

## Confronting Climate Change in the Great Lakes Region

### Technical Appendix Climate Change Projections

#### PRECIPITATION

Click here to go directly to [time series](#) or [geographical plots](#) of precipitation change for the Great Lakes region, or to time series of the change in precipitation for [individual states/provinces](#).

Changes in regional precipitation carry particularly important consequences, both for ecosystems and society. Precipitation is generally more variable than temperature in terms of absolute deviation from long-term or century-scale average, with inter-annual variations in precipitation in the Great Lakes region ranging from –40% to 100% from the mean for a given year. On a seasonal basis, the variation is larger in winter, where precipitation can range from –50% to +90% from the mean, whereas summer variations are smaller, at  $\pm 40\%$ . However, it is notable that precipitation has generally been above average relative to the previous century since around 1970.

According to the latest model results, average winter precipitation across the region is likely to increase, while summer precipitation remains the same or decreases. Increases in monthly average precipitation up to 40% are projected to occur in winter, with largest increases occurring at higher latitudes and for [emission scenarios](#) at the higher end of the range (A1FI, A2). At the same time, snow depth on the ground is projected to decrease – although actual snowfall could either increase or decrease, depending on atmospheric conditions during winter precipitation episodes. The geographical distribution of precipitation is expected to change significantly in the summer, with decreases over the states to the south and west of the Great Lakes, signaling possible impacts on agriculture. Precipitation is also projected to increase downwind of the Great Lakes, likely due to the influence of the lakes on local conditions under warming temperatures.

