



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Canada



DROUGHTS IN CANADA: WHERE, WHEN, & WHY?

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Environment and Climate Change Canada

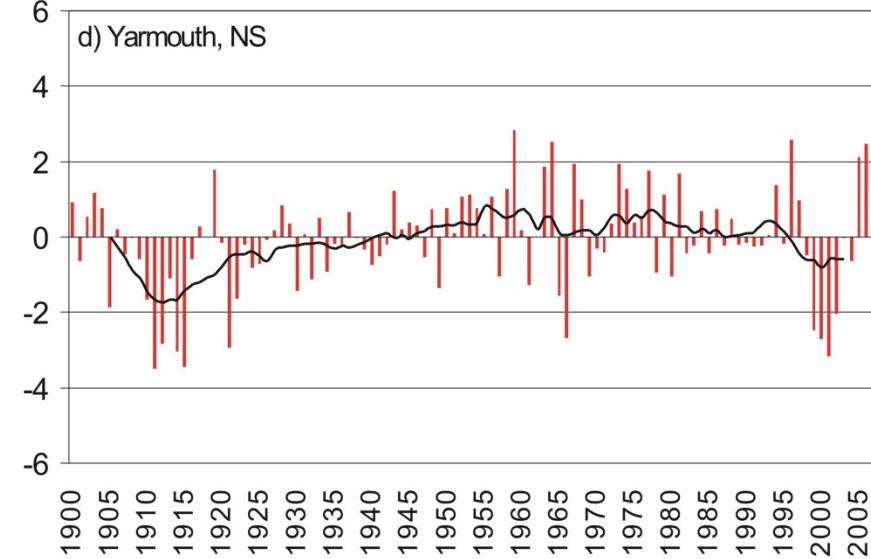
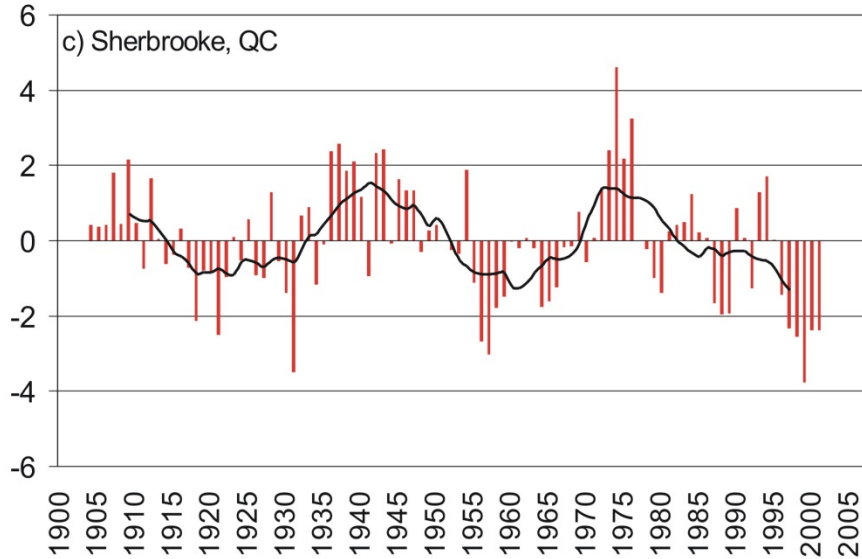
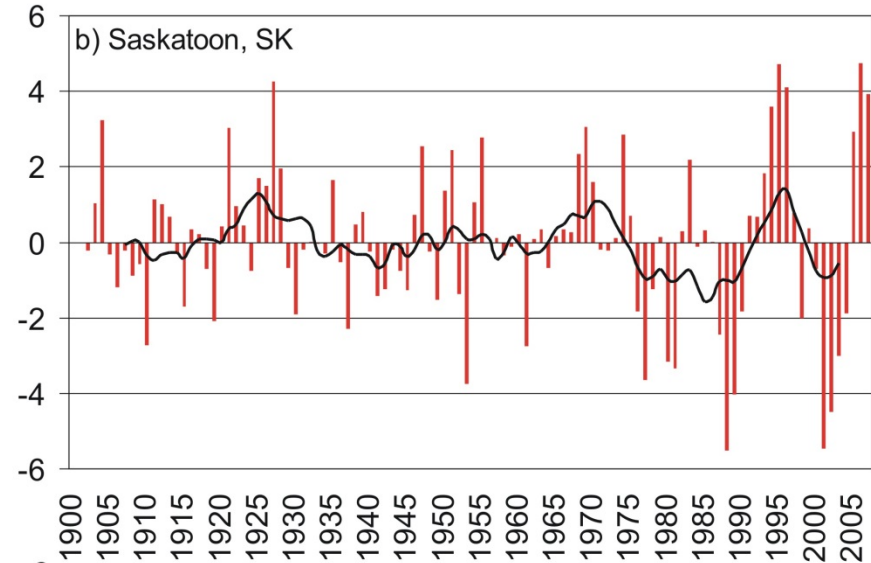
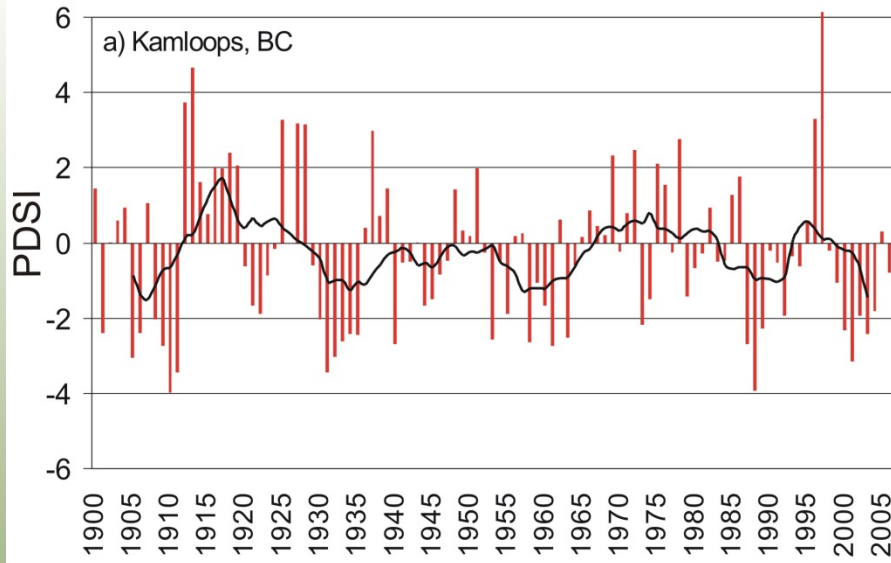
Saskatoon, SK, Canada

