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# Forecast Drift and Stationary Systematic Error



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## **Defining Forecast Drift and Stationary Systematic Error**

- **How to Distinguish Between Forecast Drift and Initialization Shock**
  - Drift is Not Necessarily Monotonic, it's the Result of the Model Tending Towards its Own Attractor.
  - Initial Shock is the Model Rejecting part of the Initial Conditions
    - Depends on the initial Condition State and the Time Scale of the Process
    - Shock can be Associated with Erroneous Natural Variability
  - Shock and Drift Not easy to Separate, Time Scale Dependent.
- **Stationary vs. Non-Stationary Errors**
  - Errors that are, for example, Typically Different in 1980 and 2010
  - Spurious Trends in Data Sources
  - Local vs. Remote Errors
  - Fast vs. Slow Error Growth

## Attributing Forecast Drift and Stationary Systematic Errors

- How to Detect and Attribute Model Errors:
  - Component Models: Atmosphere vs. Ocean vs. Land vs. Ice vs. Coupling vs. Resolved Processes vs. Unresolved Processes vs. Parameterized Physics vs. Numerics vs. Complexity vs. ...
  - Initial Condition Error vs. Initialization Shock vs. Forecast Drift vs. ...

- Need to Define Pragmatic **Drift**/Shock for Specific Context or Use
  - Need to Document Multiple Interpretations for Wider Community
  - White Paper? BAMS paper?
- Need to Relate Forecast Quality to Model Fidelity (Both in the Mean and, Especially, Variability)
  - Prediction, Projection and Predictability go Hand-in-Hand
  - Model Version Consistency in MIPs
- Initial Condition Should be Provided Along with Forecast Data
  - Initial Condition Error Cannot be Ignored
- “Busted” Forecasts Should Be Analyzed
  - Relate False Alarms to Errors in Natural Variability
  - Epochs of Low Forecast/Predictability Skill: State Dependence
- Flux Over-ride, Initial Condition, Component wise uncoupled experiments for Attribution
  - Transpose MIPs – Error Growth Across Time-Scales
  - Model Version Consistency in MIPs
- Support for LRF Transient Intercomparison Project

## *Coordinated Diagnostics and Metrics to Evaluate*

- Should there be a Coordinated Effort?
- Separate Diagnostics and Metrics for Component Models, Coupled System, Forecast Drift, Initialization Shock, Initial Condition Error, Unrepresented or Unresolved Processes ...
- Numerical Experiments? Coordinated?