



*... for a brighter future*

# ***Climate Change and National Security***



***Presented to 77<sup>th</sup> MORS Symposium***

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# Topics

- A Timeline of the National Security Interest in Climate Change
- What are the National Security Implications?
- A Comment on the State of the Science
- Incorporating Climate Change Impacts into National Security Planning
- Summary and Conclusions

# *A Timeline of the National Security Interest in Climate Change – The Discussion is not New*

- In 1974, the CIA commissioned a study on the “Potential Implications of Trends in World Population, Food Production, and Climate
- In 2003, a report was prepared for DoD called “An Abrupt Climate Change Scenario and Its Implications for United States National Security”
- In 2007, the Center for Naval Analysis published a report by 11 retired flag officers on “National Security and the Threat of Climate Change.”
- In 2008, the National Intelligence Council published “Global Trends 2025: A Transformed World”

# The 2007 CNA Report was the “Ground Shaker”

## Quotes from the CNA Report

“It’s not hard to make the connection between climate change and instability, or climate change and terrorism.”

Gen Anthony Zinni, USMC (Ret),  
Former US CENTCOM CINC

Adm. T. Joseph Lopez, USN (Ret),  
Former CINC, U.S. Naval Forces Europe  
and of Allied Forces, Southern Europe

“Climate change will provide the conditions that will extend the war on terror.”

“I wasn’t convinced by a person or any interest group—it was the data that got me.”

Vice Adm. Richard H. Truly, USN (Ret),  
Former NASA Administrator, Shuttle  
Astronaut, and 1<sup>st</sup> Command of Naval  
Space Command

# *What are the National Security Implications? CNA Report Findings*

1. Projected climate change poses a serious threat to America's national security
2. Climate change acts as a threat multiplier for instability in some of the most volatile regions of the world.
3. Projected climate change will add to tensions even in stable regions of the world.
4. Climate change, national security and energy dependence are a related set of global challenges

# *What are the National Security Implications? CNA Report Recommendations (1 of 2)*

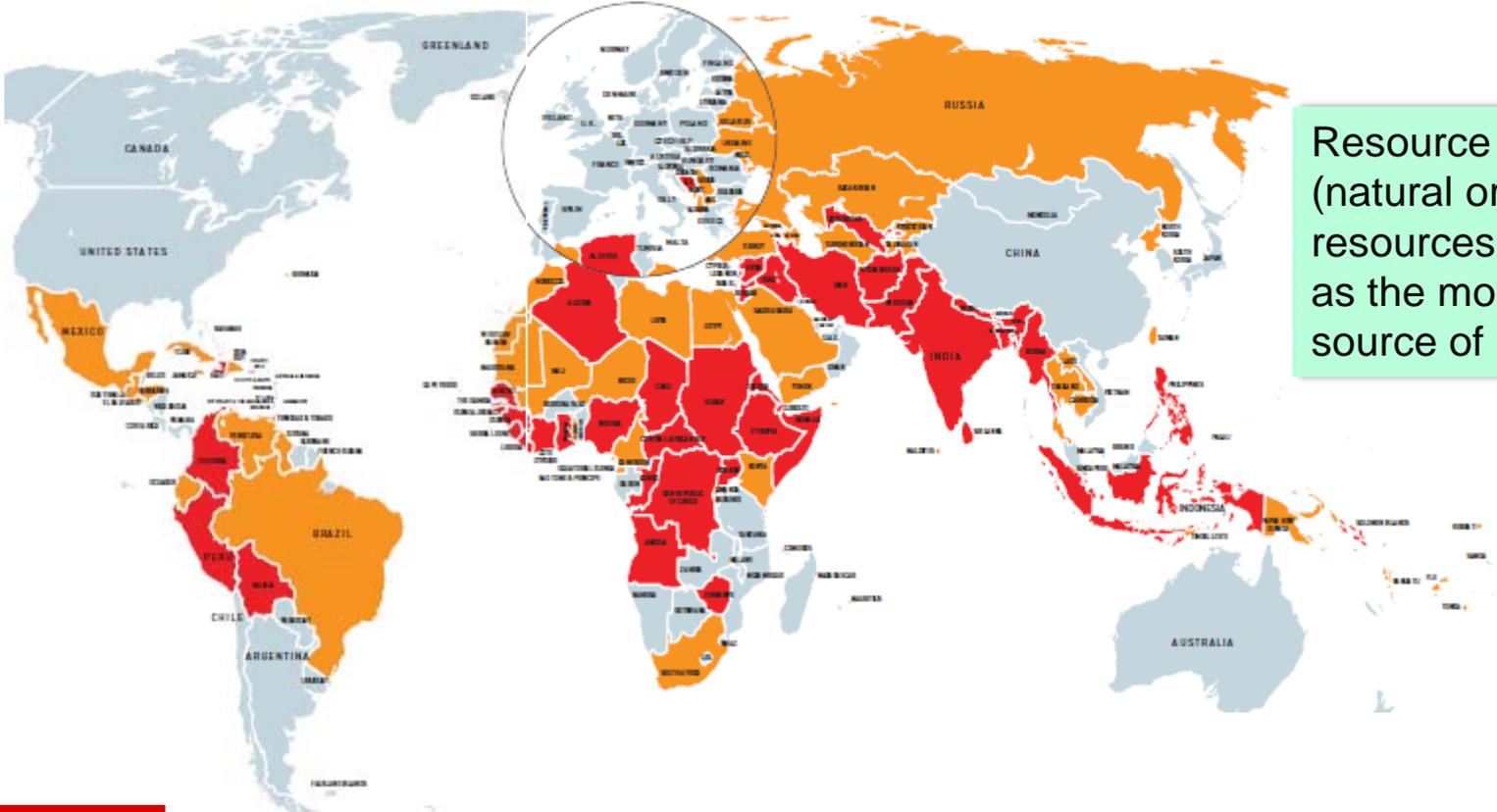
1. The national security consequences of climate change should be fully integrated into national security and national defense strategies
2. The U.S. should commit to a stronger national and international role to help stabilize climate changes at levels that will avoid significant disruption to global security and stability.
3. The U.S. should commit to global partnerships that help less developed nations build the capacity and resiliency to better manage climate impacts.