Outline

- Past drought occurrence
- Atmospheric causes
- Future droughts
- Research plans



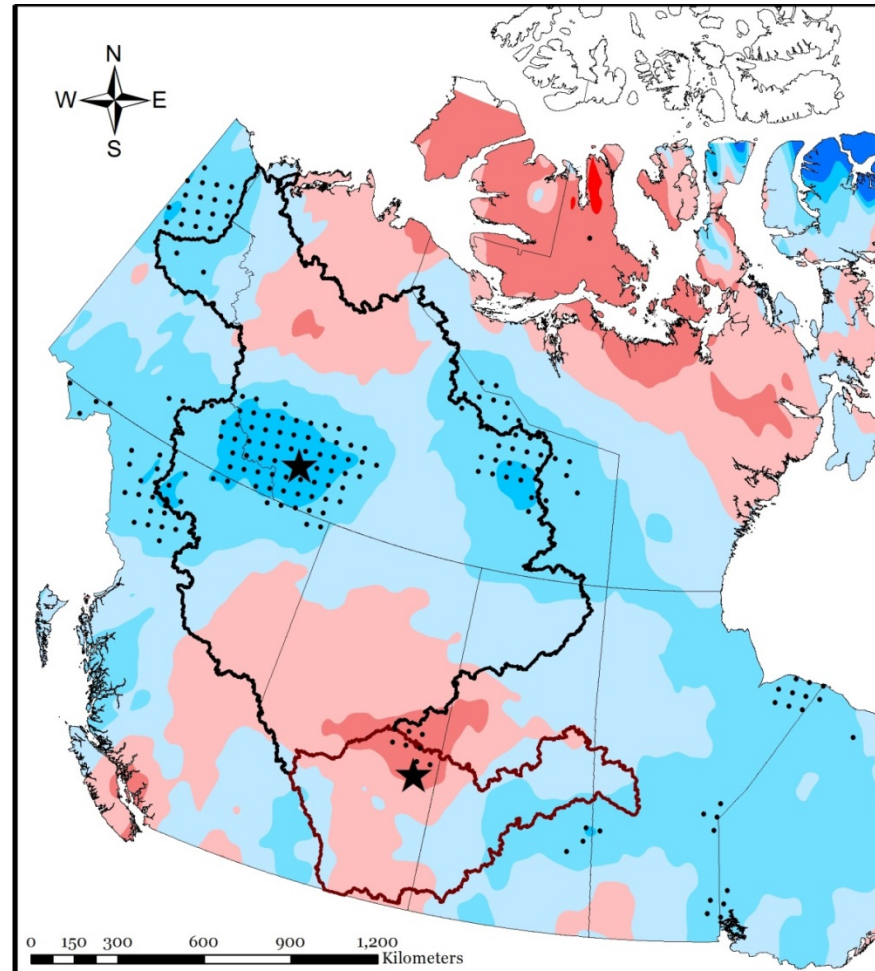
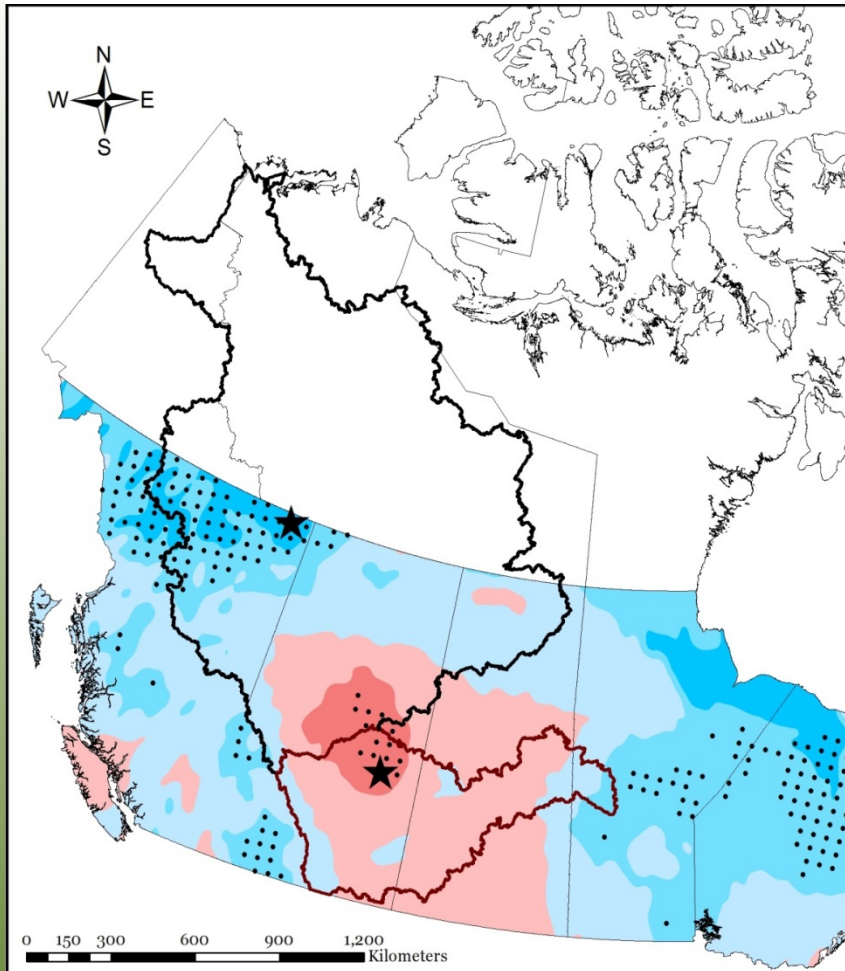
Drought Occurrence



