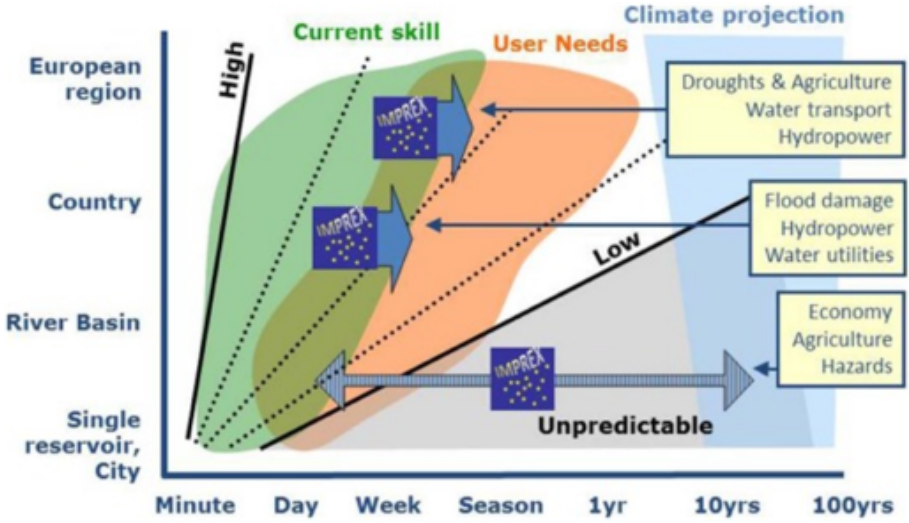
Building an Interannual to Decadal (2 to 30 year) Prediction/Projection Capability for Decision Support

Overview of Day 1

5-6 June 2019

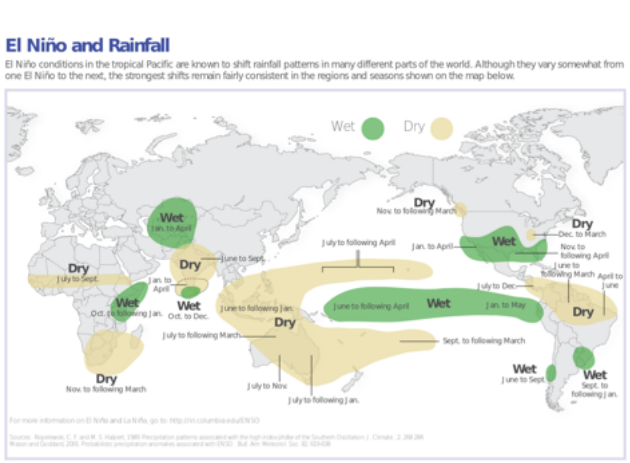
Scientific Challenge

- **Predictability** and understanding of physical processes may lead to increased skill, but processes such as large-scale variability, sunspots, etc. and their interaction with the climate system must be further studied and included in global models.
  - Observing systems will aid in these predictability studies
  - Prioritization of physical processes to study can be problematic due to their interaction, we need better holistic understanding
  - Be cognizant of getting “the right answer for the wrong reasons”



Collaborative and Overall Challenges

- **Lack of mission** in extended range or long-term climate predictions creates an almost “ad-hoc” structure for predictions on this timescale
- **International partnerships** and a **global view** of climate prediction is necessary. For example, collaboration with the European sector on new satellite information and programs.
  - A question was posed: How can we fully harness benefit of international partnerships for the benefit of US tax-payers?