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#### PRECIPITATION

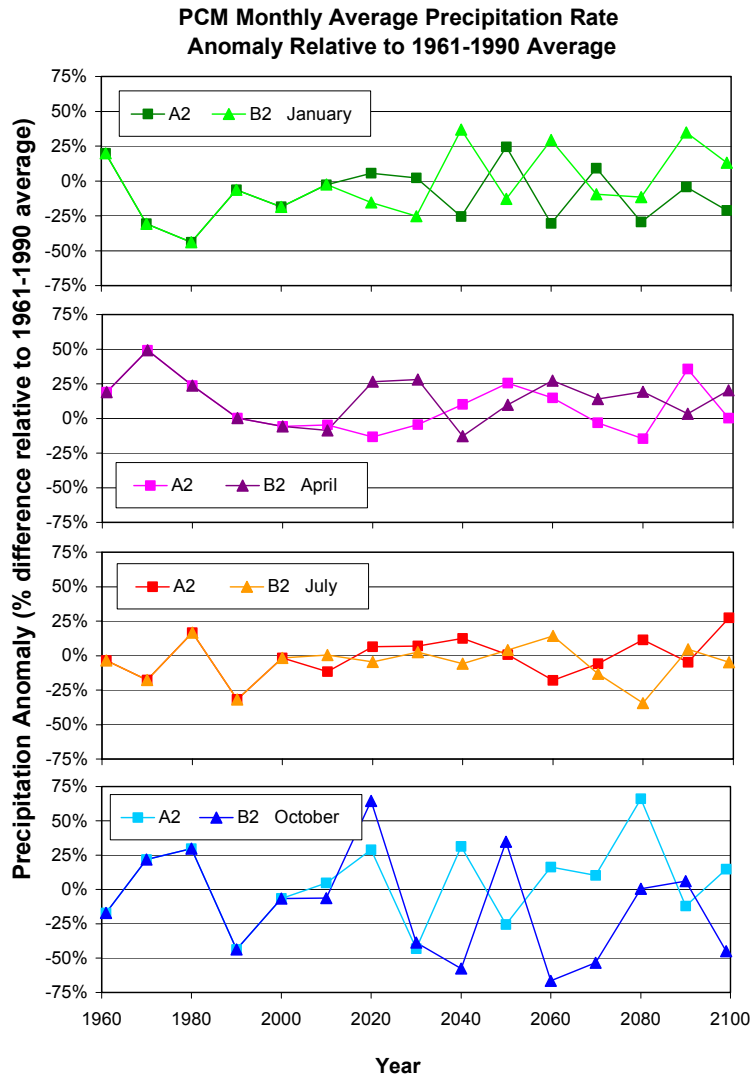
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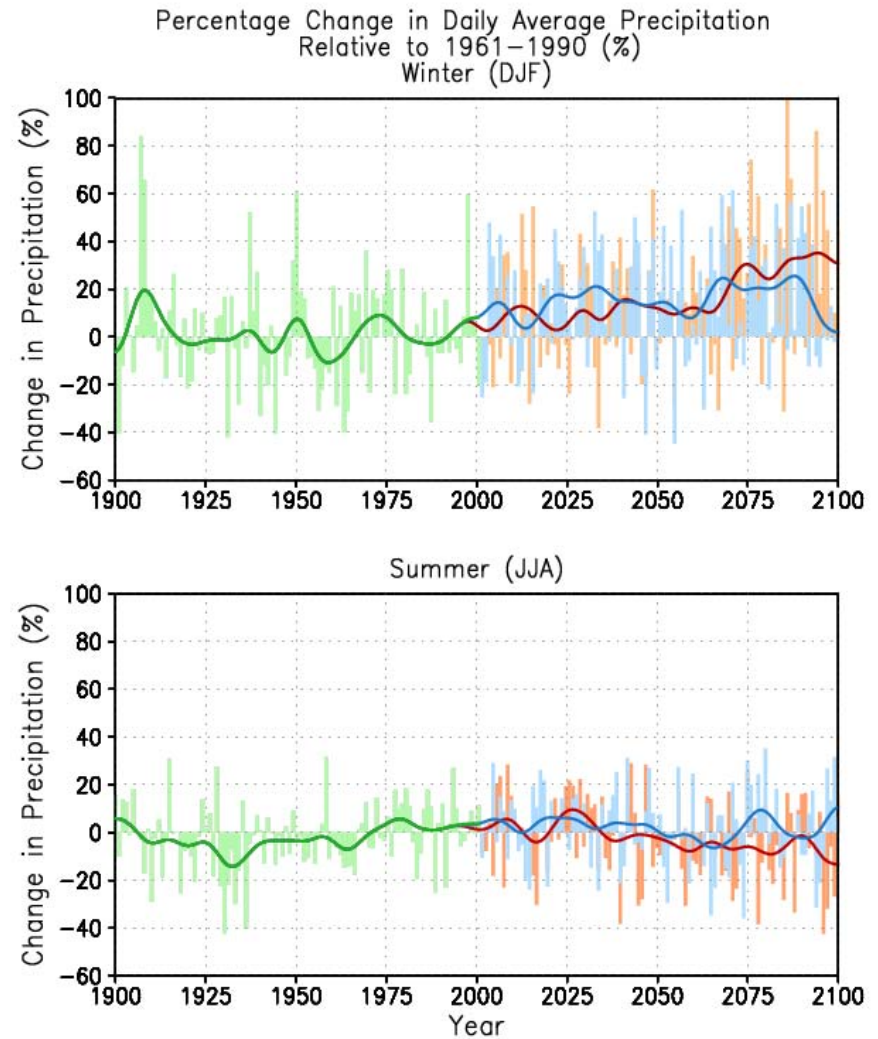
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## TIME SERIES

PCM projections of January, April, July and October precipitation anomaly for the A2 and B2 ('mid-range') emissions scenarios.

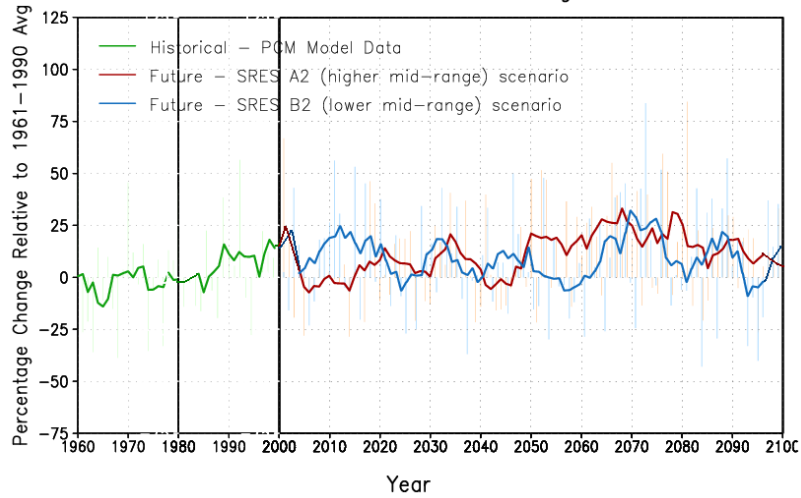


HadCM3 projections of winter and summer precipitation change for the A1FI 'high' emissions scenario (red) and the B1 'low' emissions scenario (blue). Historical data is shown in green.