SPEI Trends: Summer

1900-2011

1950-2011



SPEI

<-0.5 0.0 0.5 1.0 1.5 >2.0



Focus Regions



Significant Regions

Saskatchewan River Basin

Mackenzie River Basin

SPEI

<-1.0 -0.5 0.0 0.5 1.0 >1.5



Focus Regions



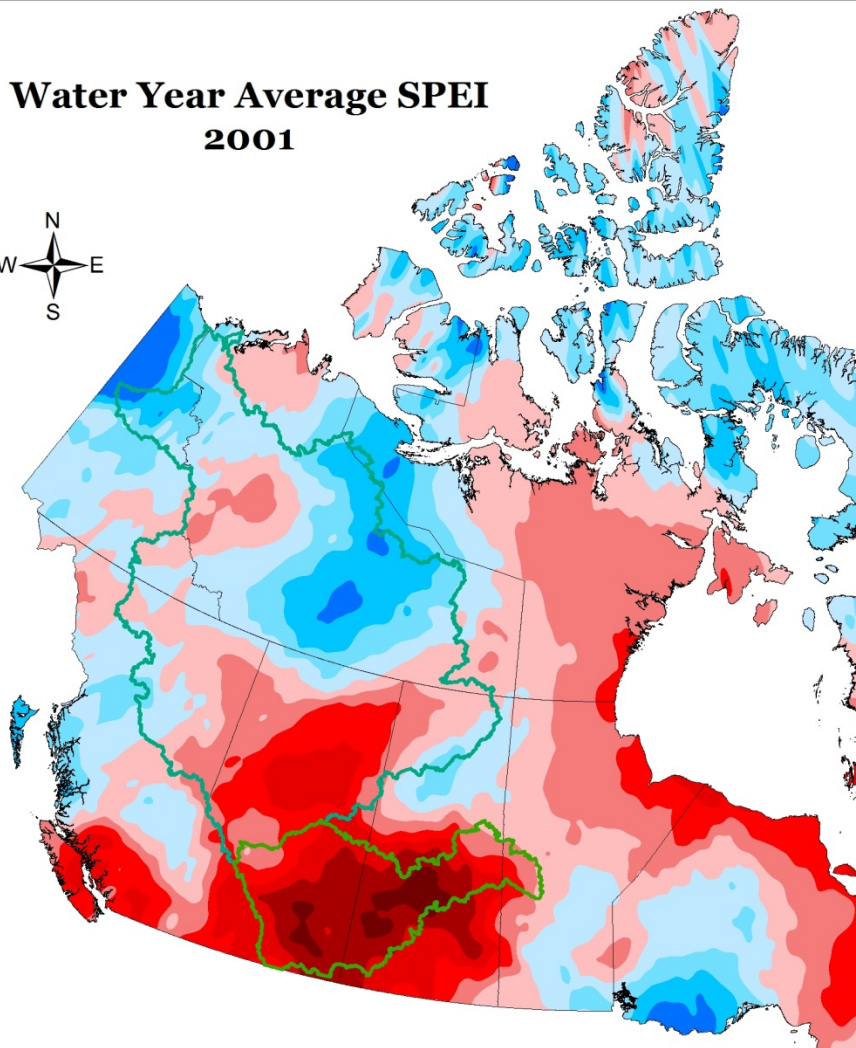
Significant Regions

Saskatchewan River Basin

Mackenzie River Basin

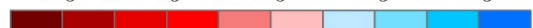
Drought/Excessive Wet Variability

Water Year Average SPEI
2001



SPEI

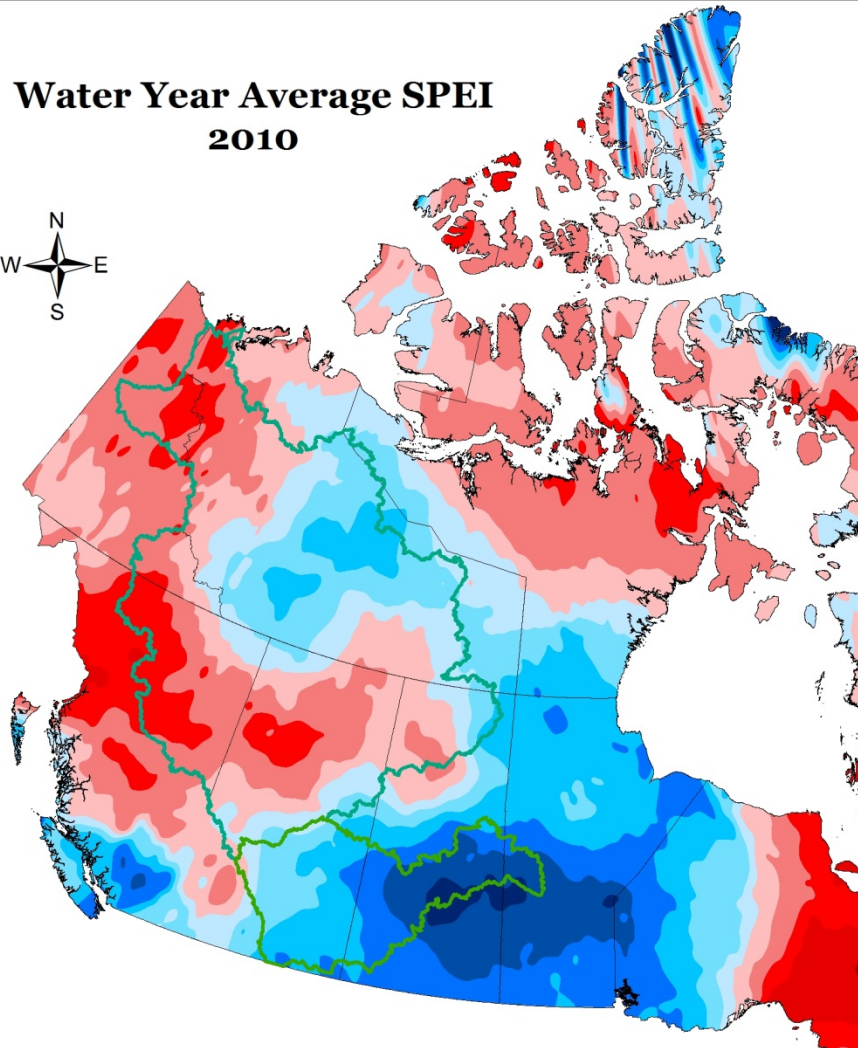
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Saskatchewan River Basin
Mackenzie River Basin

