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Canada

MJO dependence of subseasonal forecast skill

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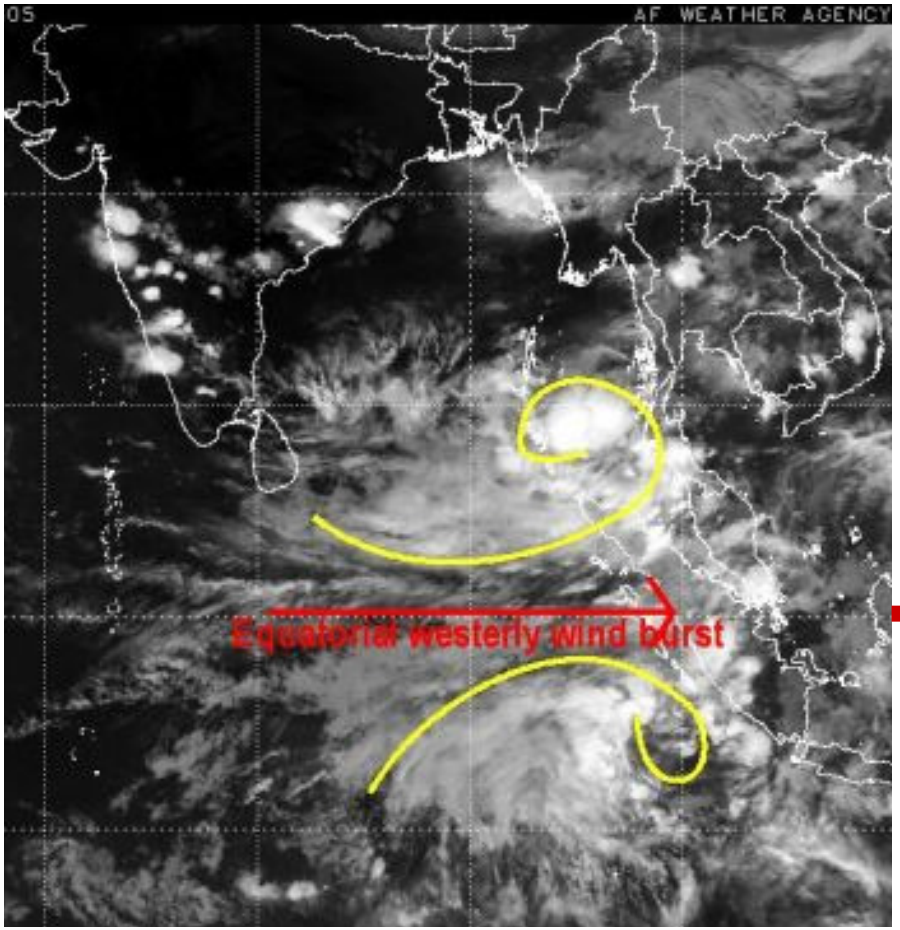
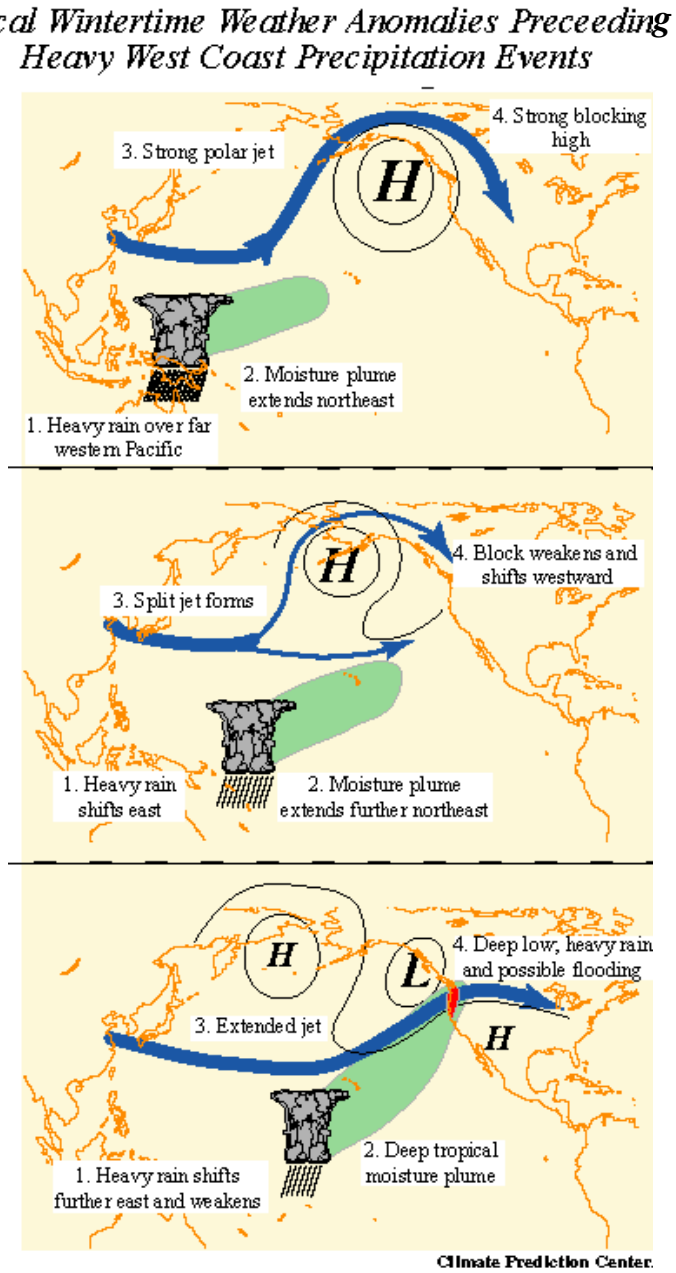
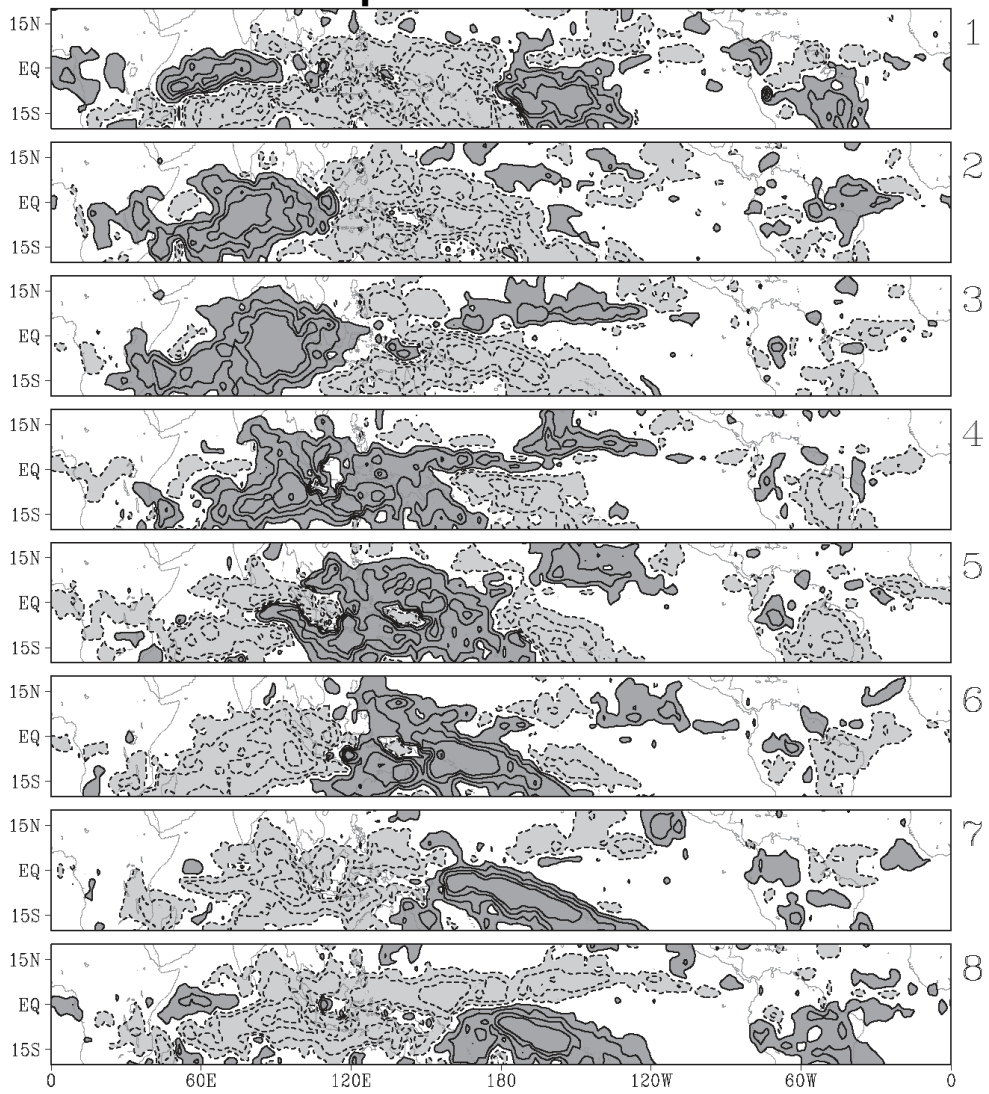
MJO and its global effects