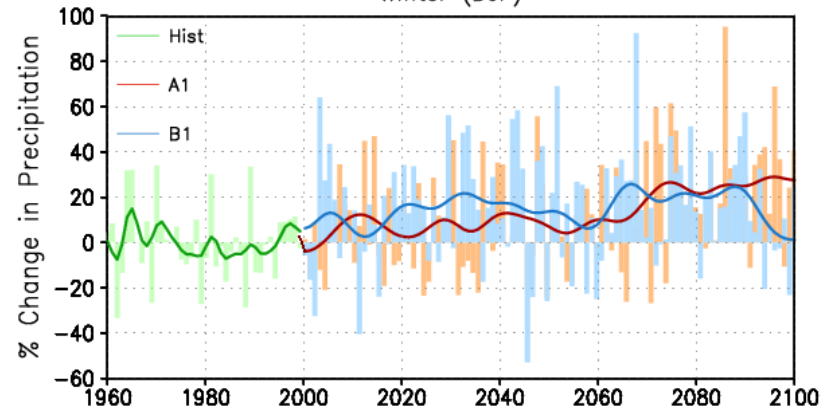


## HadCM3 and PCM Temperature Projections for the A2/B2 'mid-range' Scenarios

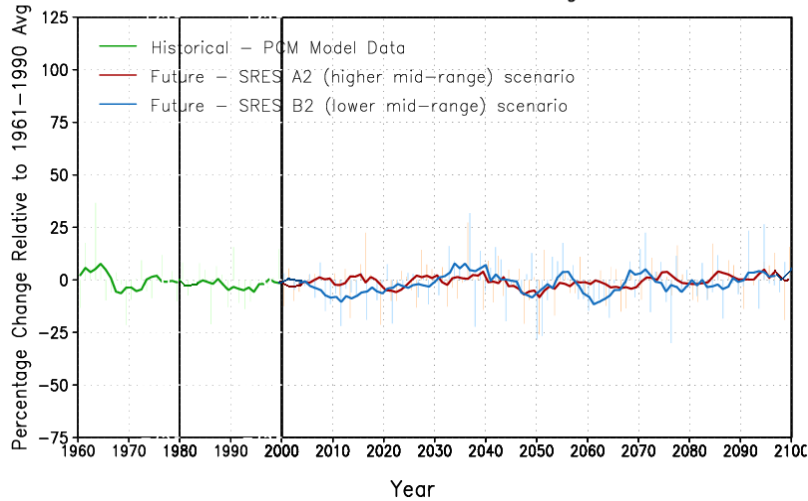
PCM Winter (DJF) Precipitation Projections for the Great Lakes  
Relative to 1961–1990 Average



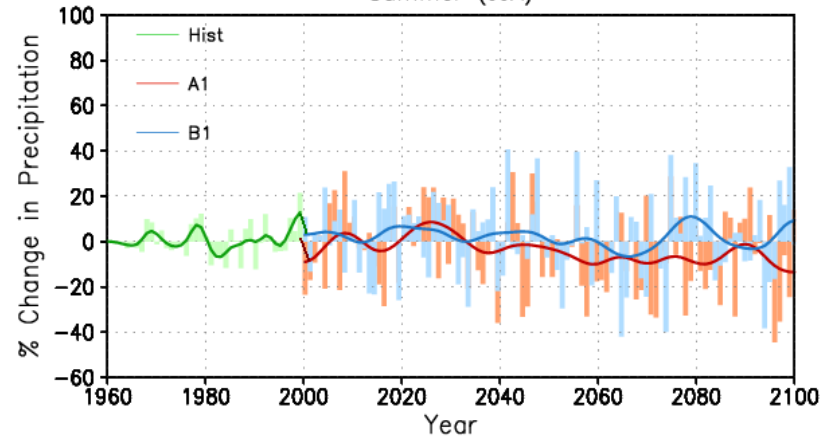
Percentage Change in Daily Average Precipitation  
Relative to 1961–1990 (%)  
Winter (DJF)