Map Author: Chad Laughren

Water Year Average SPEI
2010



SPEI

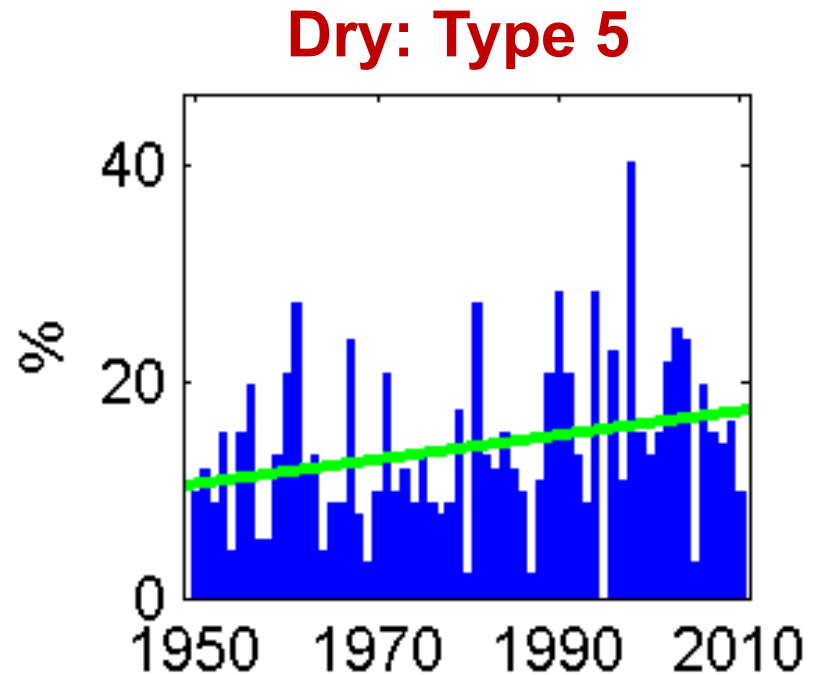
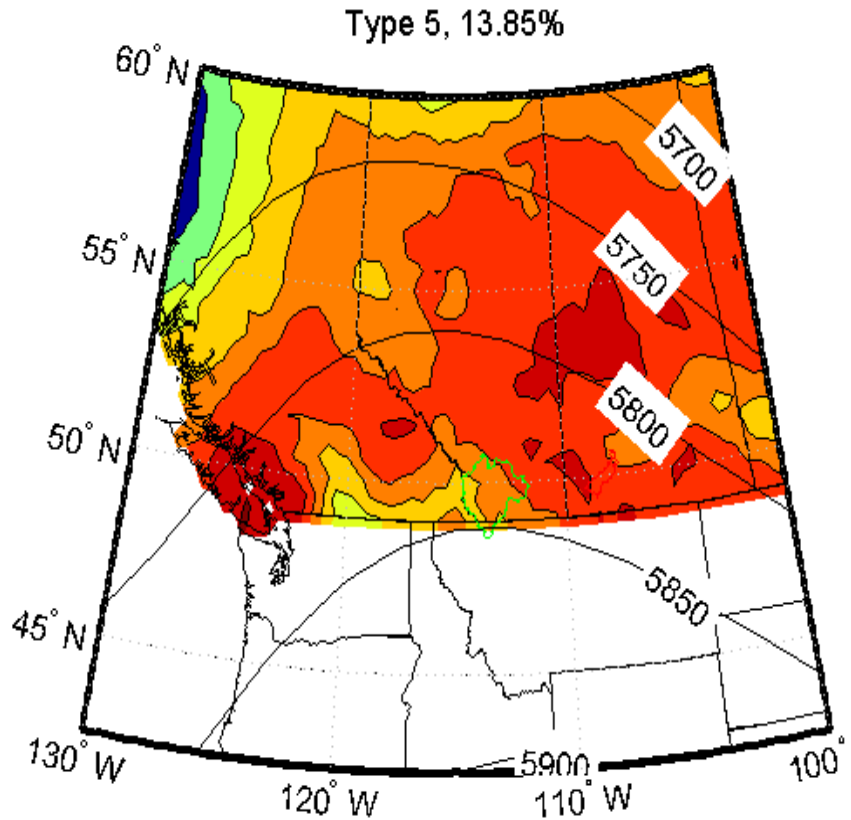
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Saskatchewan River Basin
Mackenzie River Basin

