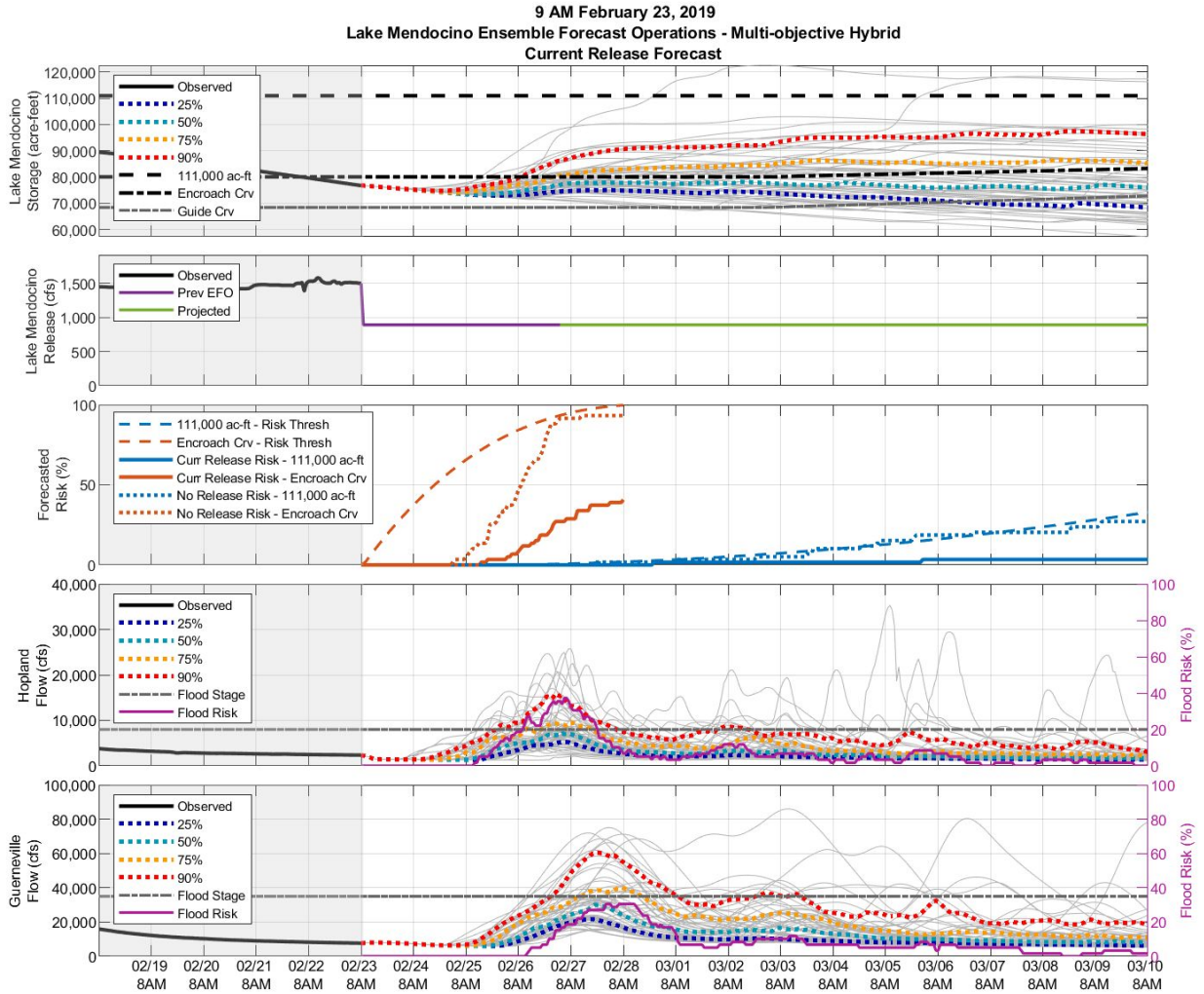
Decision Support Tools Needed for FIRO Integration

