IMPACT RELEVANCE AND USABILITY OF HIGH RESOLUTION CLIMATE MODELING AND DATASETS

August 2-7, 2015
Aspen, CO

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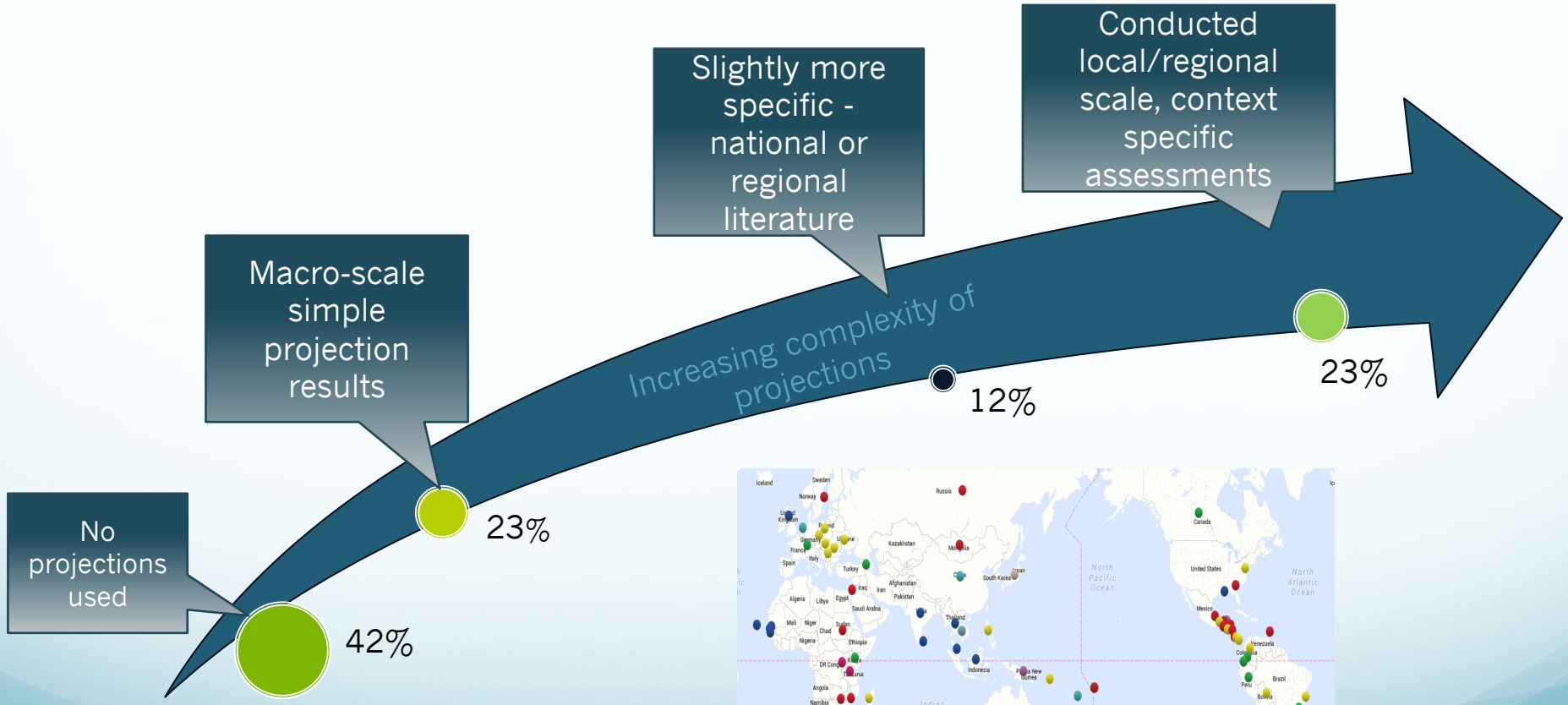
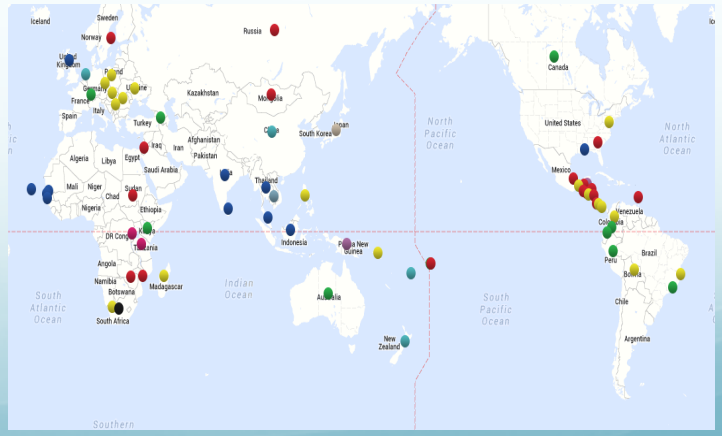
Sponsors:
DOE Office of Science
NASA Earth Scences
Heisig-Simons Foundation