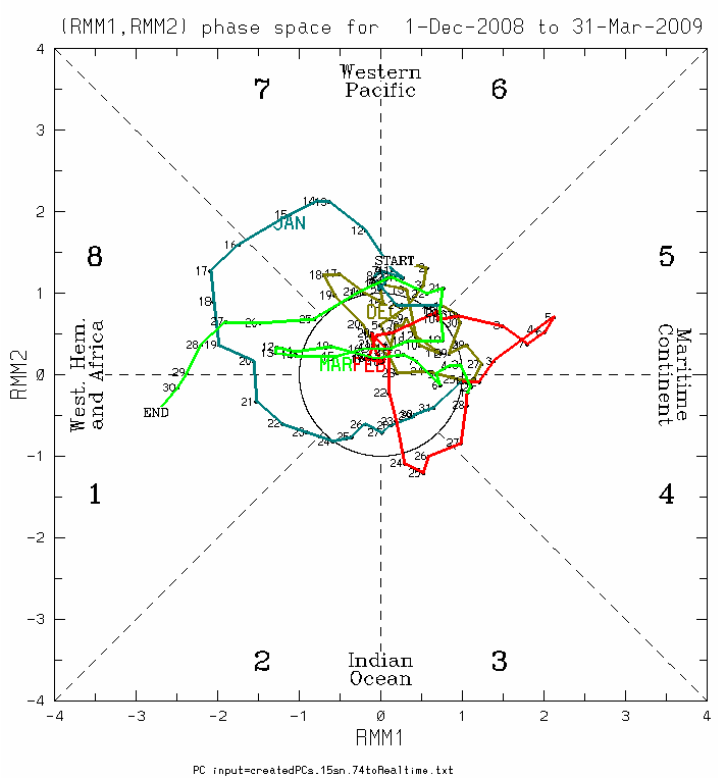


MJO Evolution

Precipitation anomalies



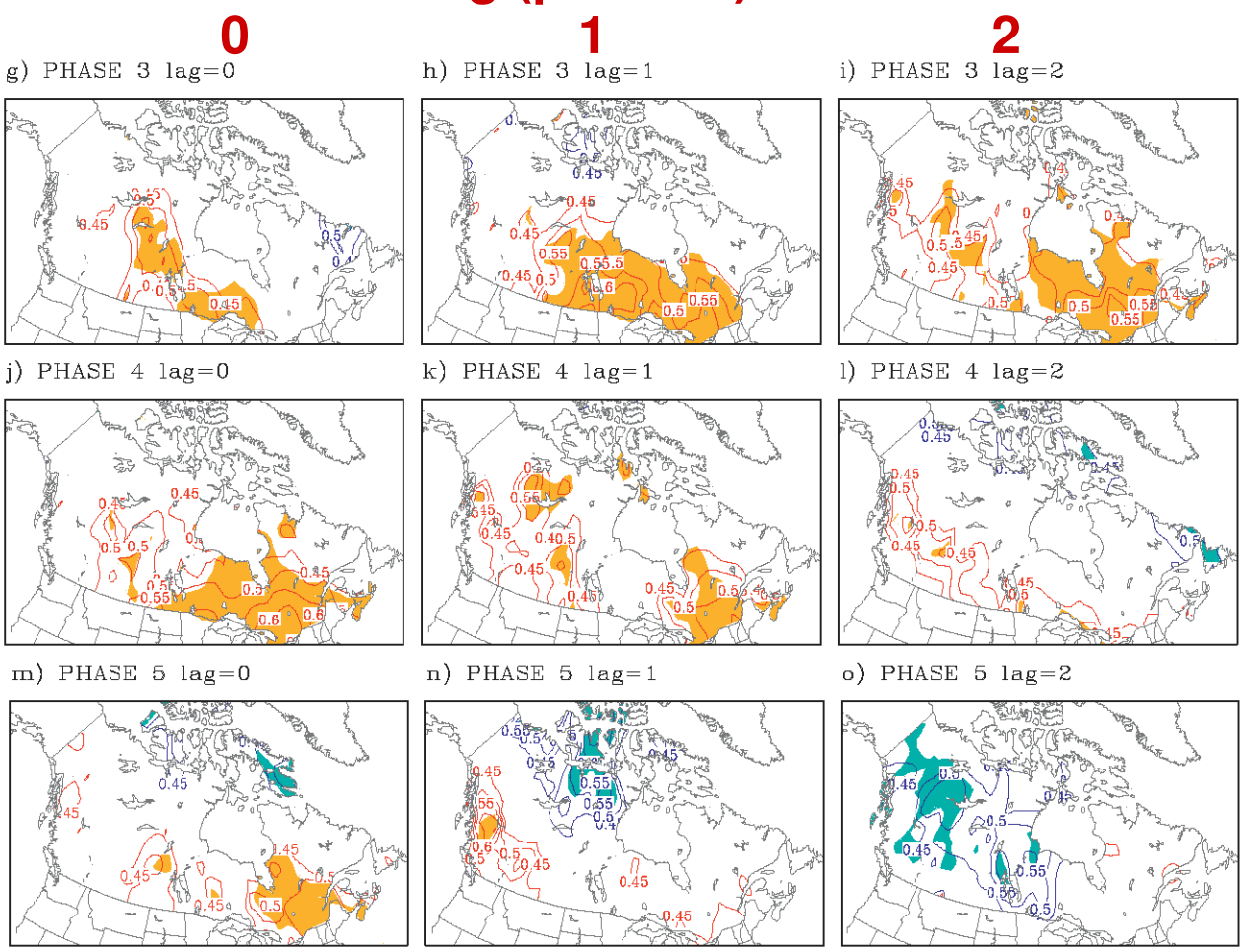
Amplitude & phase



Lin and Brunet MWR 2009

MJO Impacts on Canada

- **Winter temperatures: lagged, phase-dependent influences**



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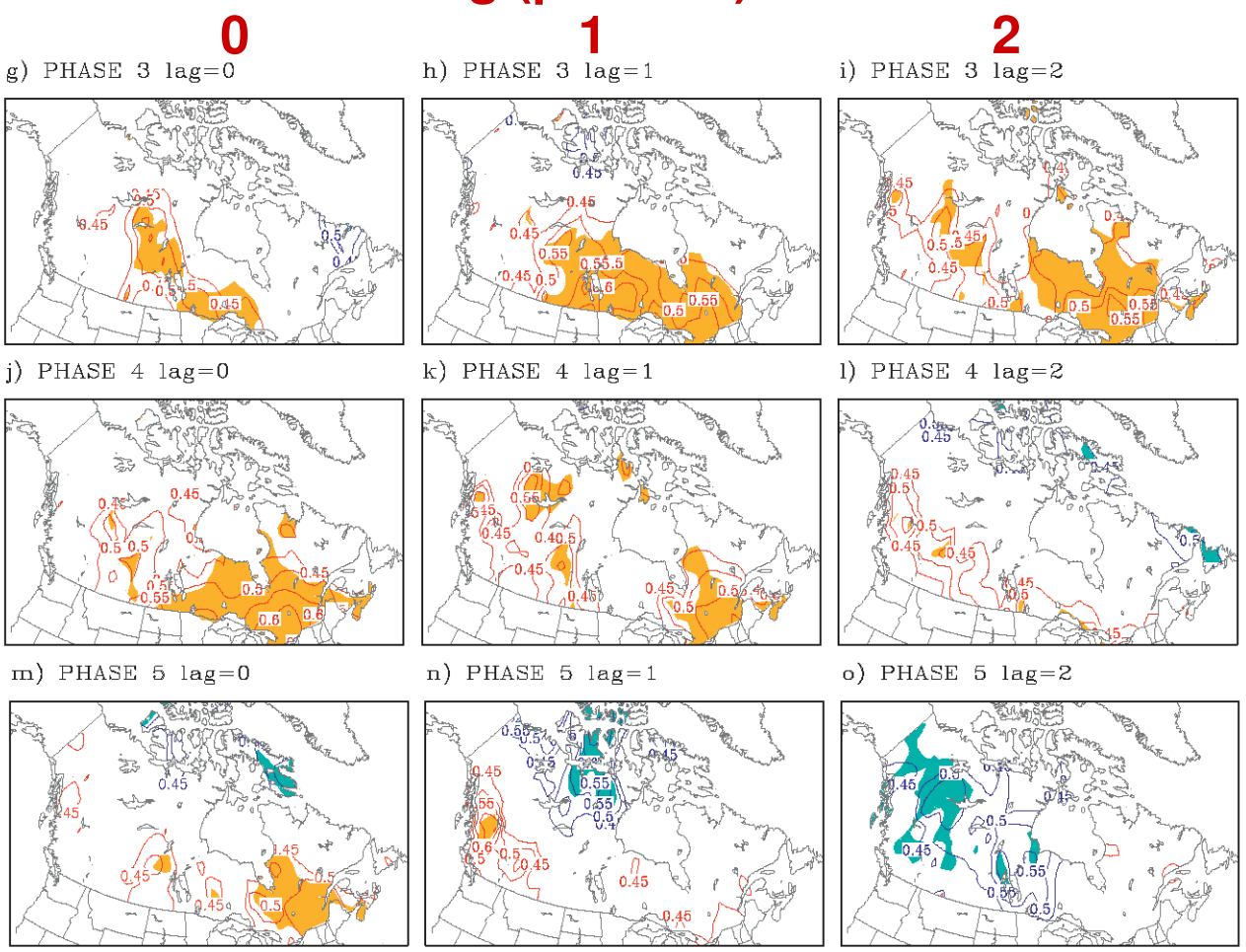


Lin and Brunet MWR 2009

