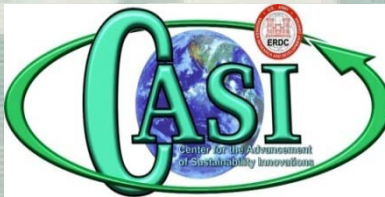


Climate Change Adaptation Approaches

Presented at the
E2S2 Symposium
May 11th, 2011
New Orleans, LA

William D. Goran

U.S. Army Corps of Engineers
Director, Center for the Advancement of
Sustainability Innovations

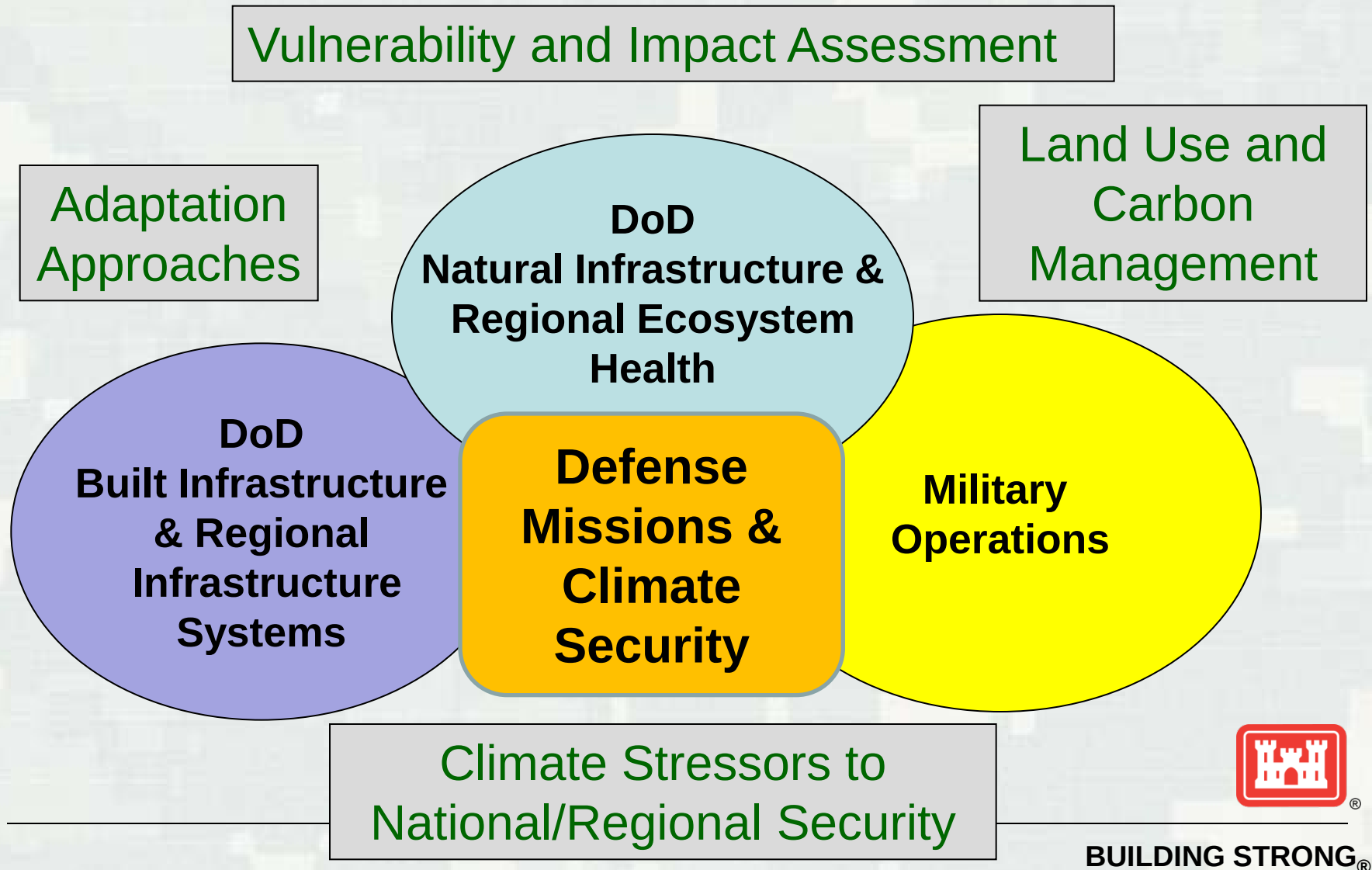