Map Author: Chad Laughren

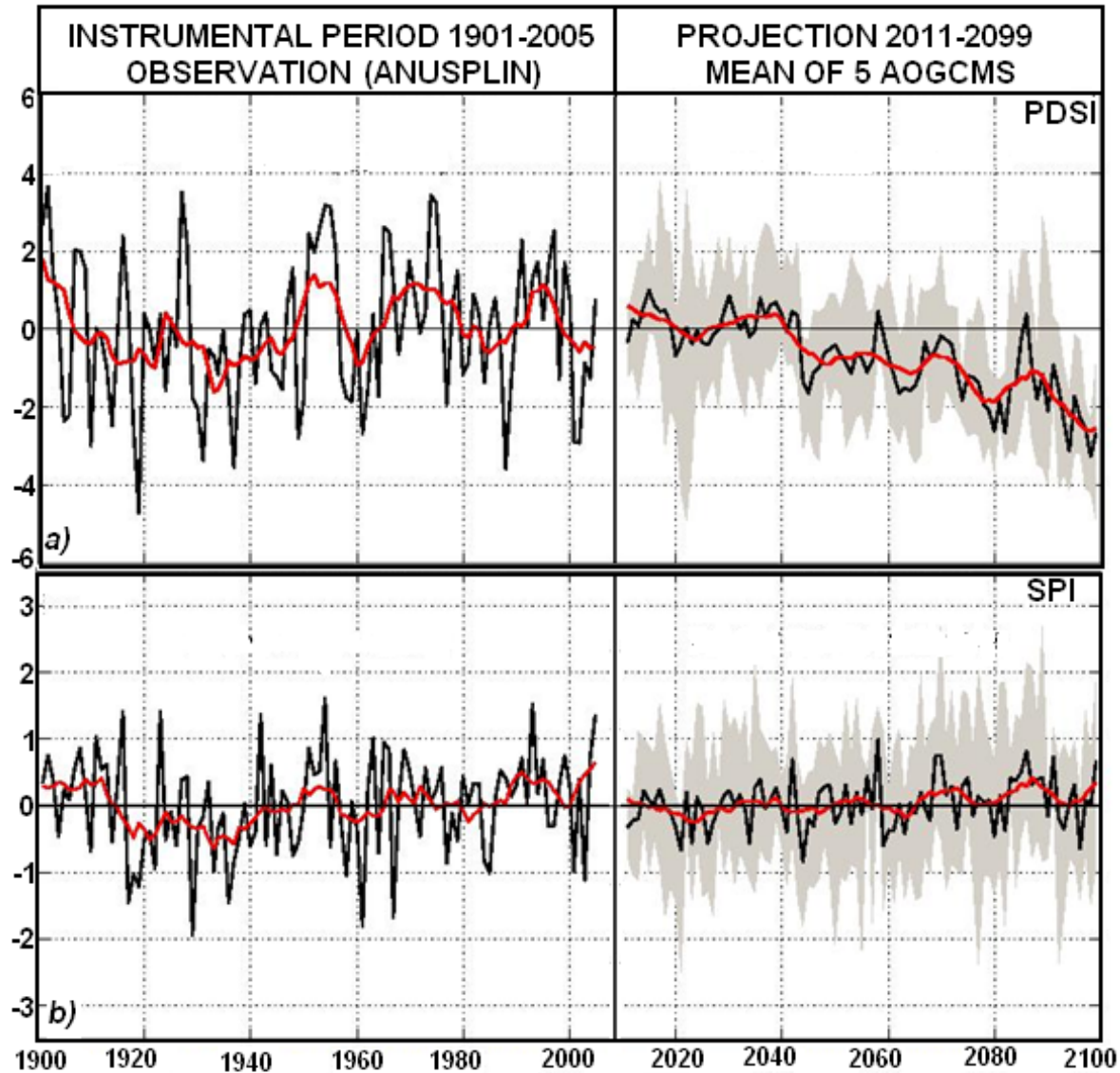
Dry Summers: Upper Air Circulation



Summer: Southern Prairies

Observed

Future