- **Z500, SLP, precip as well**

H. Lin *Wed 15:15*

MJO and subseasonal forecasts

- Dynamical forecast models, initialized realistically, should represent *lagged* extratropical influences due to
  - MJO state at (and prior to) the start of the forecast $\rightarrow$ ~ 2-3 pentads
  - predicted future MJO state $\rightarrow$ > 2-3 pentads?

- This lagged influence constitutes a potentially predictable *signal*

- **Hypothesis:** subseasonal forecasts are more skillful when this signal is large than when it is small (by analogy with ENSO)

Subseasonal forecasts

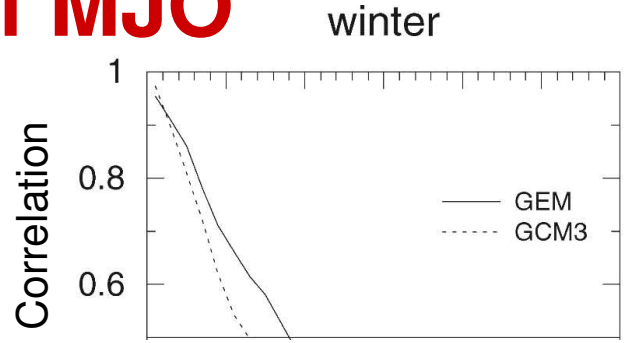
- GEM-clim 3.2.2
  - Resolution: 2°× 2°, 50 levels
  - 1985-2008, 3 times a month (initialized at 1st, 11th, and 21st)
  - 10 ensemble members – (NCEP reanalysis + balanced perturbation