2022 FIRO Annual Workshop

Chris Delaney

August 3, 2022



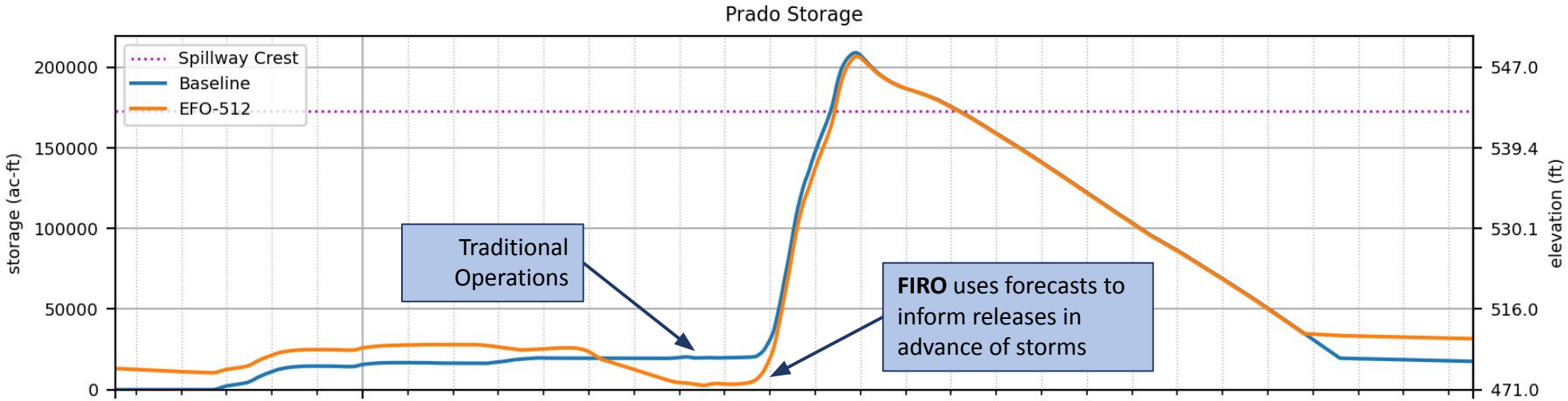
FIRO Needs Decision Support Tools

- Decision support tools (DSTs) are a necessary part FIRO to provide decision makers with current and forecasted conditions to make informed operational decisions.
- A decision support system (DSS) is an information system from a related set of tools that supports decision-making.

FIRO Needs Decision Support Tools

- Traditional reservoir operations rely on observations to inform operations.
  - Forecasts are used, but primarily for awareness of future conditions.

- FIRO water control plans (WCPs) use forecast information as the primary component of the decision-making process.
  - Reoperation to improve water management objectives:
    - Improve water supply reliability
    - Decrease downstream flood risk



A FIRO DSS must fully support reservoir operations.

- A DSS should represent the systemization of a FIRO WCP.
  - Provide all of the information needed to fully implement a WCP.

- A WCP plan should be defined in a fashion that could be represented by a DSS.
  - Could define the necessary attributes of a DSS for implementation.

Current and forecasted conditions can evolve rapidly during a flood event.

- Operation of reservoirs can be very dynamic.
  - Current and forecasted conditions can change rapidly.
  - Reservoir operators may need to respond to these changes up to multiple times per day.
- DSS must be able to ingest and process data quickly.