Future Summer SPEI

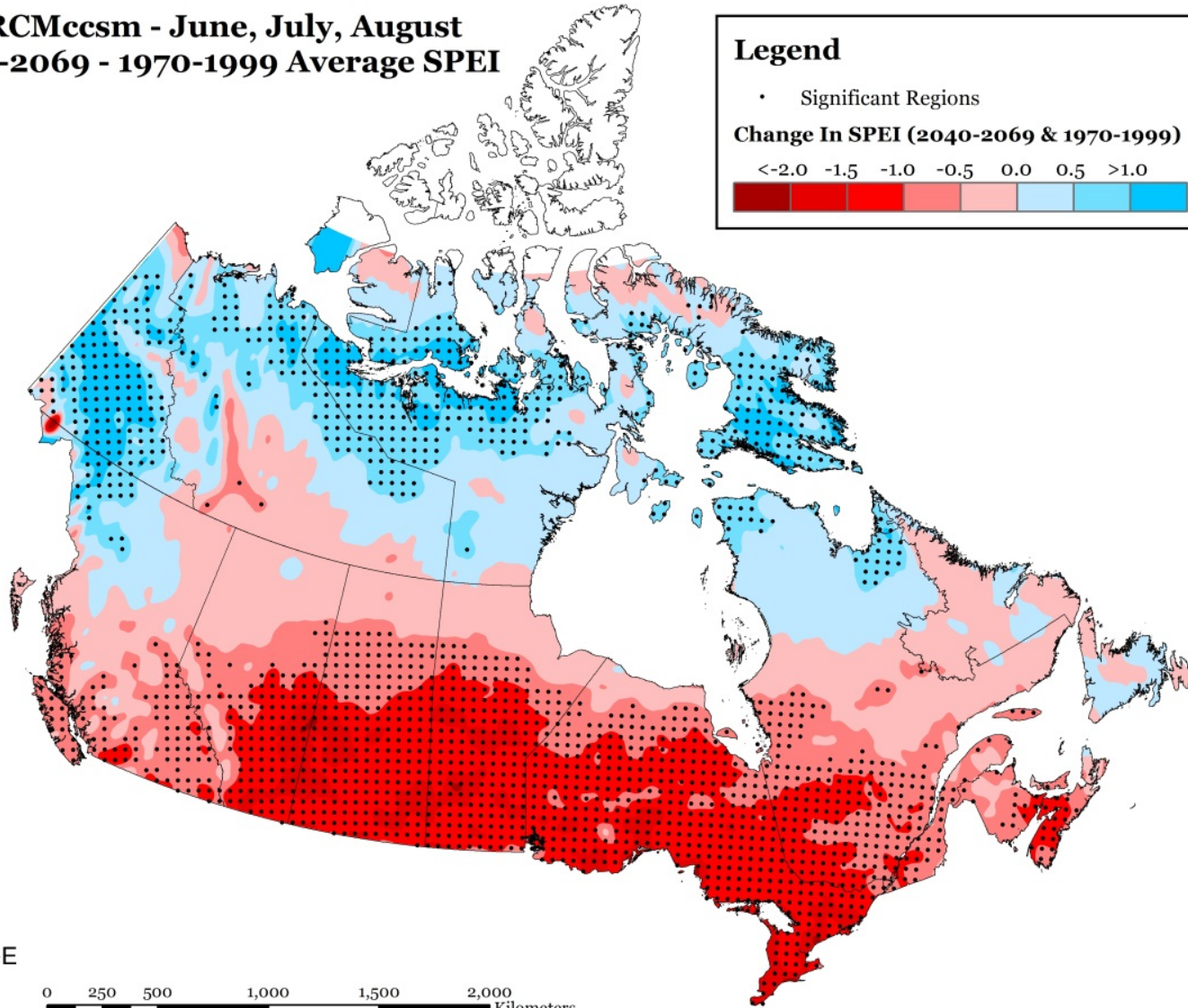
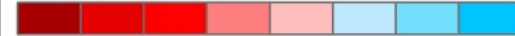
CRCMccsm - June, July, August
2040-2069 - 1970-1999 Average SPEI