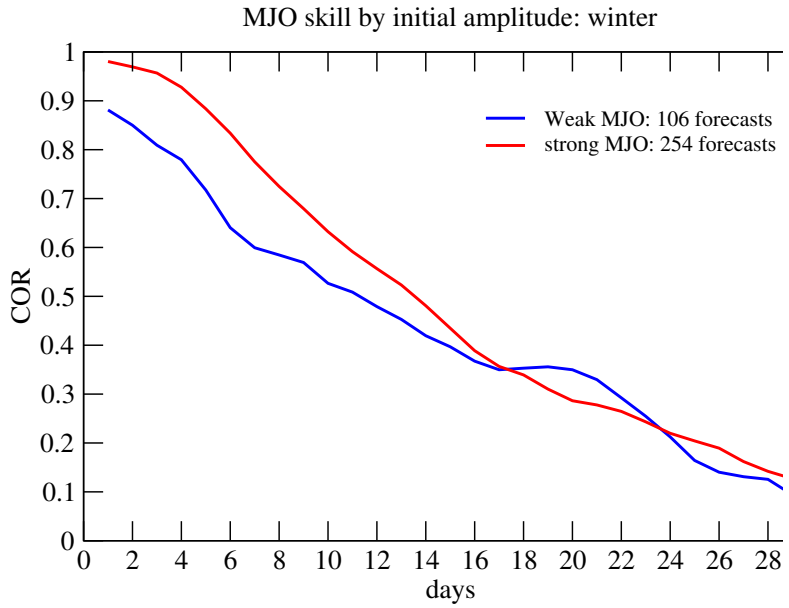
- CanCM3 (CHFP2A)
  - GCM3 resolution: 2.8°× 2.8°, 31 levels
  - Coupled to OGCM (1.4°× 0.94°, 40 levels)
  - 1979-2008, initialized at 1st of each month
  - 10 ensemble members – Constant Incremental Nudging assim of ERA

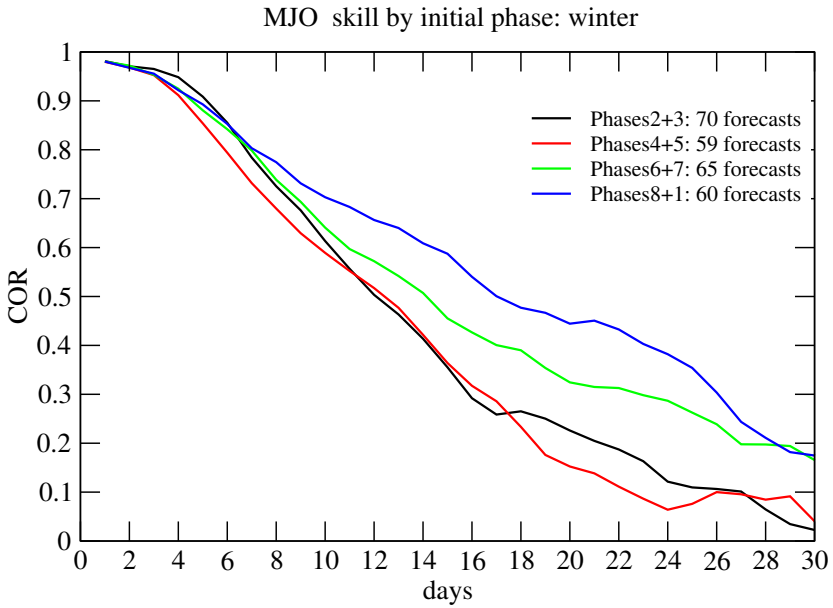
- Both:
  - Consider forecasts initialized in NDJFM
  - Remove *interannual* variability by subtracting seasonal means

GEM Forecasts of MJO

- Lin, Brunet and Derome *MWR* 2008
  - GEM and GCM3 (uncoupled)
  - Single forecasts from 1st of month