# *What are the National Security Implications? CNA Report Recommendations (2 of 2)*

4. The Department of Defense should enhance its operational capability by accelerating the adoption capability by accelerating the adoption of improved business processes and innovative technologies that result in improved U.S. combat power through energy efficiency.
5. DoD should conduct an assessment of the impact on U.S. military installations world-wide of rising sea levels, extreme weather events, and other possible climate change impacts over the next 30 to 40 years.

# CNA Recommendation #1 – Integrate Impacts of Climate Change Into National Security Strategies

## Anticipated Areas of Conflict or Political Instability



Resource competition (natural or energy resources) is postulated as the most common source of conflicts



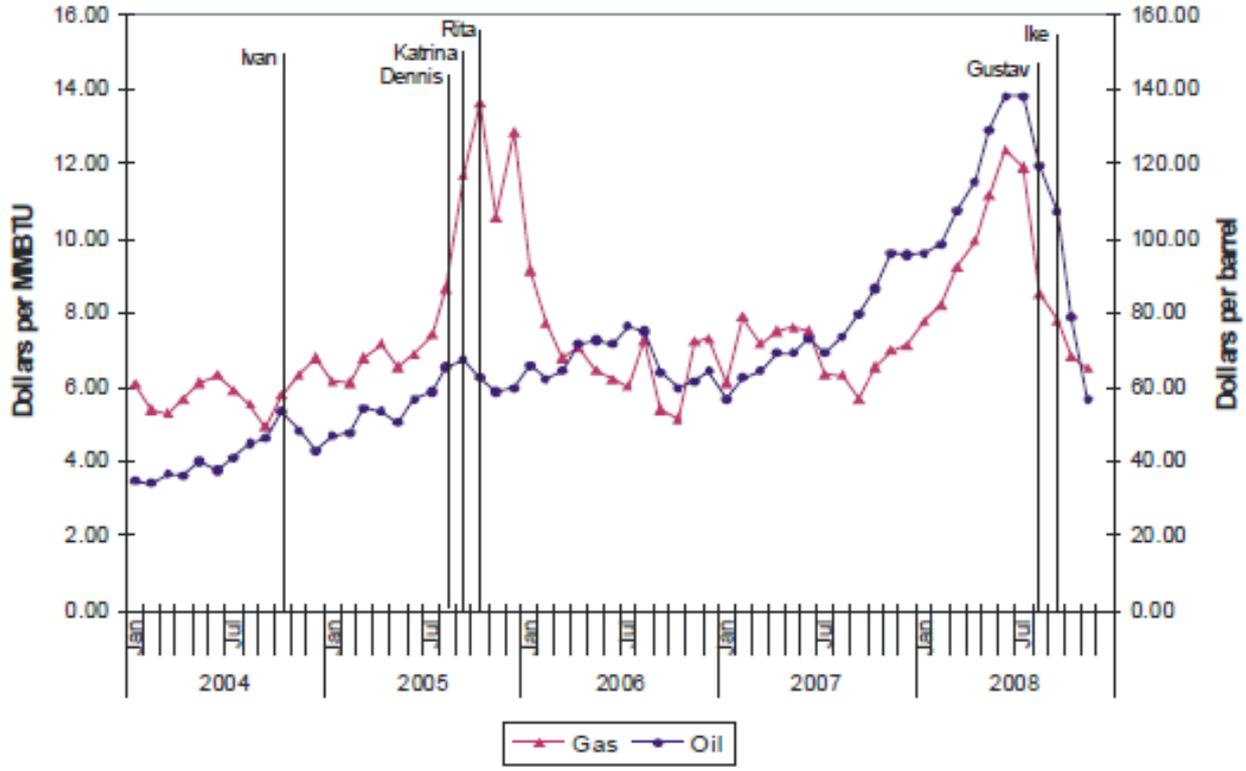
States facing a high risk of armed conflict as consequence of climate change