Legend

• Significant Regions

Change In SPEI (2040-2069 & 1970-1999)

<-2.0 -1.5 -1.0 -0.5 0.0 0.5 >1.0



Future Summer SPEI

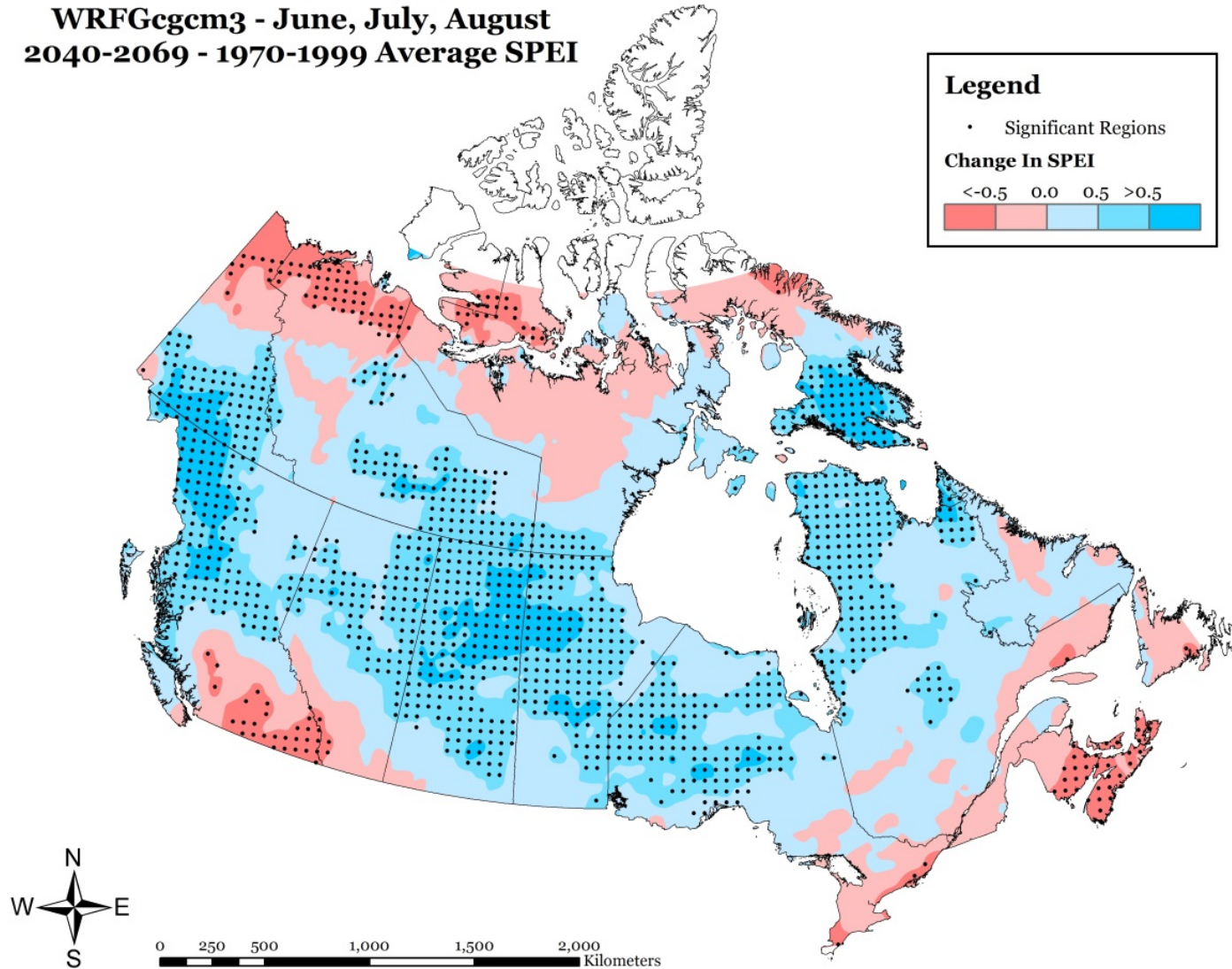
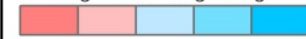
WRFGcgcm3 - June, July, August
2040-2069 - 1970-1999 Average SPEI