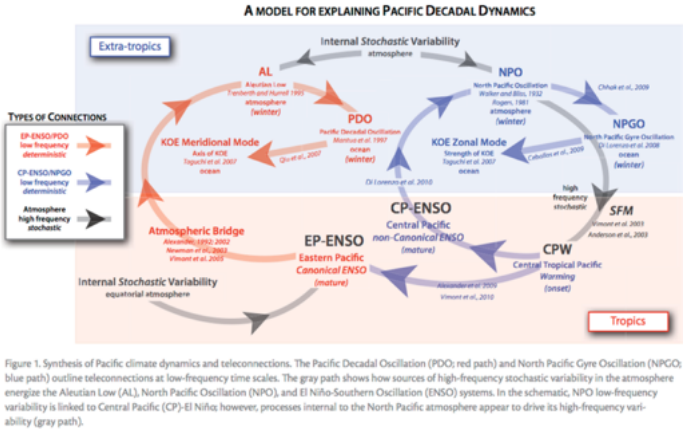
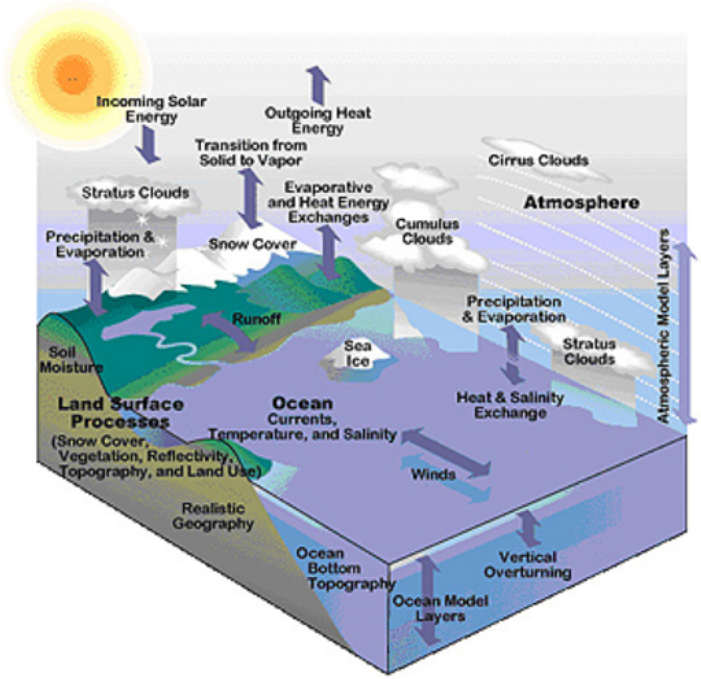


Figure 1. Synthesis of Pacific climate dynamics and teleconnections. The Pacific Decadal Oscillation (PDO; red path) and North Pacific Gyre Oscillation (NPGO; blue path) outline teleconnections at low-frequency time scales. The gray path shows how sources of high-frequency stochastic variability in the atmosphere energize the Aleutian Low (AL), North Pacific Oscillation (NPO), and El Niño-Southern Oscillation (ENSO) systems. In the schematic, NPO low-frequency variability is linked to Central Pacific (CP)-El Niño; however, processes internal to the North Pacific atmosphere appear to drive its high-frequency variability (gray path).

HPC Challenges

- Earth system models are becoming increasingly more complex in order to simulate the climate system - increases in resolution (e.g. Navy ESPC, E3SM, ocean and ice) **necessitate HPC increases and computational efficiency**, as do predictions on longer or extended range time-scales