States facing a high risk of political instability as consequence of climate change

# CNA Recommendation #1 – Integrate Impacts of Climate Change Into National Security Strategies

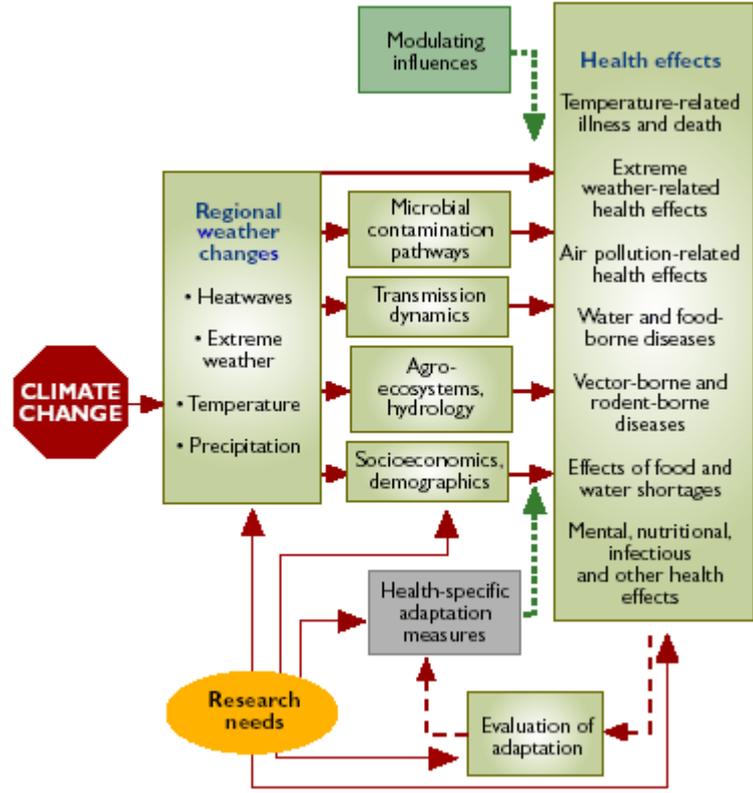
## Impacts from Extreme Events on Spot Energy Prices and Availability