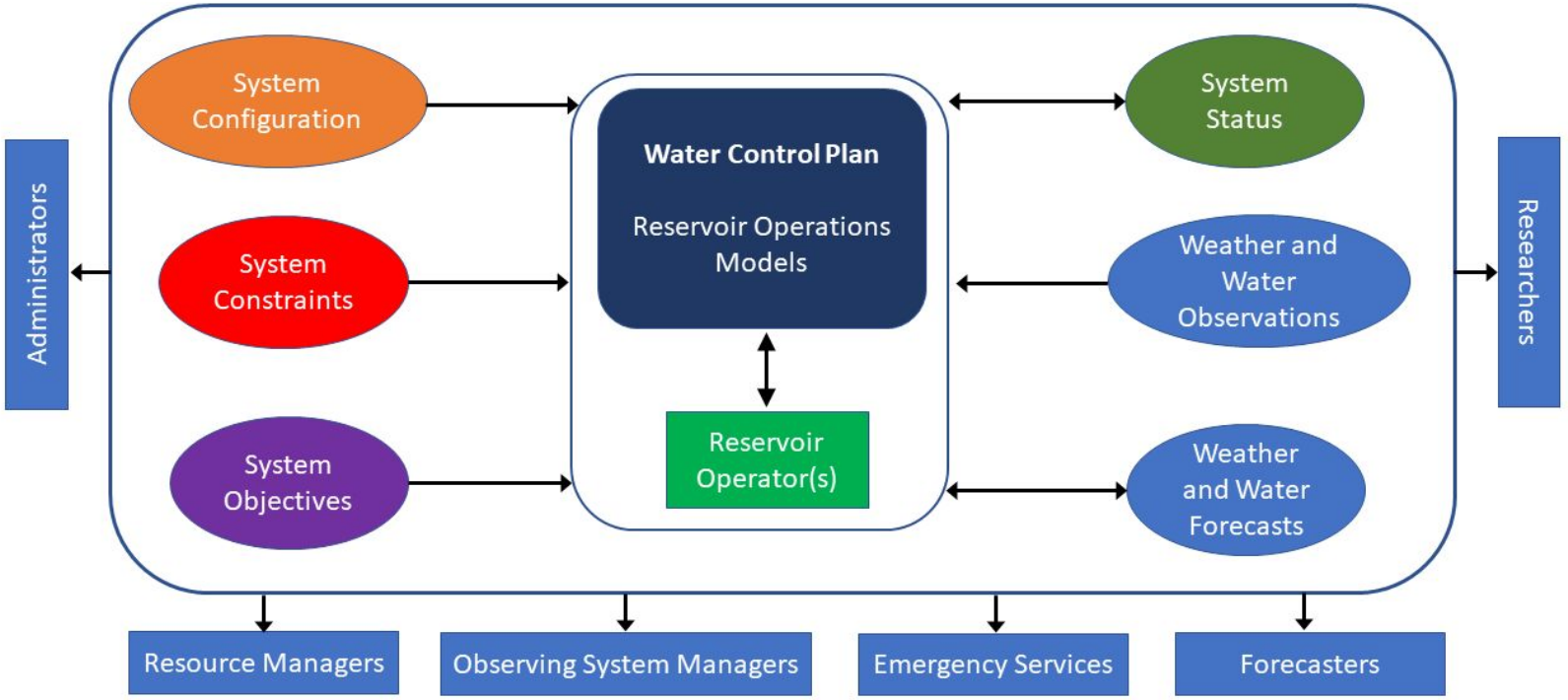
Decision Makers in a FIRO Environment

- Reservoir Operations
  - Flood risk manager
  - Water supply manager
  - Hydropower manager
- Emergency services manager
- Resource managers
  - Wildlife, Fisheries, Recreation, Other
- Forecasters
  - Weather, Water
- Researchers
  - Modelers, Developers
- Administrators

They all need "tools" and to be *effective* the tools need to be captured into a "system."

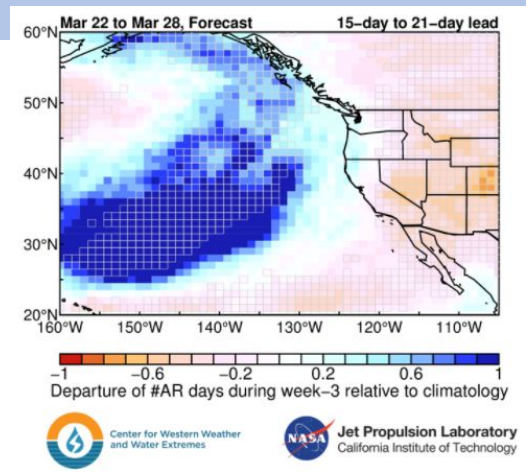
Systemization of a Water Control Plan

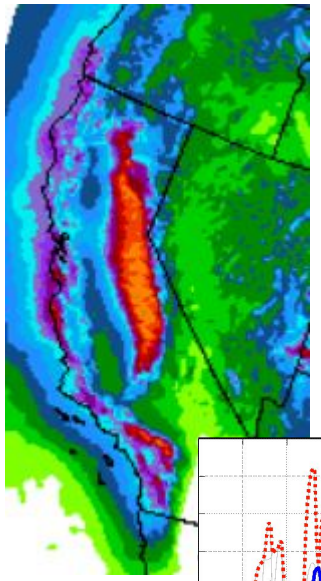
- A DSS should assist all these decision makers for flood control operations.
- A DSS should provide a common set of information for decision makers to provide a consistent picture of forecasted conditions.