PCM Summer (JJA) Precipitation Projections for the Great Lakes  
Relative to 1961–1990 Average

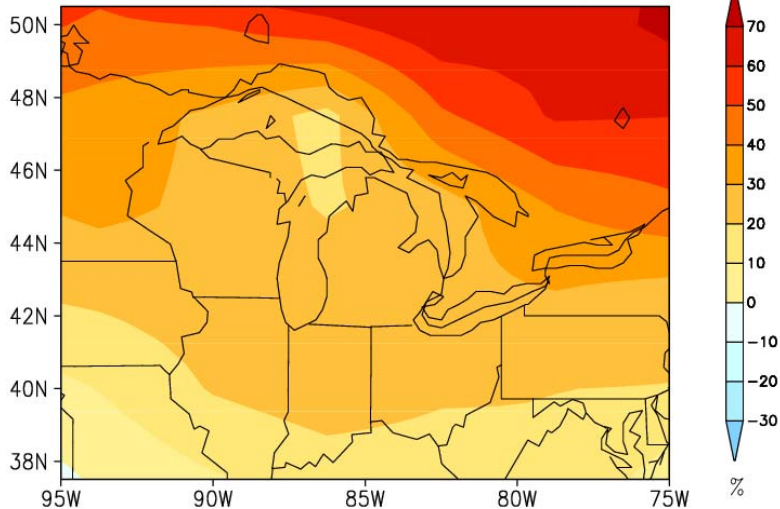


Summer (JJA)

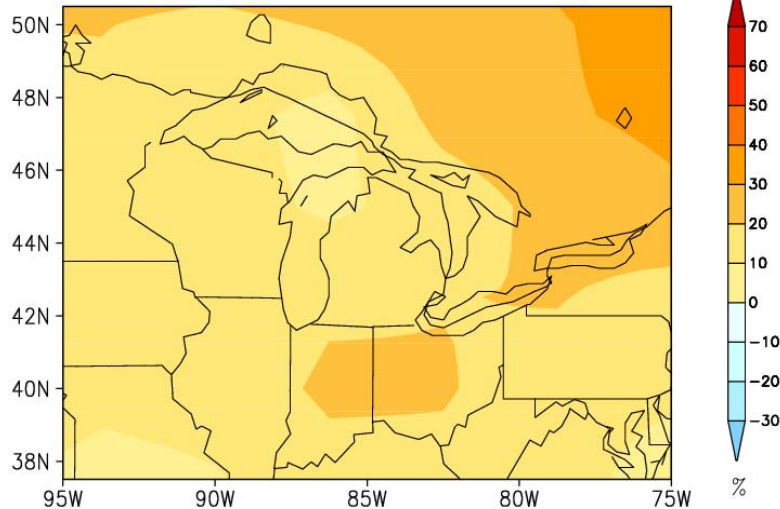


# HadCM3 30-Year Average Precipitation Anomaly in 2070-2099, Relative to 1961-1990 Average

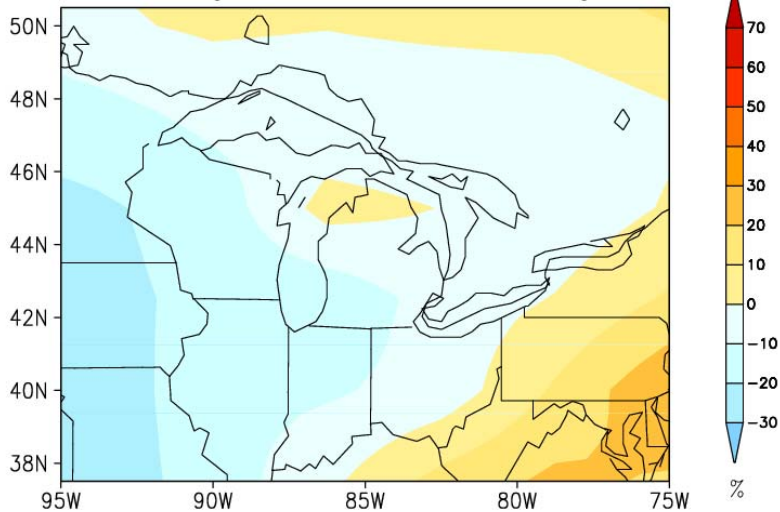
2070–2099 Winter (DJF) Precipitation for High Emissions  
% Change Relative to 1961–1990 Average



