATE IMPACTS ON AGRICULTURE

- Increasing variability in growing season weather will directly impact our ability to efficiently produce food, feed, and fiber.
- Increasing intensity of precipitation in the Midwest in the spring increases soil erosion and degrades our soil making it more susceptible to climate variation.