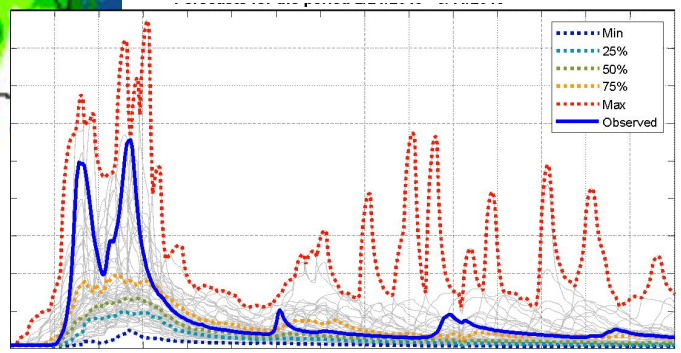


Decision Support Systems Must be Adaptive

- The science of climate and weather forecasting is continually evolving, and forecasting tools are ephemeral.
- A DSS should be adaptive to incorporate improved tools as they are vetted through research.
- A WCP should not prescribe or require a particular tool, but should describe the type of forecast information required to implement a WCP.







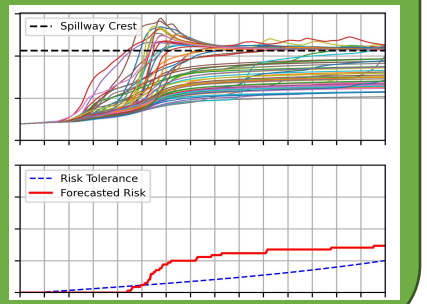
FIRO Decision Support System

Forecast Coordinated Operations (FCO)

Corps Water Management System (CWMS)

Ensemble Forecast Operations (EFO)

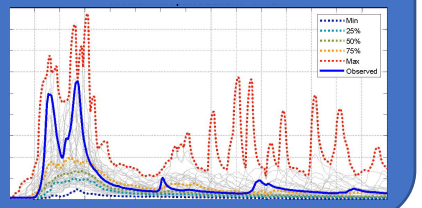
Operations Models



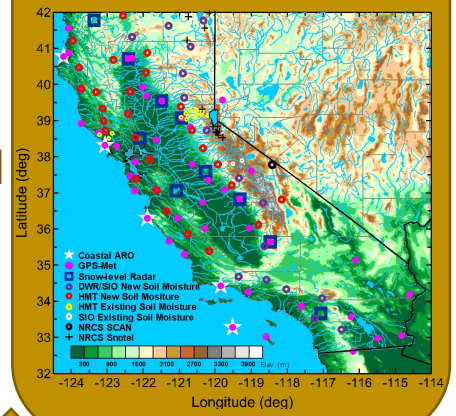
Hydrologic Ensemble Forecast System (HEFS)