Motivation and Context

- What information is needed to support adaptation decision-making in different contexts?
- How do we evaluate and communicate the credibility of climate data products? How good is good enough?
- What are the tradeoffs among modeling, downscaling, and evaluation approaches for meeting these challenges
  - Especially given limited human resources, time, and computational resources.
- Why high resolution?
  - Because it is required for decision-making?
  - Because it is required to model physical processes?

Many Adaptations Projects Use No Climate Projections at All





Kripa Jagannathan, based on United Nations Framework Convention on Climate Change (UNFCCC) database

Which data to use?

California Landscape Conservation Cooperative

Climate Commons

Home | Datasets | Documents | Web Resources | CA LCC Projects | Get Started | Contact Us

Dataset

2011 California Basin Characterization Model (BCM) Downscaled Climate and H… Summaries

Commons Hosting

Climate Commons Hosting Status: Available

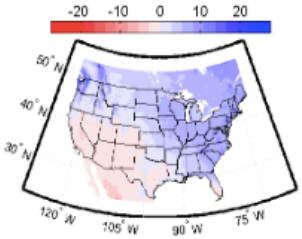
(*Log in to view and download hosted datasets. D*

Discussion Forum

Discuss this dataset

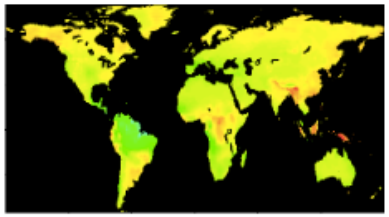
Library of Downscaled Climate Projections

A data set of 112 downscaled climate projections, based on output from 16 GCMs and 3 different SRES emissions scenarios (A2, A1B, B1) has been made available for public downloading. The spatial domain is shown in the figure, covering the conterminous US plus portions of Canada and Mexico. The resolution is 1/8 degree (~140 km^2 per grid cell). Raw monthly data for any region as well as summary statistics may be specified. The data set is formally introduced in AGU's Eos 88(47), …en Data Oasis. Streamflow was …here, with documentation here.



Global Downscaled Data

Downscaled global CMIP3 GCM output are served here. This covers global land areas at a 1/2-degree (about 50 km) spatial resolution. A similar downscaled product using CMIP5 GCM runs is available here.



Both the global and US-wide datasets are included in the Climate Wizard: http://www.climatewizard.org. Both CMIP3 and CMIP5 globally downscaled data and analysis can be obtained at the Climate Wizard Custom website: http://climatewizardcustom.org/

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Downscaled climate and hydrologic response for California and the Great Basin

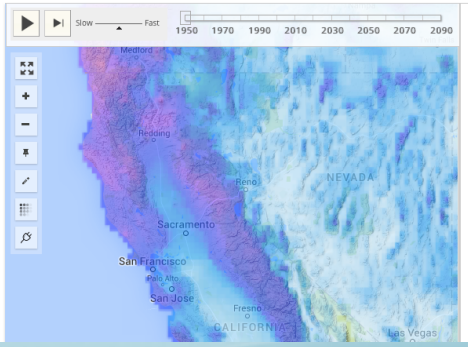
Announcements

cal-adapt

RESOURCES | CLIMATE TOOLS | DATA ACCESS | COMMUNITY

DATA SOURCES ▸ DOWNLOAD ▸ SHARE ▸

PRECIPITATION: DECADAL AVERAGES MAP



Elevation:

MONTH: Annual

MODEL: All

Precipitation

The following map displays the projected annual precipitation totals across the state at decadal averages. On average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century.