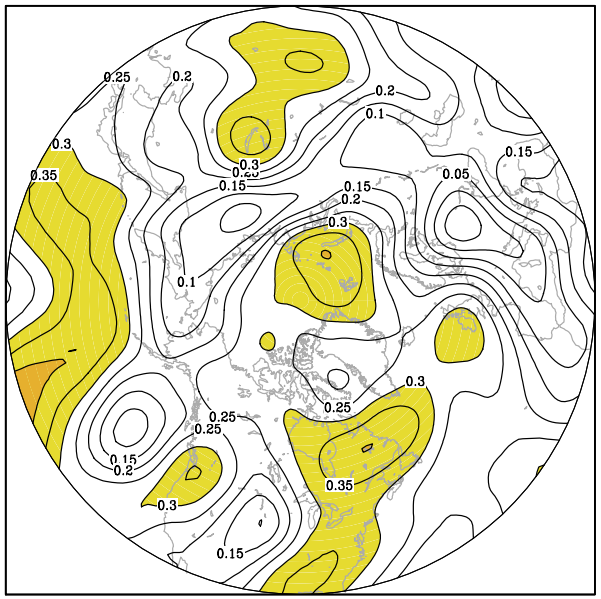




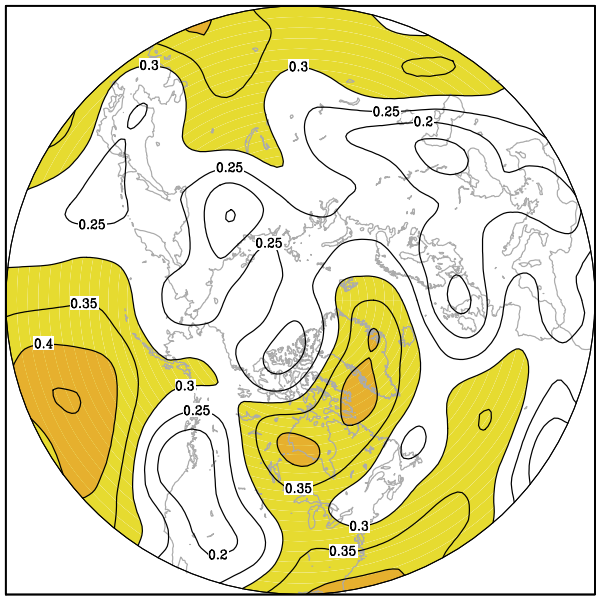


GEM Forecasts for NH Extratropics

a) weak MJO: Z500 skill



b) strong MJO: Z500 skill

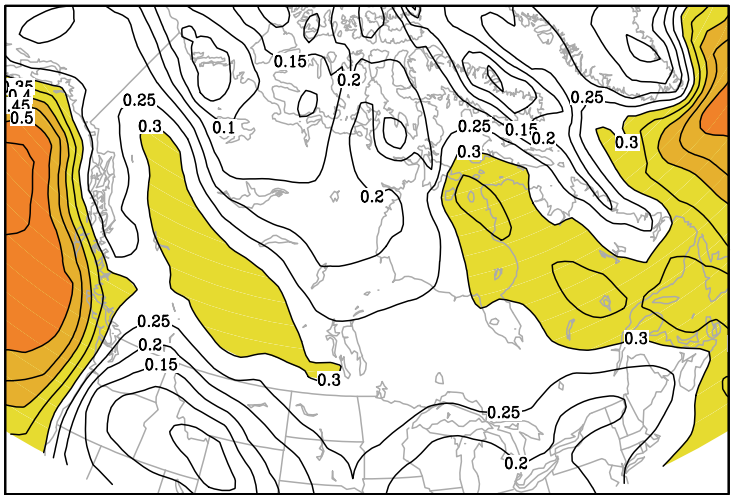


Z500 correlation skill averaged for pentads 3 and 4

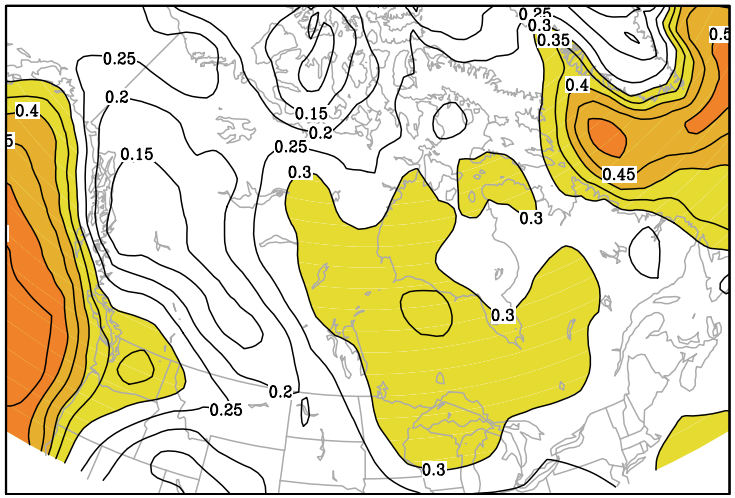
Winter: November to March, 106 weak MJO, 254 strong MJO

GEM Forecasts for Canada

a) weak MJO: T2m skill



b) strong MJO: T2m skill

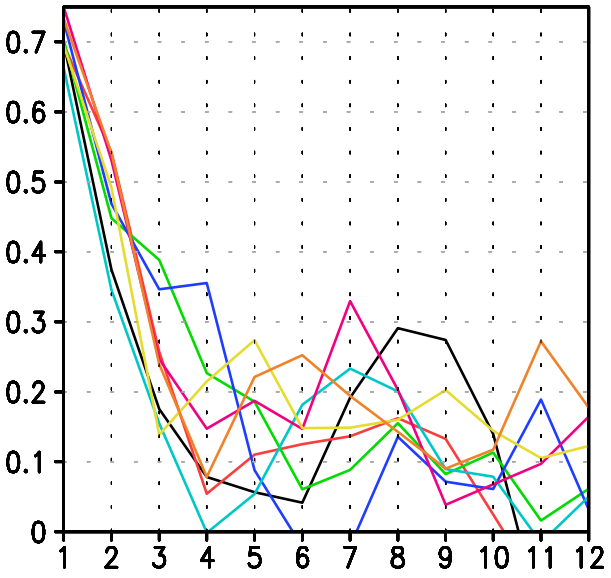


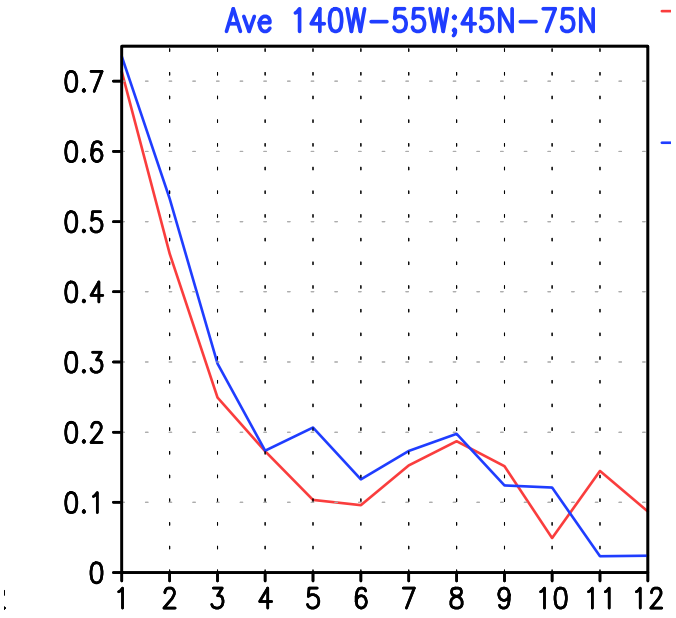
T2m correlation skill averaged for pentads 3 and 4

Winter: November to March, 106 weak MJO, 254 strong MJO

CanCM3 Forecasts for Canada

Verification data:ERA





Conclusions

- Some evidence that Canadian winter surface air temperatures are more predictable following a strong MJO and certain MJO phases
- Further work needed to relate forecast skill to signal strength
- Forecasts of Z500 and precipitation, influenced by the MJO, are also being examined
- MJO modulation of skill may persist beyond first ~3 pentads if MJO itself is predictable