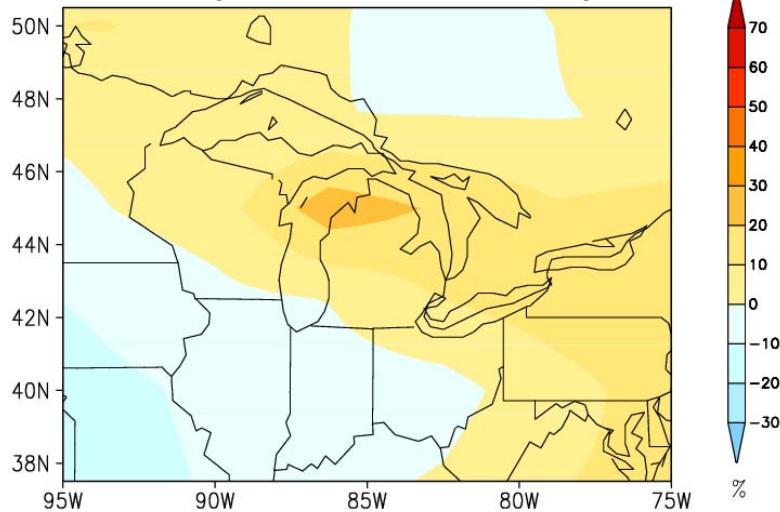
2070–2099 Winter (DJF) Precipitation for Low Emissions  
% Change Relative to 1961–1990 Average



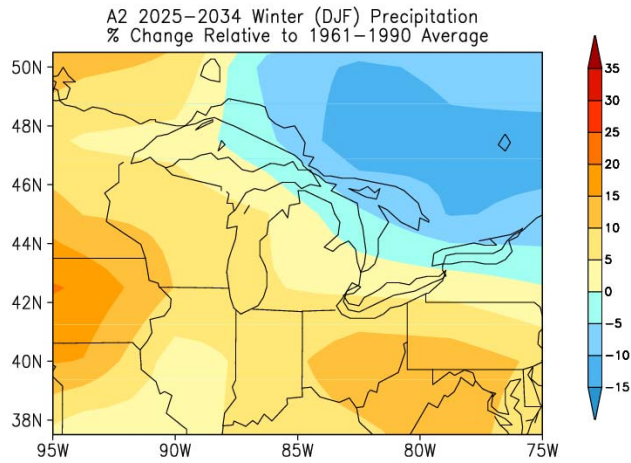
2070–2099 Summer (JJA) Precipitation for High Emissions  
% Change Relative to 1961–1990 Average



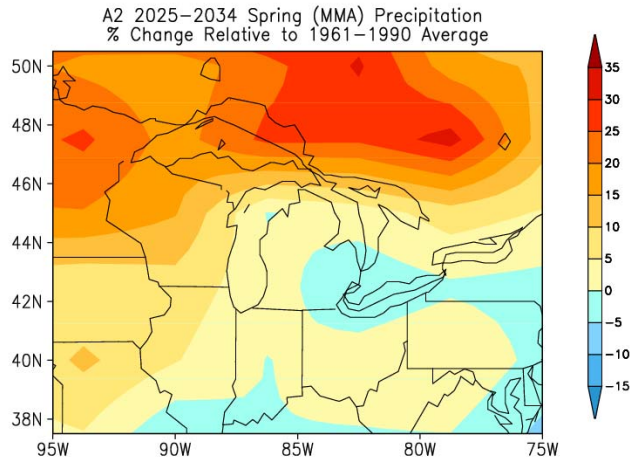
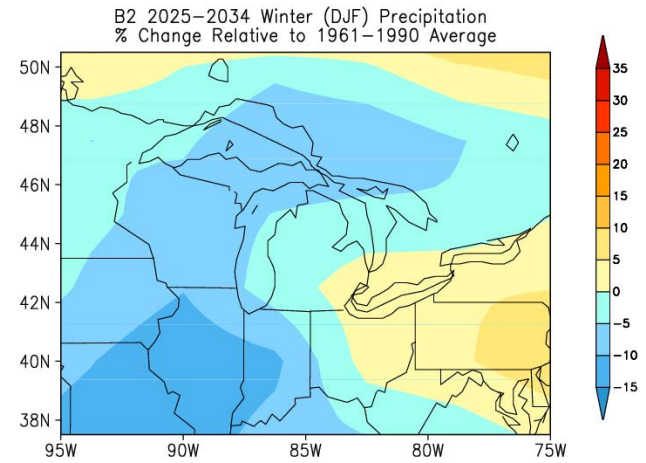
2070–2099 Summer (JJA) Precipitation for Low Emissions  
% Change Relative to 1961–1990 Average