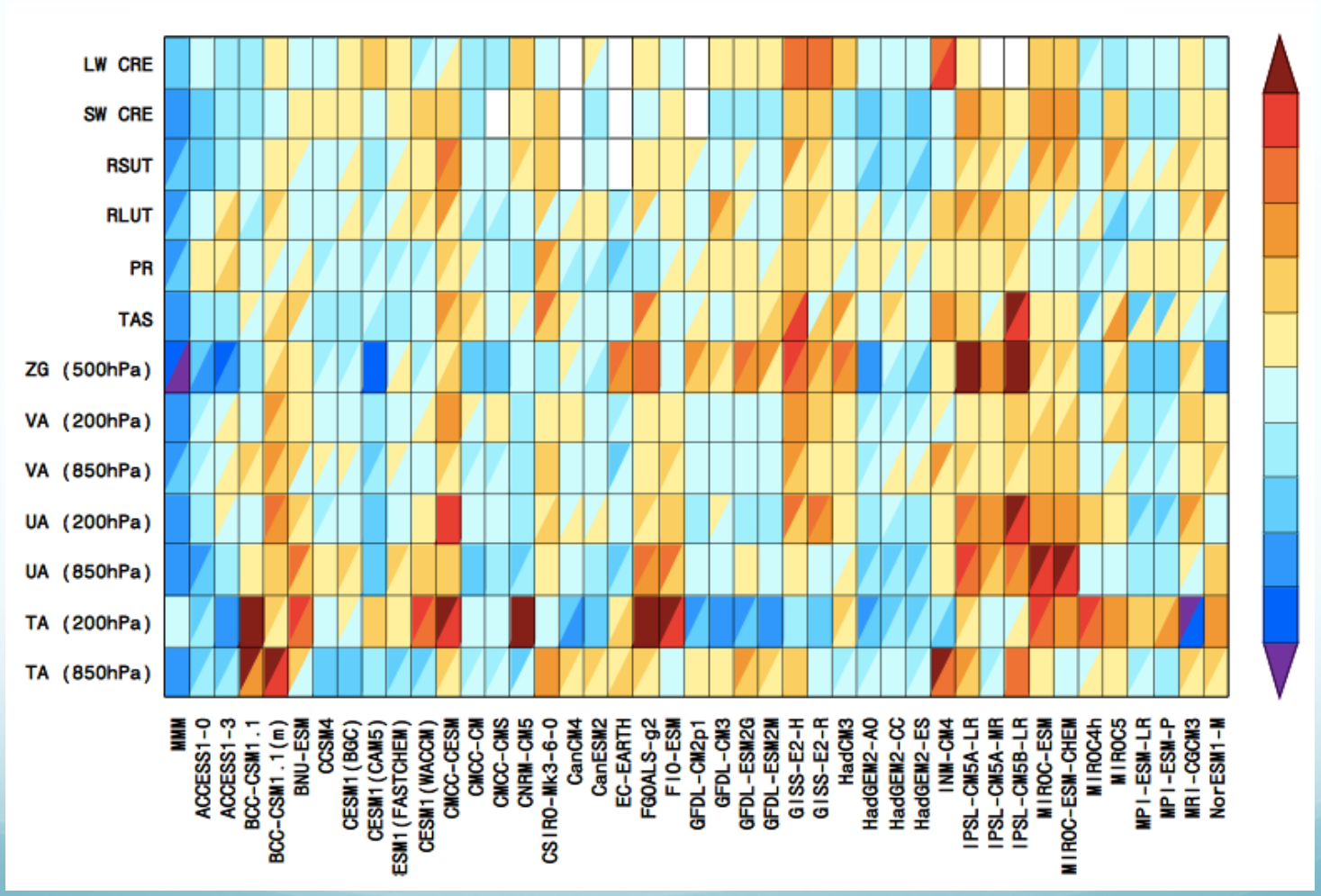
The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. One of the four climate models projects slightly wetter winters, and another projects slightly drier winters with a 10 to 20 percent decrease in total annual precipitation. However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized.