US Army Corps of Engineers
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Climate Concerns for Department of Defense

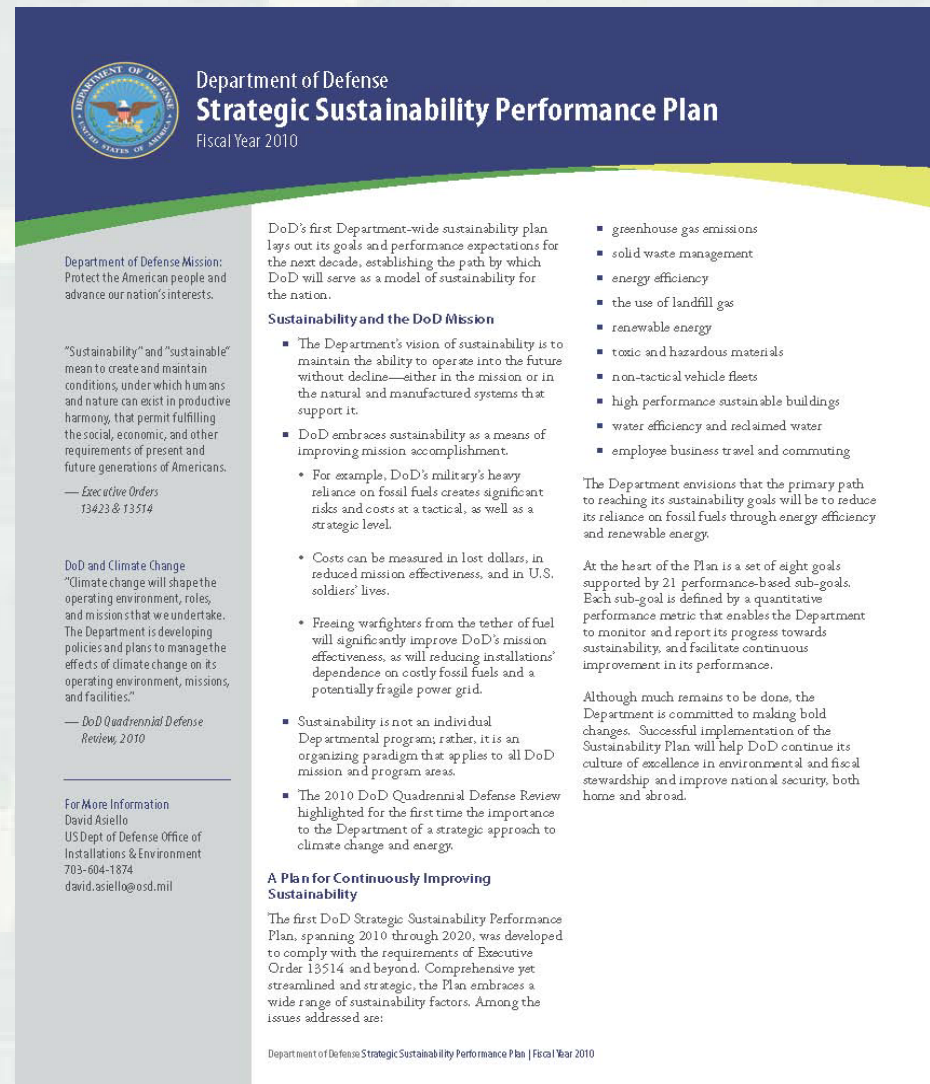


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Department of Defense Strategic Sustainability Performance Plan (8/26/10)