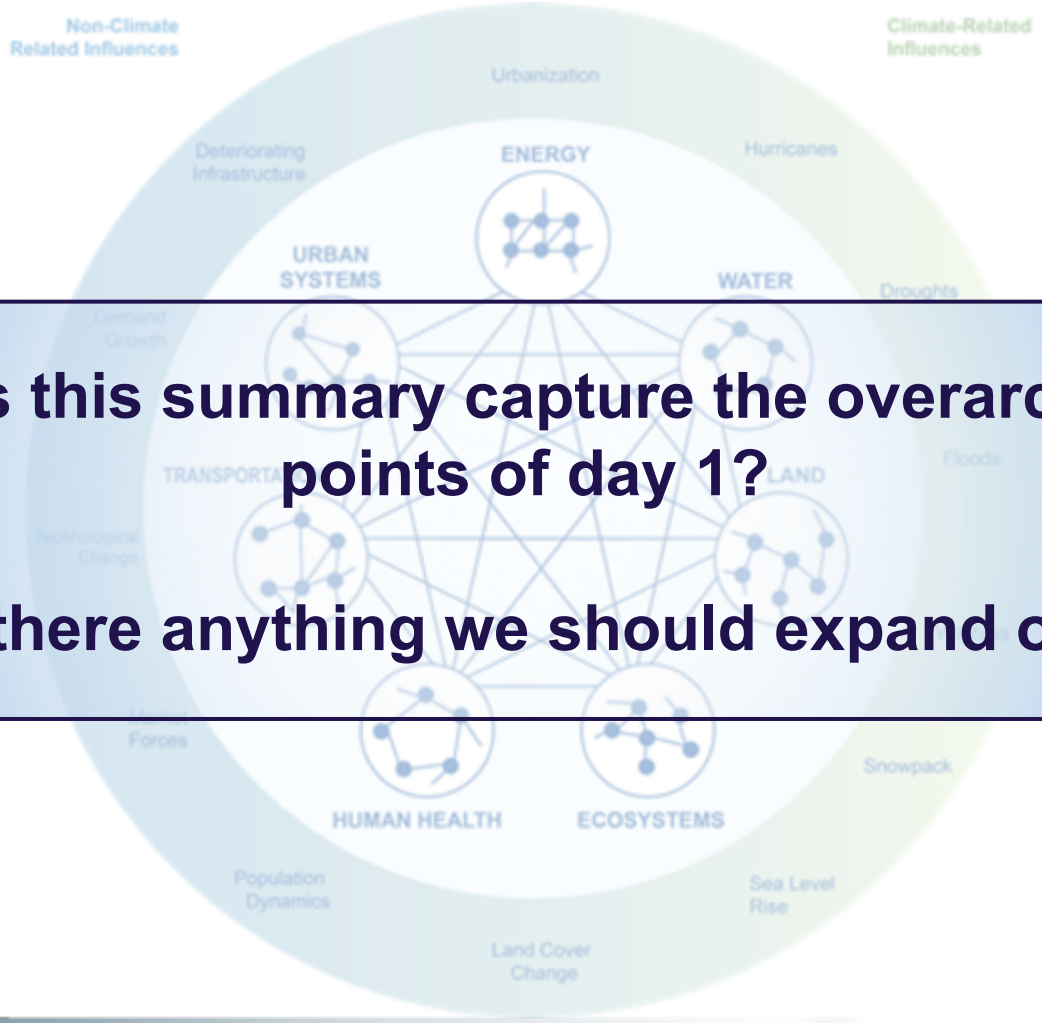
User Communication and Engagement Challenges

- **Communication** of climate prediction and predictability is important for users, and can be a hindrance in many sectors. Skilled communicators and translators of climate science are necessary in order to improve user trust in data and predictions. **Engagement** of the user community is important (value, risk-based framing, etc.).
- A question was posed: **What does "operational" mean past the 2 year time-scale?** This needs to be an engagement with the decision maker (an iterative process). The human and economical impact needs to be central to decision support. These social impacts are important to consider at the forefront.
- Is there something between research to operations that one could aim toward?
  - **Partnerships with the research community** are and will remain key in this process.

Challenges in User Needs vs. Capabilities - What are the Next Steps?

- **Questions and Comments for Discussion:**
  - Feasibility vs. user needs discussions should occur between researcher and end-user
  - Conversations need to be had about what is actually predictable vs. what users need
  - Data needs to be translated to users in appropriate ways
  - The end goal or need should determine the modeling experiment or study
  - Climate services discussions need to happen on a regional basis
  - Skilled translator of climate data
- **Implementation of climate services as a nation - are there next steps?**
  - Determine what capabilities we currently have, and if these capabilities will meet the needs of users (is the science reliable, credible, and salient?)
  - Increase interest, understanding, leading toward a mandate
  - Look toward state climatologists, RISAs, **NCA**, regional climate hubs, Blue Action (ECMWF), etc. as frameworks

Open Discussion



Does this summary capture the overarching points of day 1?

Is there anything we should expand on?