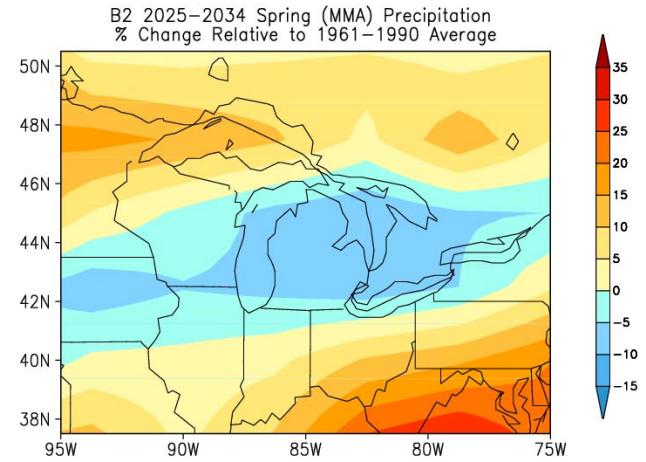
# HadCM3 Precipitation Projections for 2025-2034 (% Change relative to 1961-1990 Average)

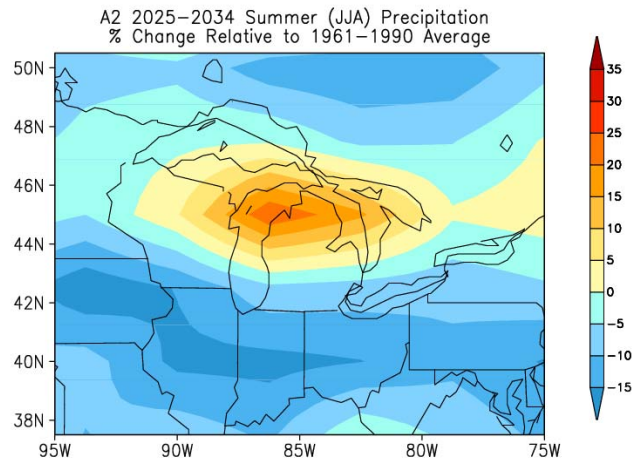


**Winter  
(DJF)**

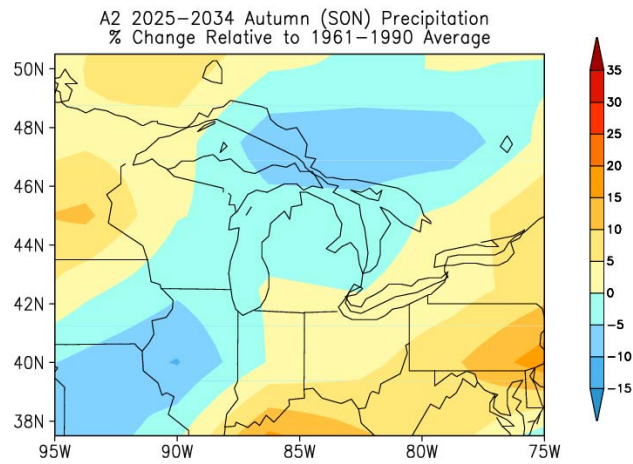
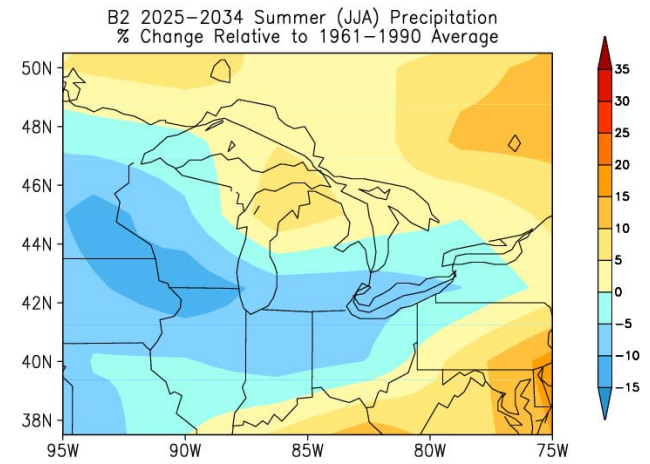