- Mandated by EO 13514 (10/09).
- ***One of the four priorities is to maintain readiness in the face of climate change.***
- Addressing Climate Change Risk and Vulnerability: a Three-Phase Approach
 - ▶ **Phase 1:** Development of a decision framework
 - *coordinate with other federal entities*
 - ▶ **Phase 2:** Climate change impact assessments
 - *develop analytical methodology and tool guidance for conducting assessments*
 - ▶ **Phase 3:** Climate change adaptation planning
 - *robust strategies*

New CEQ Implementing
Instructions – 4 March 2011



Council on Environmental Quality (CEQ) Guidance



Requirements

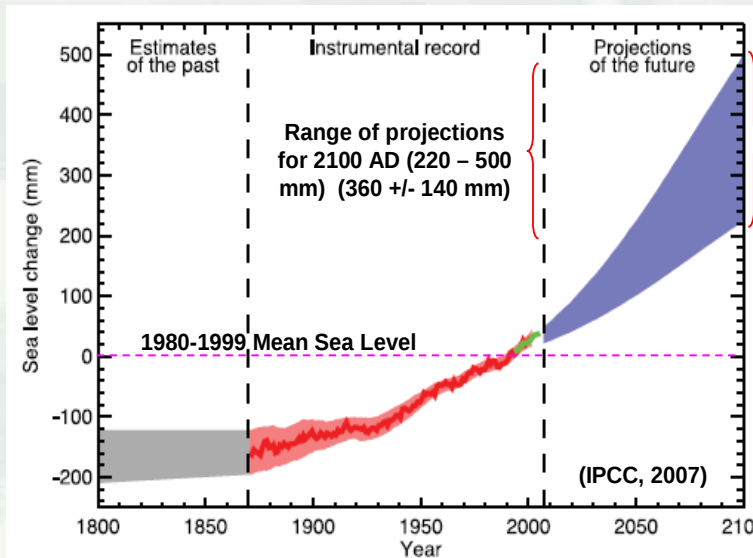
- Identify senior agency person responsible for adaptation by 3 Jun 2011
- Conduct high level agency assessment & identify priority actions for 2012 by 30 Sep 2011
- Conduct more detailed agency assessment by March 2012
- Integrate into 2012 Strategic Sustainability Performance Plan (SSPP) by 4 June 2012

New CEQ Implementing
Instructions – 4 March 2011



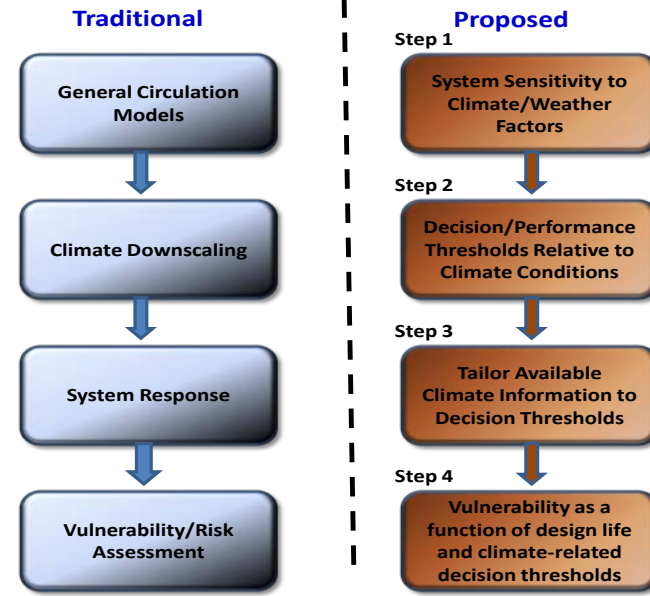
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Approaching Climate Change Impact Assessment



Traditional approach is to use IPCC general circulation models projections and scenarios (such as for sea level change, above) to determine extent of potential change and uncertainty of this change, and then identify what might be impacted.