Legend

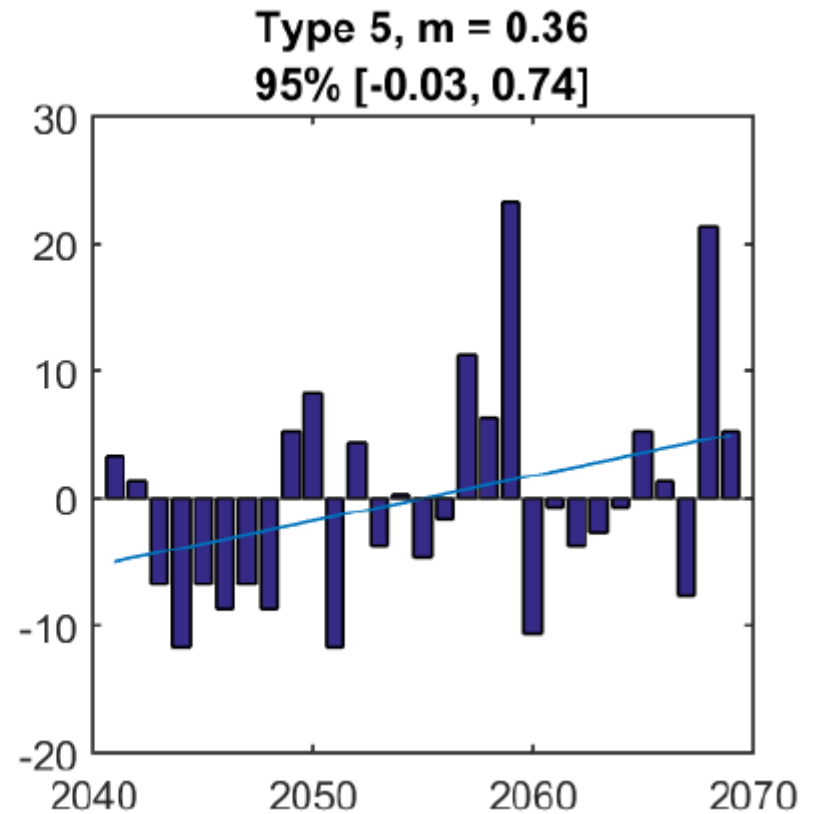
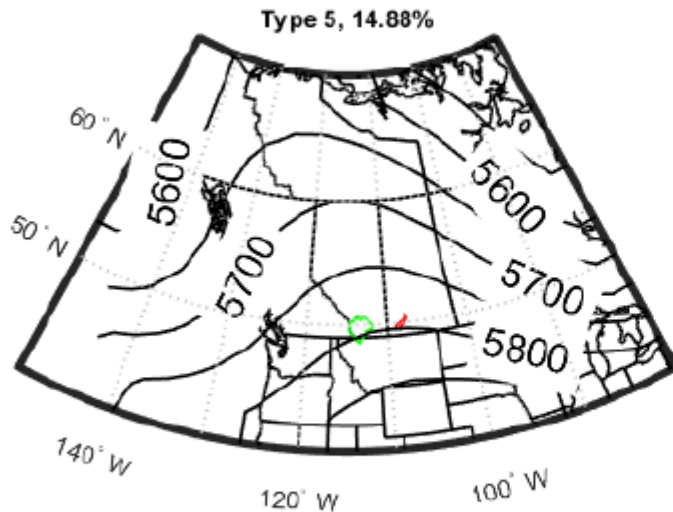
• Significant Regions

Change In SPEI

<-0.5 0.0 0.5 >0.5



Future Atmospheric Circulation Dry Types



Research Plans

- Utilize new SPEI data set to characterize future droughts (latest CMIP5 GCMs)
- Explore other finer resolution products: CORDEX, WRF
- Find relevant case studies with documented impacts and identify/assess future characteristics: Frequency, intensity, duration, atmospheric circulation, etc.