**Spring  
(MMA)**

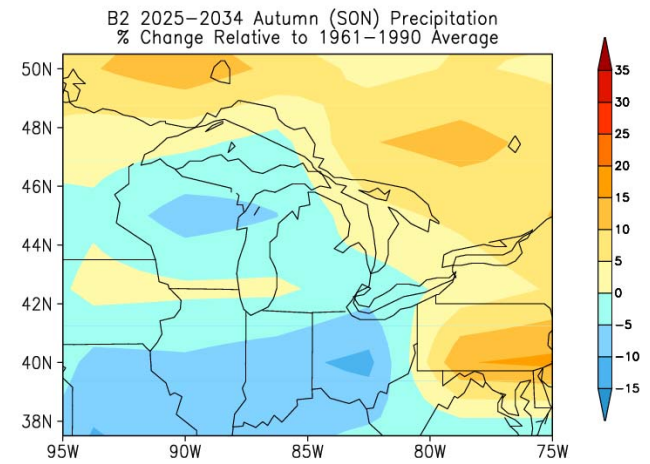




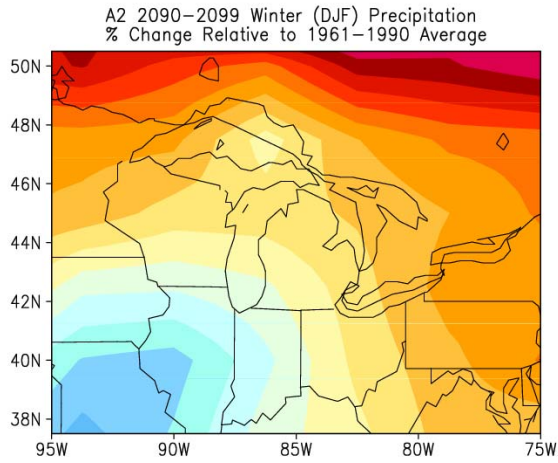
**Summer  
(JJA)**



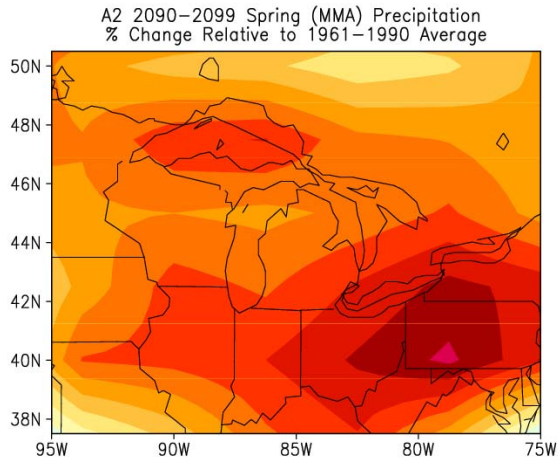
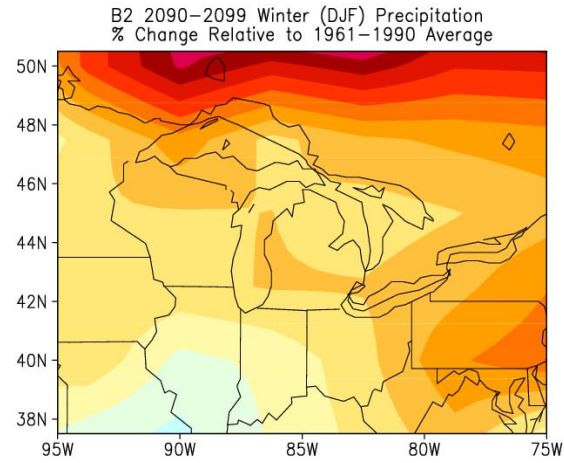
**Autumn  
(SON)**