Louisiana Department of Natural Resources/Technology Assessment Division

# CNA Recommendation #1 – Integrate Impacts of Climate Change Into National Security Strategies

## Health Impacts from Climate Change

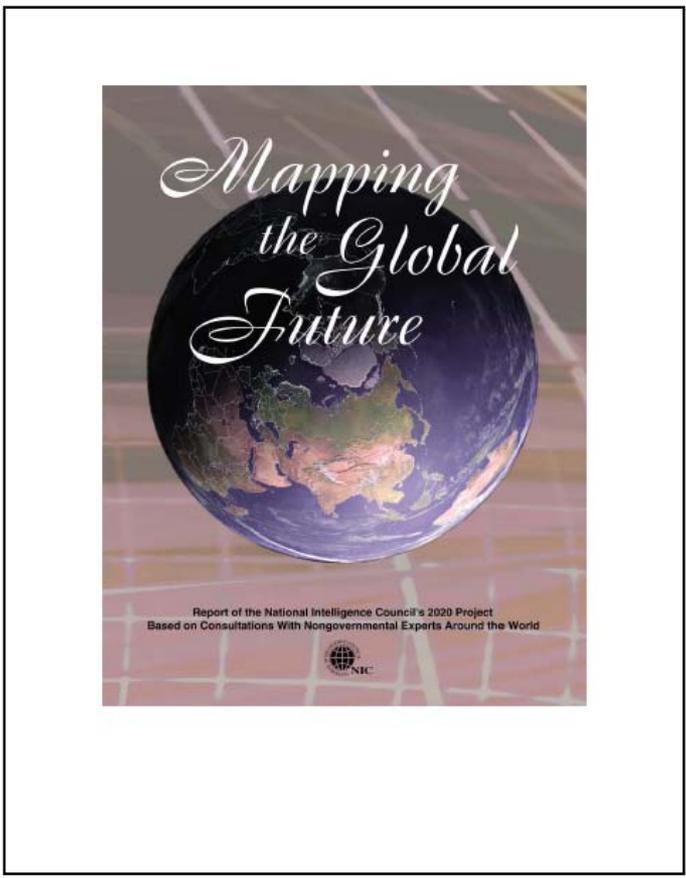
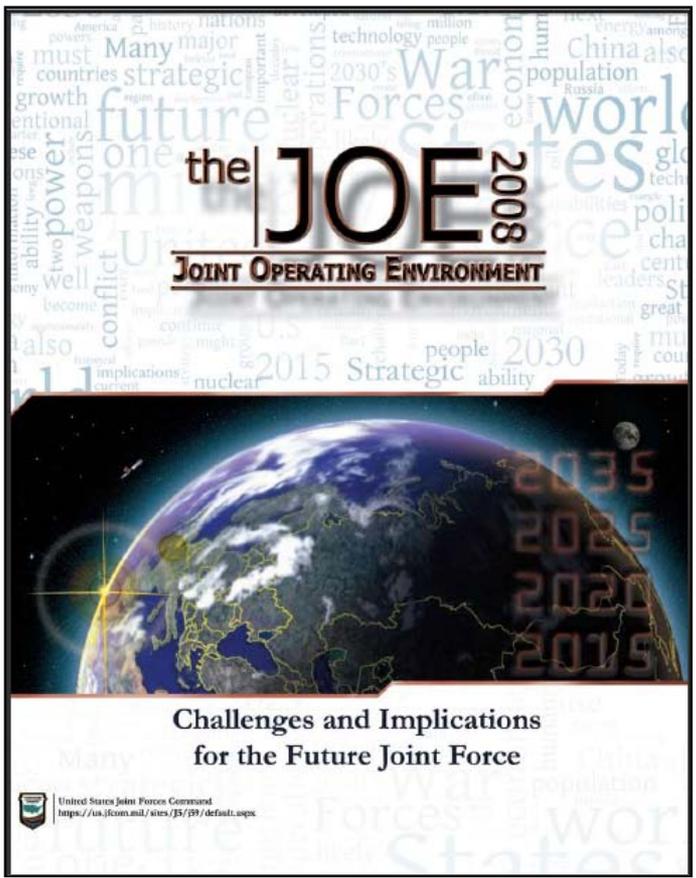


- The World Health Organization (WHO) has estimated that global warming is already causing ~150,000 excess deaths a year.
- In the summer of 2003, an extreme heat wave in France and Italy caused an estimated 22,000 to 45,000 deaths from temperature-stress related effects

Source: WHO

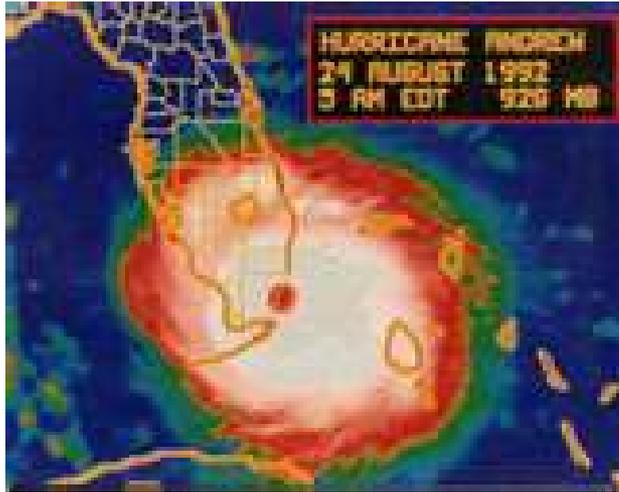
# CNA Recommendation #1 – Integrate Impacts of Climate Change Into National Security Strategies

