APT
Applications Process Team

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Why Does U.S. CLIVAR Need an APT?

Climate research is becoming ever more interdisciplinary in nature. Whereas the physical climate system has been the primary focus of U.S. CLIVAR research activities, it is increasingly clear that interactions between physical, chemical and biological components are critical not only for understanding climate impacts but also for understanding feedbacks in the system that determine how the physical climate system itself changes.
Why Does U.S. CLIVAR Need an APT?

• Applications concerns may inspire new science:
  • Identification of the Pacific Decadal Oscillation (PDO) occurred as a result of collaborative research on salmon catches
• Regional expressions of climate variability
  • U.S. CLIVAR also poses the fundamental science question, “What determines regional expressions of climate variability and change?”
• What regional expressions are important to society, ecosystems, & the “Grand Challenges”
• Requires collaboration with applications communities
Why Does U.S. CLIVAR Need an APT?

Communication about Models
Climate models often fail to inform not because of bad algorithms or bad design, but because of inadequate communication of how they work and what their relative strengths and weaknesses are.

Communication about state of the science: Use of U.S. CLIVAR science can be improved through:

• the thoughtful articulation and communication of the limitations to the science, uncertainty, and confidence in predictions and projections
• Use of language that is mutually understood by producers and users of climate science information.
Why Does U.S. CLIVAR Need an APT?

Communication about Uncertainty and Risk

Communicating uncertainty may involve extra effort to understand the institutional, organizational and cultural contexts of end users, their risk tolerances, and competition with other factors shaping their decision context.

An APT can help facilitate and organize the conversation the information necessary for climate service agencies to develop these efforts.
Why Does U.S. CLIVAR Need an APT?

Communication about Uncertainty and Risk

• In many cases, additional information about forecast skill, or ability of models to capture historical climate variations, will be needed.
• Communicating probabilistic information depends on user metrics and familiarity with various ways of communicating forecast success, in addition to efforts to educate end users.
Why Does U.S. CLIVAR Need an APT?

Societal Benefit

• Effective communication of climate research results, information and insights is essential for society to reduce vulnerabilities to the impacts of climate variability and change.

• **An APT could plan and organize a** focused effort to communicate climate science

• will also allow society to reap the benefits of substantial investments in the climate research enterprise.

• Anticipation and response to seasonal, interannual, and decadal and longer time-scale climate variability offers potentially significant societal benefits.
Linear

- Problem
- Research
  - Knowledge
  - Transfer
- Adoption
- Diffusion
Scientists

Practicioners

[Diagram with overlapping circles labeled 'Scientists' and 'Practicioners']
User Needs

Potentially Predictable
APT: Goals

- Increase science understanding
- Improve communication
- Maximize science/knowledge use
- Improve science
APT: Topics

- State of knowledge
- Science readiness
- Applications community readiness – what groups are ready to collaborate
- Uncertainty
- Communicate distinctions
APT: Tasks

- Assess the state of knowledge
  - Known / Unknown / Pace of Progress *(when might we make progress on questions)*
  - Characterize and communicate uncertainty
- Assess user needs, agency concerns
- Facilitate knowledge exchange
  - Within and across boundaries
    - Institutional connections, mechanisms
- Research and develop best practices
  - Assess knowledge, co-production, metrics
  - Community of practice
APT: Model 1

- U.S. CLIVAR’s Boundary Organization
- Science → Applications + User
  - NOAA RISA, NMFS (marine ecosystems), NOS (sea level, protected areas)
  - DOI Climate Science Centers
- USDA Regional Hubs
- Cooperative Extension
- Professional Societies
APT: Model 1

- U.S. CLIVAR’s Scout Team/Communication Team
  - Assessing needs and knowledge
  - Establishing institutional linkages
  - Engaging the stakeholders
    - Intermediaries
    - New applications communities
    - End users
  - Crafting the message
APT: Model 2

- U.S. CLIVAR’s Applications Research Team
- Assessing needs and knowledge
- Developing best practices
  - Protocols
  - Metrics of effectiveness
  - Pitfalls
- Understanding networks
- End-to-end-to-end…value added
<table>
<thead>
<tr>
<th>Cross-Cutting Strategies</th>
<th>Sustained and new observations</th>
<th>Process studies</th>
<th>Model development strategies</th>
<th>Quantifying improvement in predictions and projections</th>
<th>Communication of climate information</th>
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</thead>
<tbody>
<tr>
<td>Understand the role of the oceans in climate variability on different timescales</td>
<td>Document variations</td>
<td>Data to evaluate and improve models</td>
<td>Improve modeling of climate across processes and timescales</td>
<td>Understand limits of climate predictability</td>
<td>Prioritize observing network and predictability studies and improve predictions of ocean and climate variability</td>
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<tr>
<td>Understand the processes that contribute to climate change and variability in the past, present and future</td>
<td>Document climate-critical processes</td>
<td>Investigate processes to help explain variations</td>
<td>Property conserving climate reanalyses</td>
<td>Quantifying importance of model uncertainty in projections</td>
<td>Set priorities for observations and predictability studies; communicate about confidence and predictability</td>
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<tr>
<td>Better quantify uncertainties in the simulations and projections of climate</td>
<td>Initialize and evaluate model simulations</td>
<td>Model assessment</td>
<td>Improve models</td>
<td>Quantify model, structural and scenario errors</td>
<td>Address needs for predictability and sensitivity studies</td>
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<tr>
<td>Improve the development and evaluation of climate simulations</td>
<td>Initialize and evaluate climate models</td>
<td>Provide data to develop and test model process representation</td>
<td>Reduce biases in climate models</td>
<td>Quantify importance of model physics errors</td>
<td>Determine key targets for model development across communities</td>
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<td>Collaborate with research communities that develop and use climate information</td>
<td>Provide multi-disciplinary datasets</td>
<td>Provide process understanding and opportunity for collaboration across disciplines</td>
<td>Communication between observational and model communities</td>
<td>Improved communication across disciplinary boundaries</td>
<td>Provide information on dominant climate phenomena and predictability</td>
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