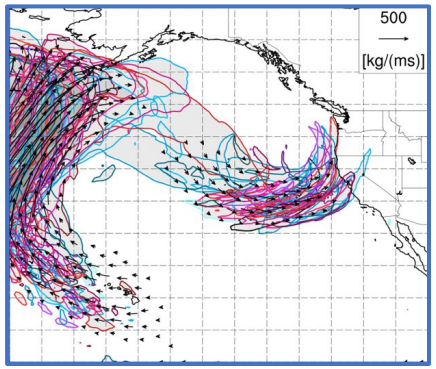
WRF-Hydro

Hydrologic Models



Observations

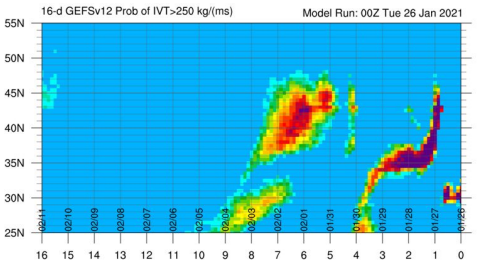


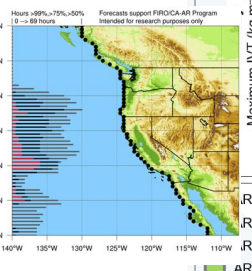


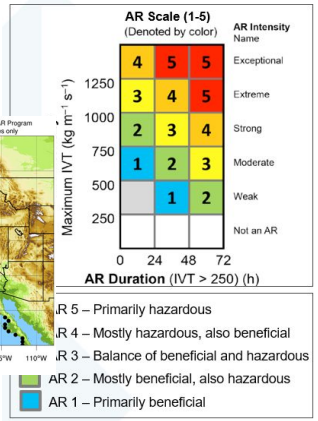
Integrated Vapor Transport

AR Landfall Tool

AR Scale



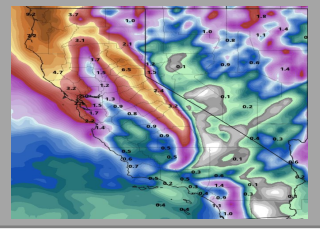




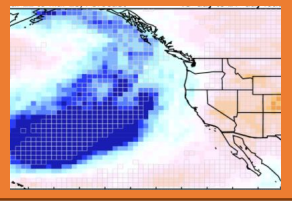
GEFS

West-WRF

Atmospheric Models



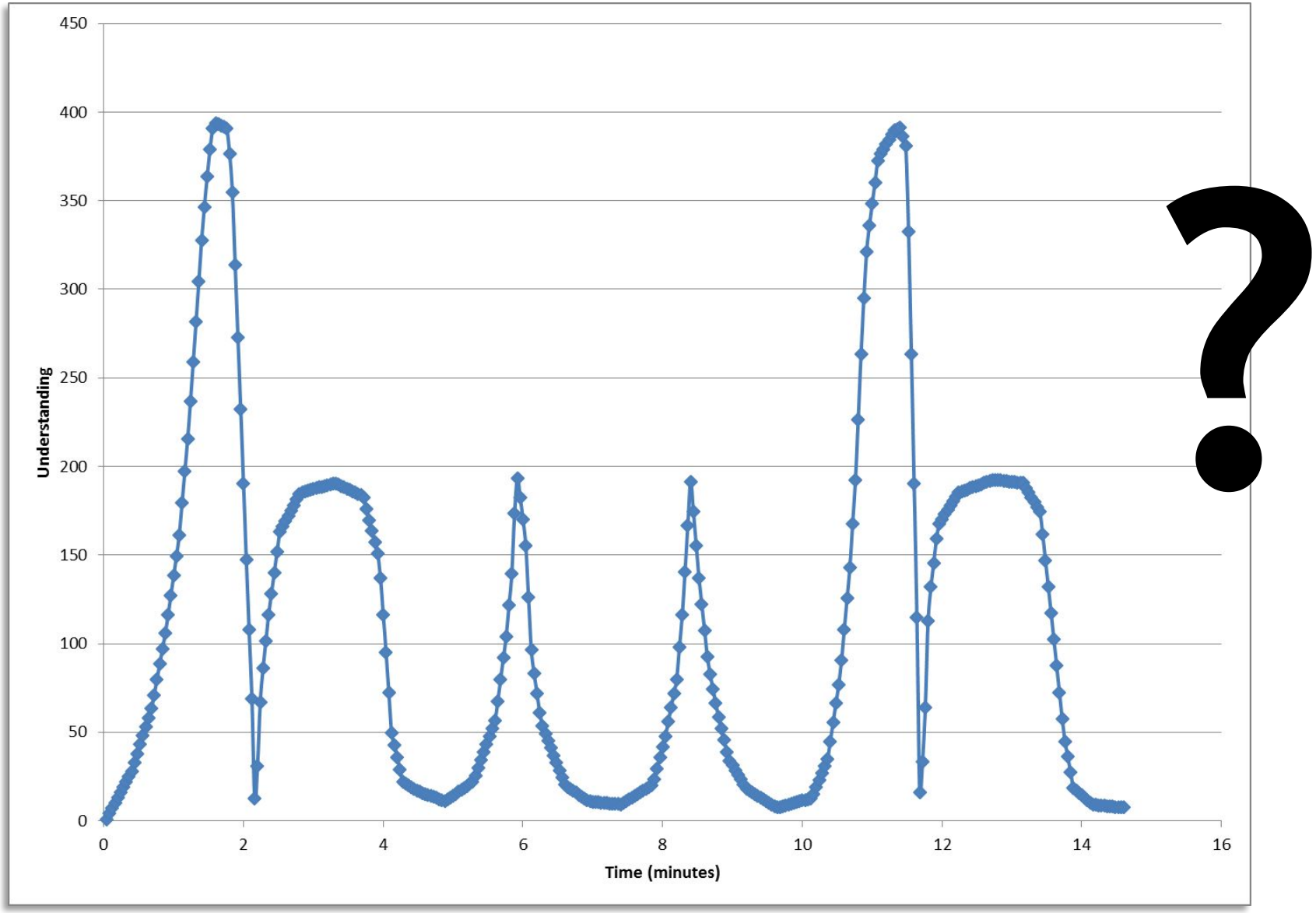
Climate Models



Subseasonal AR Outlook

NOAA Climate Outlook

Questions?


450
400
350
300
250
200
150
100
50
0
Understanding
0
2
4
6
8
10
12
14
16
Time (minutes)