ABOUT THE TOOL | GRAPH IT | DISCLAIMER

Google – "Downscaled Climate Data California"

IPCC 5th Assessment

Models Evaluated On Global Patterns of Mean Physical Quantities

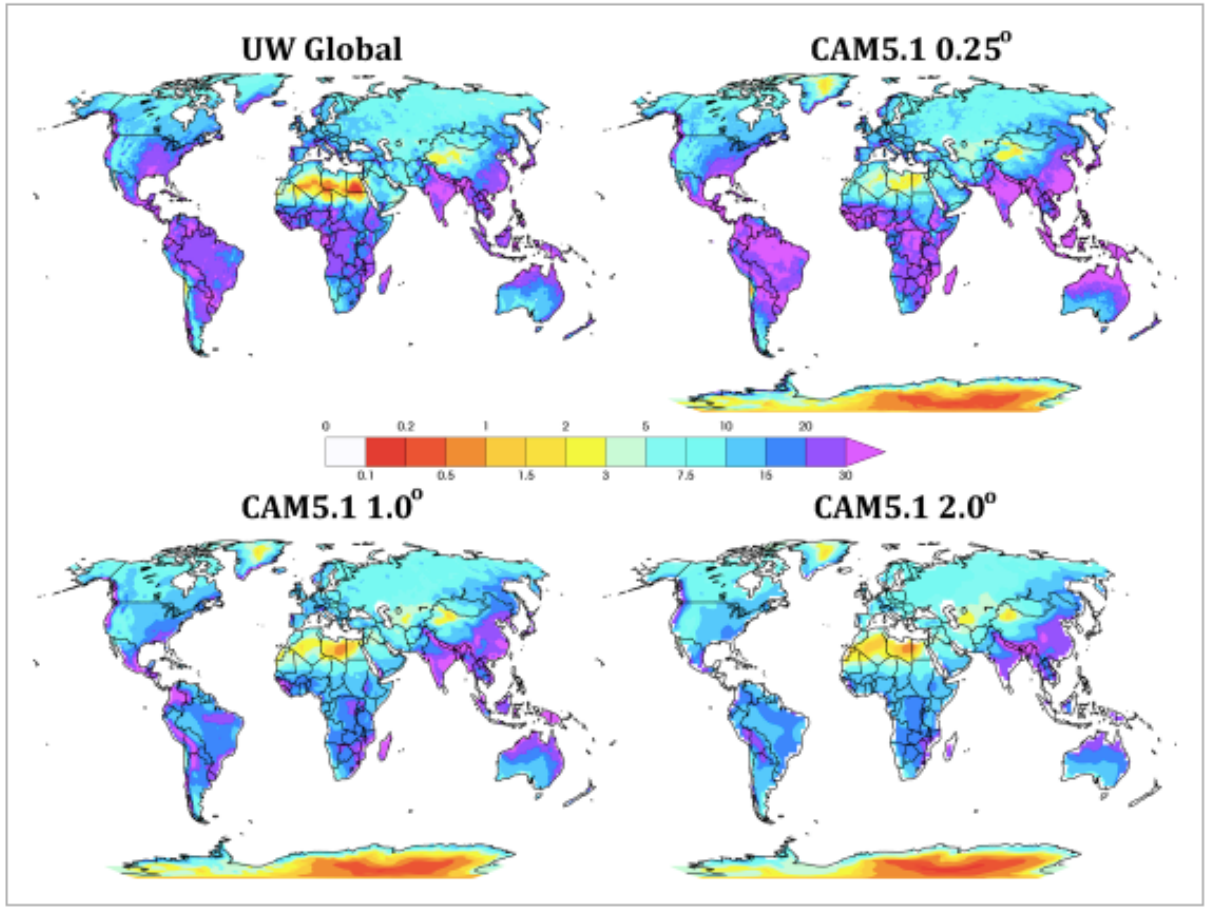


IPCC AR5, WGI, Chapter 9

Resolution Improves Representation of Some Extremes

But Understanding Extremes Requires Many Runs!

