Advanced Diagnostics for Tropical-Midlatitude Interactions and Teleconnections on Intraseasonal Time-Scales

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Project Overview

Main objective

• Deliver NWS forecast tools that will enhance Week 3 to 4 forecast outlooks
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Focus

• Implement diagnostics designed to exploit the predictability conferred by the intrinsic variability of midlatitude circulation and its interaction with the organized tropical convection
Project Direction

Northern Hemisphere Mid-latitude Variability (30-75N)

winter

summer

Zonal wavenumber

Zonal wavenumber

NGGPS PI Meeting, College Park, MD
August 08, 2018
Project Direction

Northern Hemisphere Mid-latitude Variability (30-75N)

Data adaptive method (MSSA) applied to 500-hPa geopotential height daily anomalies between 1979-2012:

- MLSO – 120 days
- MLISO-1 – 45 days
- MLISO-2 – 28 days

Stan and Krishnamurthy, 2018 (MWR, under revision)
Northern Hemisphere Mid-latitude Oscillation Patterns

(a) MLSO  
(b) MLISO-1  
(c) MLISO-2

(d) MLSO  
(e) MLISO-1  
(f) MLISO-2

August 08, 2018
Project Direction

Is MLSO equivalent to NAO or AO?
Is MLISO-1 equivalent to PNA?
Status of Research and Development

Potential Predictability of Mid-latitude Oscillations

- Linear regression model (Rodney et al. 2013):

Predictors:
- RMM1(0), RMM1(0)
- RMM1(-1), RMM2(-1)
- T2m(0)

Predictand:
- T2m(t), t = 1, 2, 3, 4 pentads

Predictors:
- RMM1(0), RMM1(0)
- RMM1(-1), RMM2(-1)
- T2m(0)
- ML Oscillation(0)

Predictand:
- T2m(t), t = 1, 2, 3, 4 pentads
Status of Research and Development

T2m anomaly correlation

Pentad 1

Pentad 2

Pentad 3

Pentad 4

Stan and Krishnamurthy, 2018 (MWR, under revision)
Status of Research and Development

GEFS Forecast Skill

120-day Middle Latitude Oscillation

SubX re-forecasts 1999-2008
Future Directions

• Evaluate the forecast skill of mid-latitude oscillations in other SubX models

• Explore the physical drivers of mid-latitude oscillations

• Explore the impact of mid-latitude oscillations on other meteorological parameters, e.g., precipitation.