## DoD and NIC are Taking Climate Change Impacts into Consideration into their Analyses



# CNA Recommendation #5 – Impact on DoD Facilities

## Impacts from Extreme Weather Events



- In 1992 Hurricane Andrew hit the Bahamas, Florida, and Louisiana, causing and caused an estimated \$30B in damages
- Homestead AFB was severely damaged and ultimately closed
- Keesler AFB was heavily damaged during Katrina
- Other DoD facilities were damaged by Katrina, impacting relief operations



# *CNA Recommendation #5 – Impact on DoD Facilities*

## *Critical DoD Facilities at Risk From Sea Level Rise*



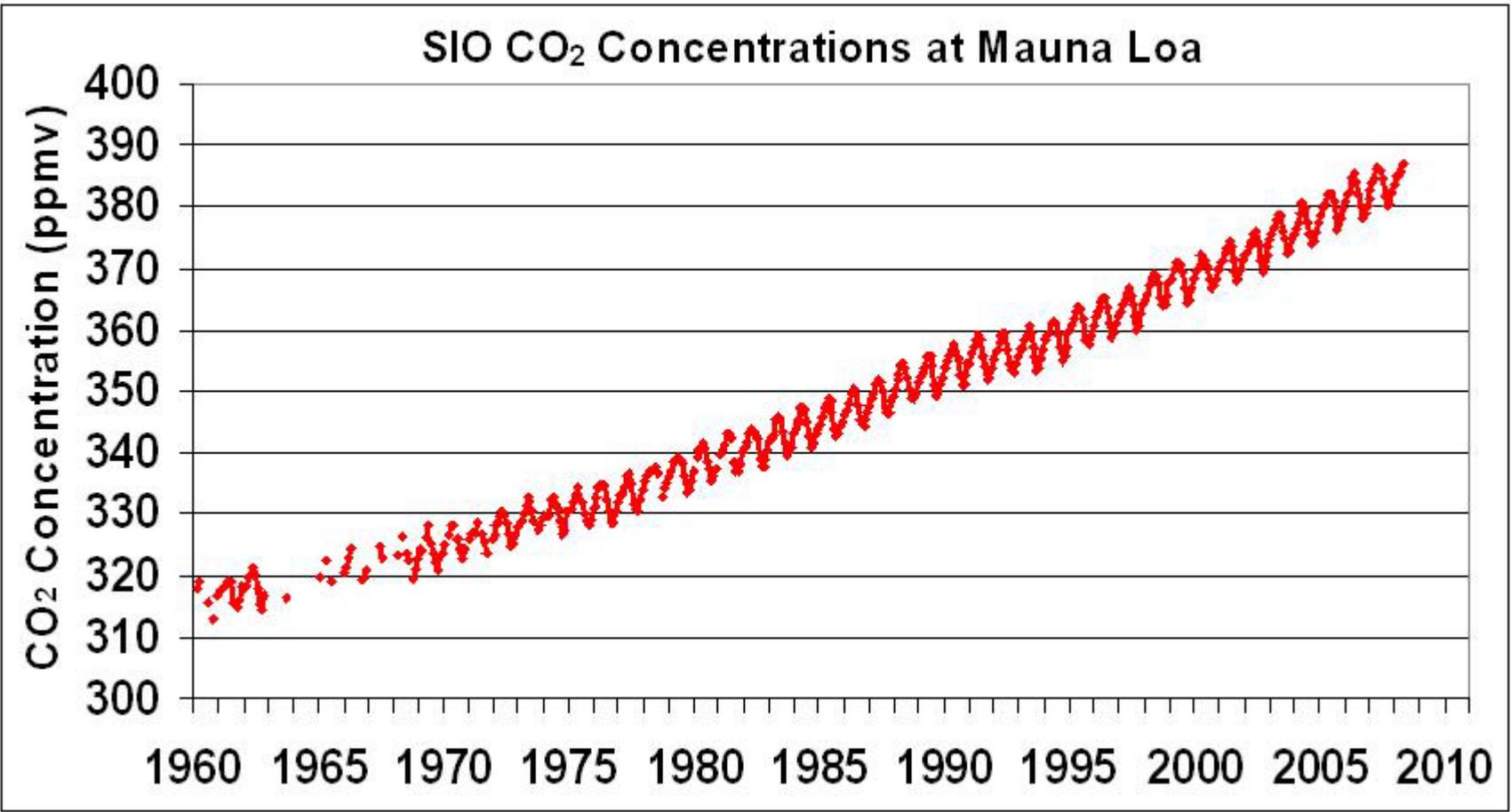
Kwajalein Atoll, Space Operations and Missile Tests