Observations



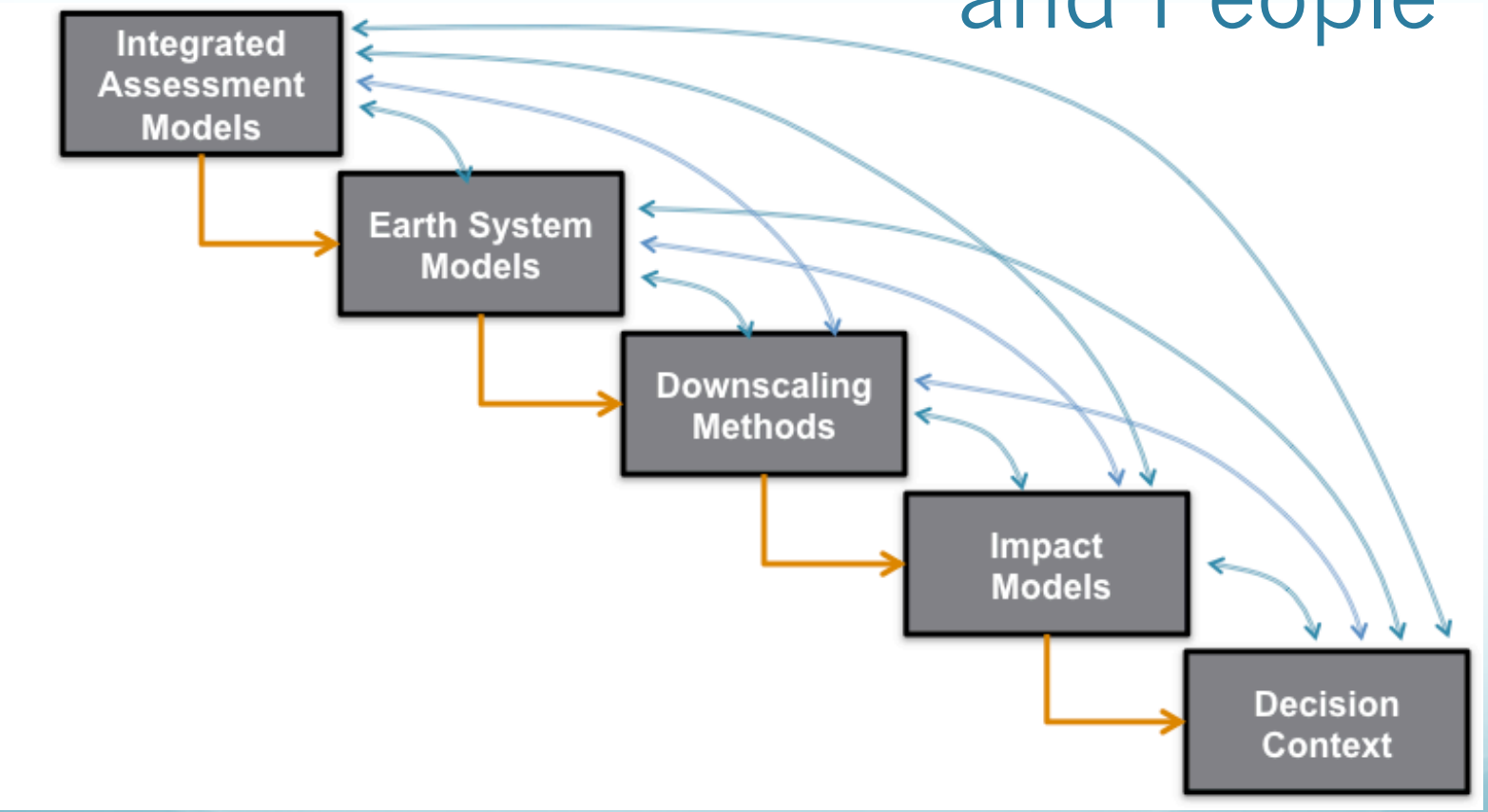
Model

Model

Model

Wehner et al., 2014, JAMES

Chain of Models
and Uncertainties
and People



Meeting Objectives

- Not a comprehensive stakeholder engagement process

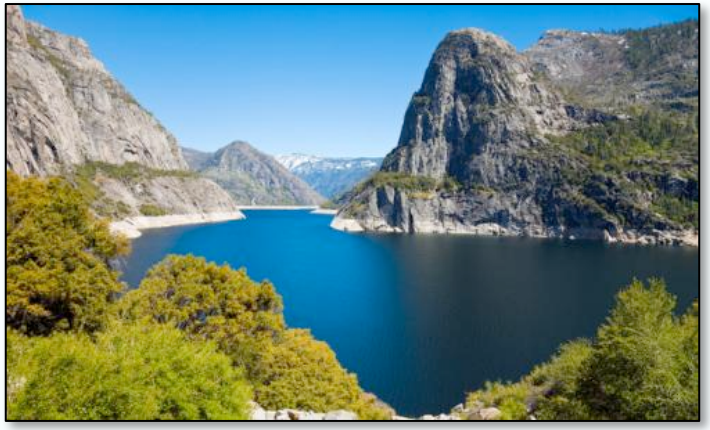
- Rather a deep dive into a handful of case studies
  - Demonstrate what has and has not worked
  - Explore how existing and forthcoming tools could be applied for various needs
  - Build relationships necessary for progress
  - Develop recommendations for moving the broader community forward

