Short-term Climate Prediction Efforts

- Subseasonal to interannual predictions from GCMs is an area of active research
  - The North American Multi-Model Ensemble (NMME), a NOAA-sponsored effort is but one example of an experimental ensemble forecast system
- Outlooks focus on surface temperature and rainfall, among others
  - Seek to capture the evolution of large-scale climate forcing signals (e.g. ENSO, MJO)
- Seasonal forecasts contributed from NASA Global Modeling and Assimilation Office (GMAO)
- At seasonal time scale, better initializations of ocean and land surface state may improve predictability.
Short-term Climate Prediction Needs

Operations
What is actionable?
- Define forecast issues
- Scope of decision-making including outside factors
- Feedback to developers

Research
What is achievable?
- Predictability studies
- Source of seasonal climate information relevant to problem
- How to incorporate new observations into seasonal forecasts

Modeling
What is available?
- Finite resources limit model resolution
- Skill assessment of model predictions
- Downscaling approaches
Connections to SPORT & ESO

• SPORT has an established approach to address R2O and make use of NASA capabilities
• SPORT has experience in RCM development and downscaling strategies
• SERVIR has strong connections to the NASA Applied Sciences Program and connection with end users who want seasonal forecast information.
• NOAA Climate Test Bed
NASA Downscaling Experiment

• Evaluate the utility of RCM dynamical downscaling of climate projections

Northeast Wintertime Storms (NESs)
• Extreme precipitation/snowfall events
• Extreme wind events

Midcontinent Summertime MCSs
• Warm / Dry Climate Model Biases
• Extreme weather events

West Coast Wintertime Atmospheric Rivers (ARs)
• Crucial for water resources/availability ~40%
• Associated with most flooding events
Predictions for Application

• Seasonal climate forecasts offer the opportunity to impact decision-making activities across multiple sectors
  • Water Resources
  • Agriculture & Ecosystem
  • Public Health (e.g. CDC BRACE)
  • Energy (Supply and Demand)
  • (Re)Insurance & Commodities

• Both public and commercial interests

• Several federal agencies are involved in efforts to make use of climate data, including seasonal guidance
  – Presidential Climate Data Initiative; NOAA CPC; DOI Climate Science Centers

• NASA Applied Science Program: “Climate” as a future program
  – ROSES A.45 Water Resources Call: 30-180 day outlook specifically targeted
(Backup) Climate Models vs. End-Users

- Seasonal prediction made using GCMs are performed at coarse scales (1° x 1°)
- Impact modeling and decision making activities occur at much finer resolution (5km or higher)
- Two basic approaches are used to bridge this gap
  - Statistical downscaling
  - Dynamical Downscaling
- Both approaches have pros and cons
  - Increases uncertainty of seasonal forecast utility

From Wilby and Wigley (1997)
Illustration of the multiple scales involved in the prediction and decision making process.