Approaches for Assessment of Climate Change Impacts on DoD Installations



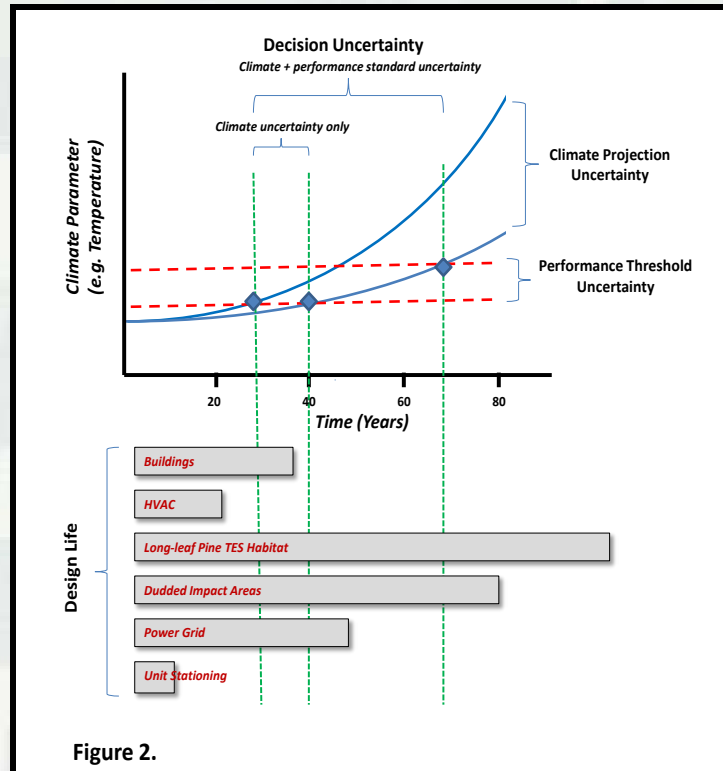
(after C. Brown)

Figure 1.

Alternative is to understand system sensitivities to changing parameters, and then apply best available climate information to relevant decisions about these systems



Framework for Climate Change Vulnerability Assessment and Adaptation Planning



Proposal Goals: Determine potential impacts of climate change to Army operations, built infrastructure and natural environment and express these impacts in an assessment framework

The basis for this framework is a process of “**decision-scaling**,” which directly maps Army relevant decision processes, operational sustainability, and decision time scales to required climate information. The framework will be applied to a few selected key impacts (e.g., sea level rise, rainfall intensity, drought, temperature change) and affected decision processes in each of the key focus areas: operations, infrastructure and facilities, and natural resources.

2.0
Provide Facilities, Programs & Services to Support the Army and Army Families

ASA (IE&E)
Staff Coordination:
ACSIM
In Support: SICE

Army
Campaign
Plan

2-7 Adapt / Execute
Climate Strategies
ASA (IE&E)



Proposed IEE
Project



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Assessment of Impacts

At the enterprise level

- Missions: how will missions be impacted by the impacts of climate change, and how will conditions change in potential (actual) theatre locations?
- Stationing: what mission activities might be compromised at which locations, and how will this impact overall readiness?
- Training: will conditions inhibit training or will perhaps help simulate circumstances in potential theatre contexts?
- Grid uncertainty/reliability: what locations might be impacted – and what adaptation are required to sustain reliable power, and what missions might be compromised with widespread power loss?