Overview of the Week

Monday	Tuesday	Wednesday	Thursday	Friday
Foundational Talks	Use Cases	Use Cases	Key Insights and Gaps	Synthesis Report & Recommendations
	Uncertainty and Model Skill		Breakouts	
Mixer	Public Lecture	Happy Hour	Dinner	

Use Cases

Water Resources



Agriculture

Urban and Coastal Infrastructure

Health

Photo by Sanjeev Gupta/EPA

Outcomes – Improving the Dialogue

There is a lack of knowledge on the part of users as to the limitations and/or skill reflected in high reso models.

There is a need for greater collaboration among users and scientists in the delivery of data and climate information in a manner that can inform and support planning in the timeline necessary for planning and investments.

Users and producers would benefit from a forum or process that would encourage longer-term coordination, especially in considering next round of GCM refinements

We need creative ways to align motivations/incentives or to foster co-benefits for hi-res modelers (producers) and users of hi-res.

Perhaps there should be a certification process for boundary spanners/organizations or best practices guidance, etc.

Outcomes – Developing the Knowledge Base

There has been insufficient research comparing different means of downscaling (statistical vs. dynamical), so it is very difficult to choose among the various methods.

Some way of enabling robust and efficient evaluation of downscaling methods by end-users would be useful.

We need to focus on considering the different approaches that are needed for different purposes.

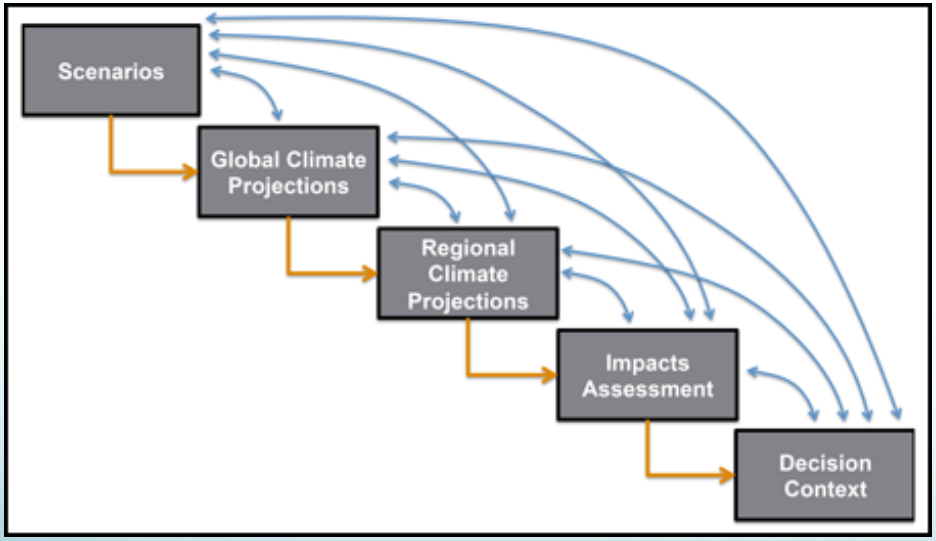
Harnessing methods and capacity from artificial intelligence/data mining communities could provide innovative ways to sift through, evaluate and manage climate data.