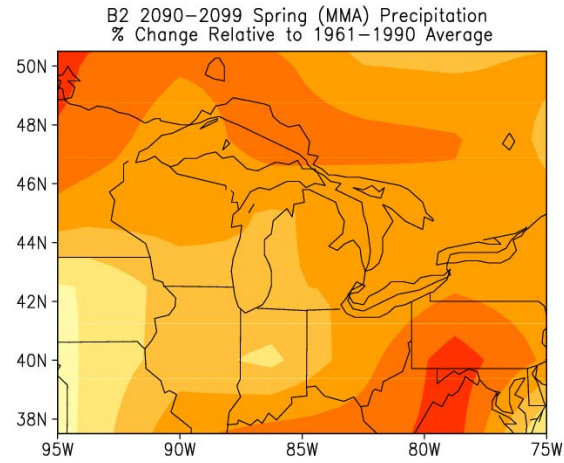
# HadCM3 Precipitation Projections for 2090-2099 (% Change relative to 1961-1990 Average)

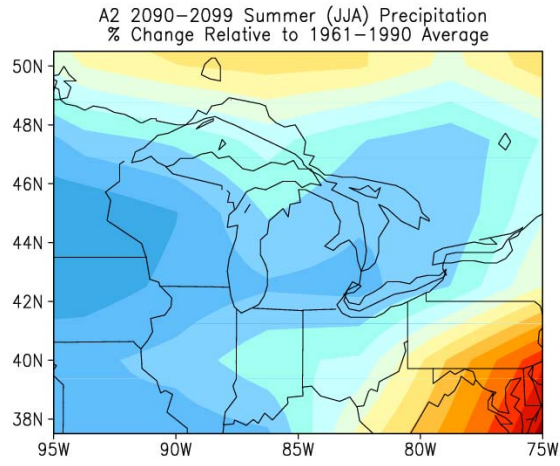


**Winter  
(DJF)**

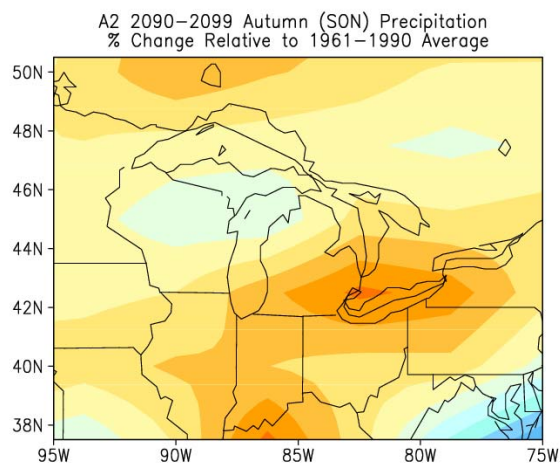
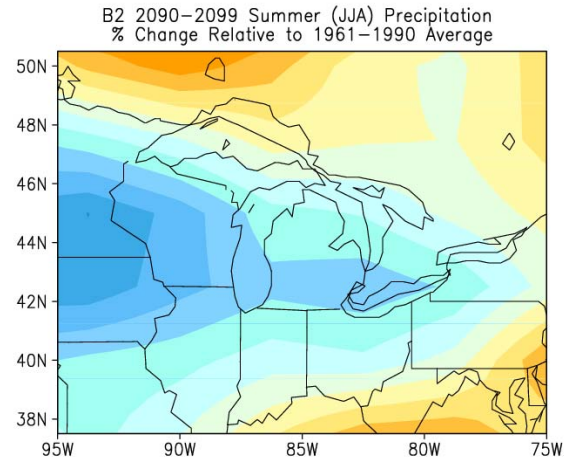


**Spring  
(MMA)**





**Summer  
(JJA)**



**Autumn  
(SON)**