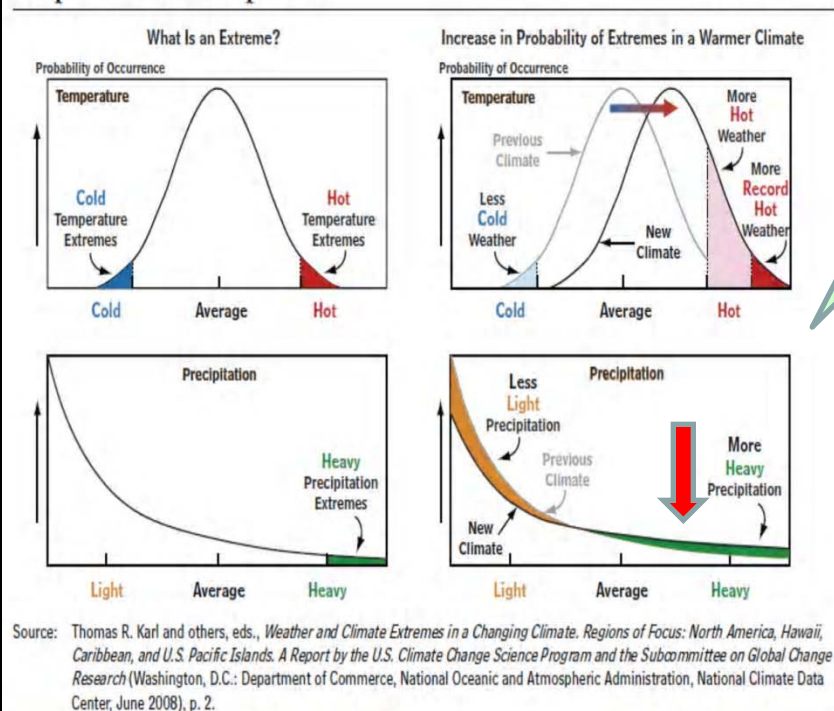
At the installation level

- Habitat restoration: longer term habitat restoration projects have long time exposures, and feasibility may be questionable
- Construction projects: increase in cooling degree days, changes in moisture regimes
- Safety for soldiers: exposure to high heat, high humidity may limit in field training in summer season



Relating Sensitivity in Design Parameters to Climate Impacts

Illustration of Changes in Averages and Extremes in Temperature and Precipitation



“Historical Data”

Climate Change Impacts to Weather Patterns

“Design Manual”

Chapter Six Drainage and Stormwater Management

6.1 INTRODUCTION

Adequate drainage is essential in the design of highways since it affects the highway's serviceability and usable life, including the pavement's structural strength. If ponding on the traveled way occurs, hydroplaning becomes an important safety concern. Drainage design involves providing facilities

Federal, state, county and local regulations, laws, and ordinances that may impact the design of storm drain systems.

Many federal laws have implications that affect drainage design. These include laws concerning:

- Flood insurance and construction in flood hazard areas,
- Navigation and construction in navigable waters,
- Water pollution control,
- Environmental protection,
- Protection of fish and wildlife, and
- Coastal zone management.

Federal agencies formulate and promulgate rules and regulations to implement these laws. Highway hydraulic engineers should keep informed regarding proposed and final regulations.

Some of the more significant federal laws affecting highway drainage are:

- **The Department of Transportation Act** established the Department of Transportation and sets forth its powers, duties, and responsibilities to establish, coordinate, and maintain an effective administration of the transportation programs of the Federal Government.
- **Federal-Aid Highway Acts** provide for the administration of the Federal-Aid Highway Program. Proposed Federal-aid projects must meet existing and probable future traffic needs and conditions in a manner conducive to safety, durability, and economy of maintenance, and must be

Intensity-Duration-Frequency (IDF) Curves

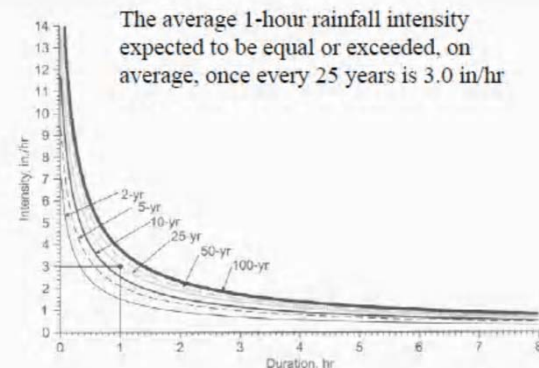


Figure 8. Intensity pattern based upon long term average (historical data).