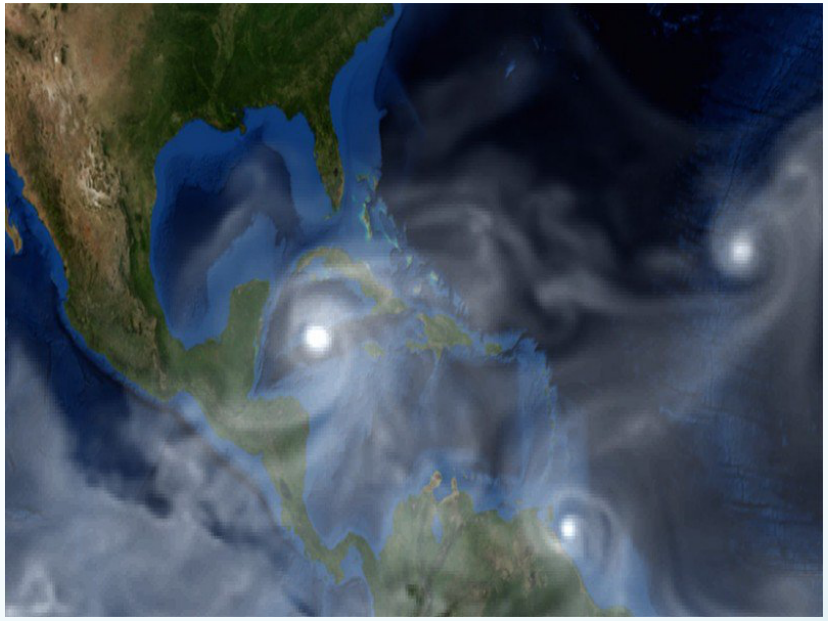
We need to evaluate alternative methods for assessing and communicating credibility / uncertainty information.

EOS Report

Climate Modeling with Decision Makers in Mind

Impact Relevance and Usability of High Resolution Climate Modeling and Datasets; Aspen, Colorado, 2–7 August 2015





Jones, A., K. Calvin, and J.-F. Lamarque (2016), Climate modeling with decision makers in mind, *Eos, 97,* doi:10.1029/2016EO051111. Published on 27 April 2016.

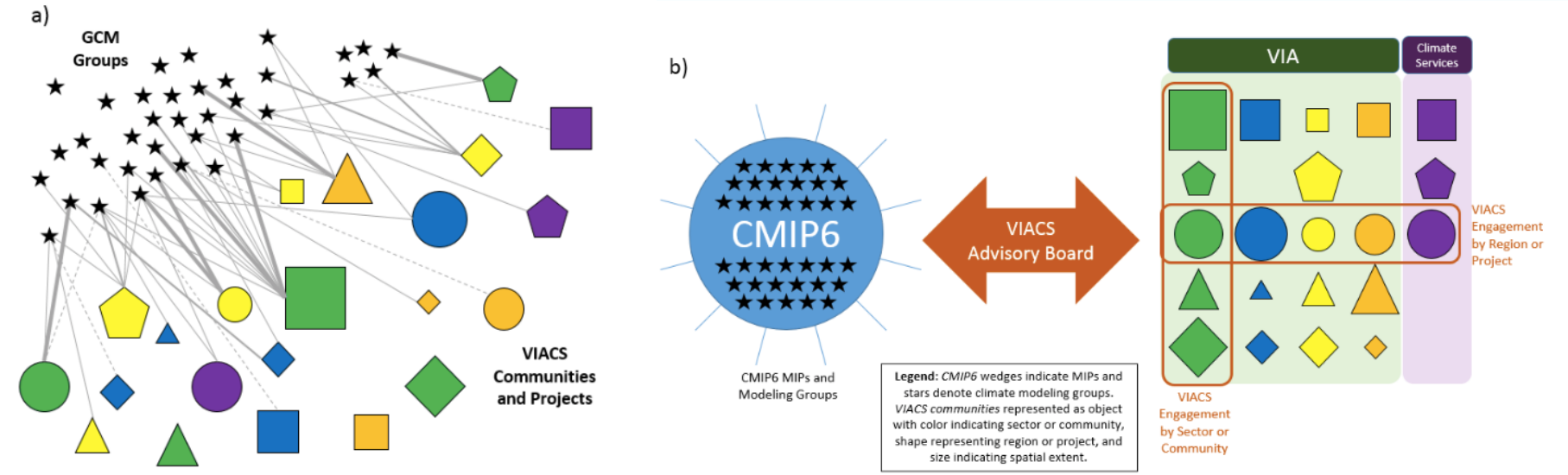
Related Activities

SERDP Report

Strategic Environmental Research and Development Program

VIACS

Vulnerability, Impacts, Adaptation, and Climate Services Advisory Board



Ruane et al. The Vulnerability, Impacts, Adaptation and Climate Services (VIACS) Advisory Board for CMIP6

Project Hyperion