http://www.ce.ufl.edu/~markn/CWR4542/CWR4542_Packet_03_student.pdf

Highway Drainage and Stormwater Management 6-1



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Some Adaptation Considerations

- Budgets are limited today, and will be limited tomorrow – we need good methods that help us understand choices along the time/cost spectrum of changing climatic conditions.
- We are making numerous decisions today about built/natural infrastructure and military operations that are already impacted, or will be impacted, directly or indirectly, by changing climatic conditions. These decisions could become more and more expensive if we delay integrating considerations of these impacts.
- In some cases, the second or third order impacts are the most alarming in terms of costs and disruption for Defense operations, security stressors, and built and/or natural environments.
- A “framework” is needed to align climate impacts and stressors to the “sensitivity” of management, operational and mission decisions to changing climatic conditions – to help focus limited resources
- This framework should inform existing planning and budgeting processes – not generate another process

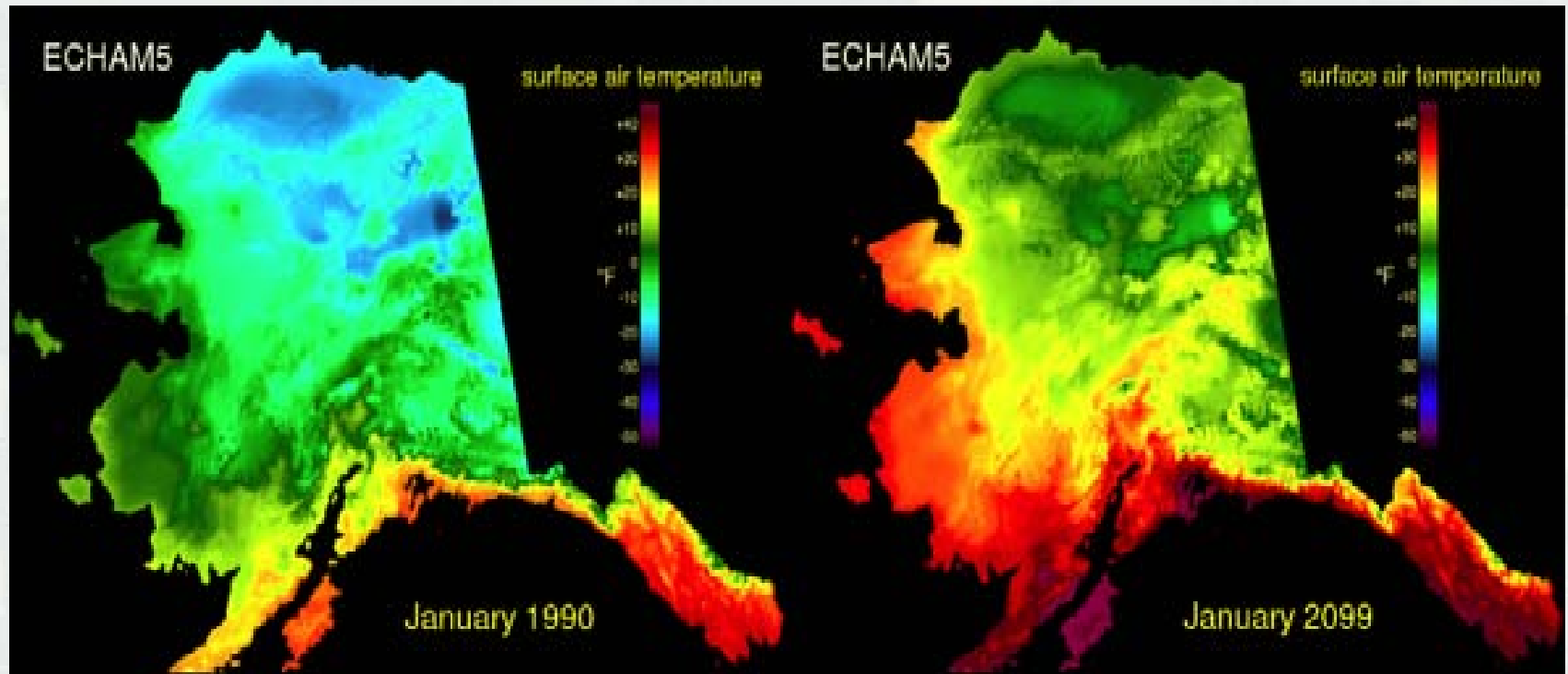


Moving Forward

- Develop Framework
- Assess Impacts and Sensitivities
- Integrate into Strategies, Plans and Budgets
- Adapt and Adjust
- Built linkages across plans



Questions?

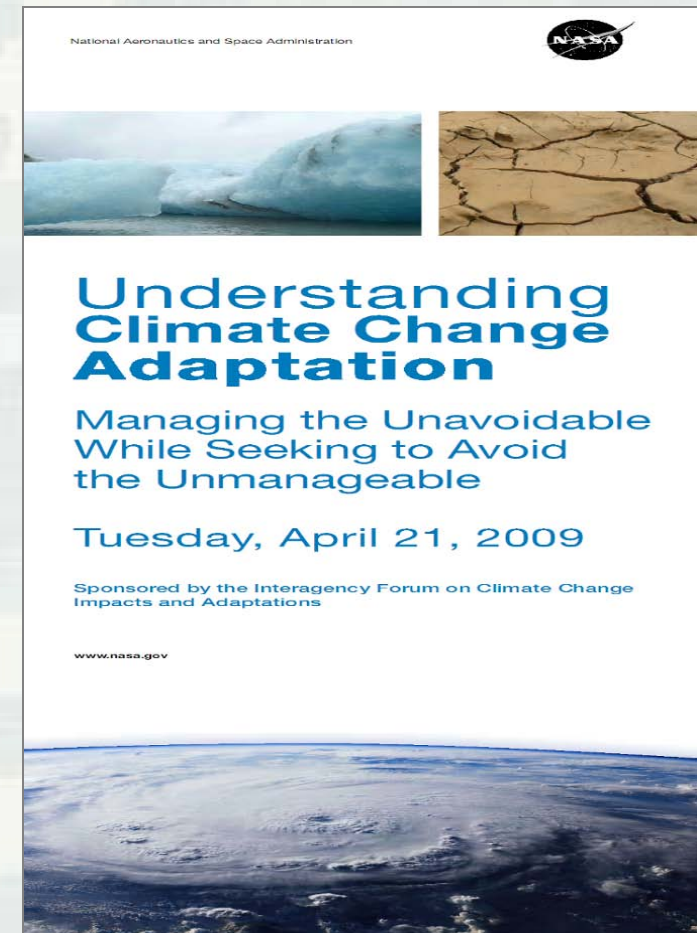


Climate Change Forum



■ Inter-Agency Climate Change Impacts and Adaptation Forum

- ▶ Meets in DC area 6-8 times/year (phone in participants from across US)
- ▶ Co-chaired by NASA (S. Higuchi) & USACE (W. Goran)
- ▶ Now in 4th year, all presentations on FedCenter
- ▶ Over 30 agencies involved, including many Defense participants.
- ▶ 2011 Forum last sessions: May 4th, next Aug 2nd
 - Blair Feltman, University of Waterloo, Adaptation Approaches in Canada
 - Kevin Knuuti, Sea Level Rise
 - Joe Thompson, GAO, Cost of Climate Change Adaptation
- ▶ Selected 2010 speakers:
 - CAPT Tim Gallaudet – U.S. Navy's Task Force CC
 - Chris Pyke - U.S. Green Building Council, Designing for a Changing Climate
 - Kathy Jacobs, Director, National Climate Assessment
 - Maria Blair, CEQ Climate Change Adaptation Coordinator



Contact: ccforum@fedcenter.gov



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