Diego Garcia, Logistics Hub and Staging Area



# Comments on the State of the Climate Science

## Observational Evidence



# Comments on the State of the Climate Science Consensus of the Modeling Community

- The fact that carbon dioxide is a greenhouse gas has never been in dispute – although the debate on its impact has been vigorous
- The debate over the last ~150 years has varied:
  - Up to mid1970's, the debate was over the sign (+/-) of the impact
  - Up to mid 1980's, the debate was over the magnitude of the impact
  - Up to ~ 2007, the debate was over the existence of other mitigating climate feedback mechanisms
  - In 2007, the United Nation's Intergovernmental Panel on Climate Change issued its first report with a finding of consensus on the issue

# Comments on the State of the Climate Science Consensus Statements from the IPCC 2007 Report

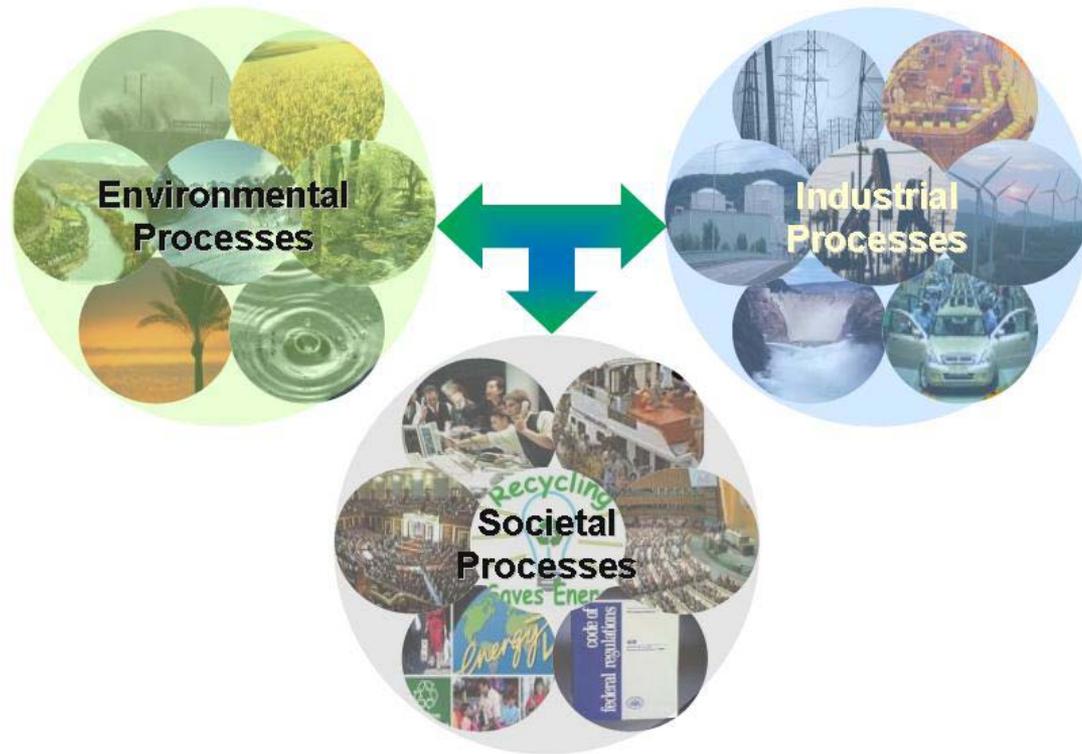
Phenomenon and Direction of Trend	21st Century Likelihood
Over most land areas, warmer and fewer cold days and nights, warmer and more frequent hot days and nights	Virtually certain
Warm spells/heat waves. Frequency increases over most land areas	Very likely
Heavy precipitation events. Frequency increases over most areas	Very likely
Area affected by drought increases	Likely
Intense tropical cyclone activity increases	Likely
Increased incidence of extreme high sea level (excluding tsunamis)	Likely

*Sources:* IPCC Interim Working Group Report 1, April 2007; IPCC Synthesis Report, November 2007.

- In the general scientific community and among the individual panel members, it was felt that the IPCC report was too conservative, especially in regards to the rate of sea ice and glacier melting – which has been supported by recent data

# *Incorporating Impacts of Climate Change in National Security Planning*

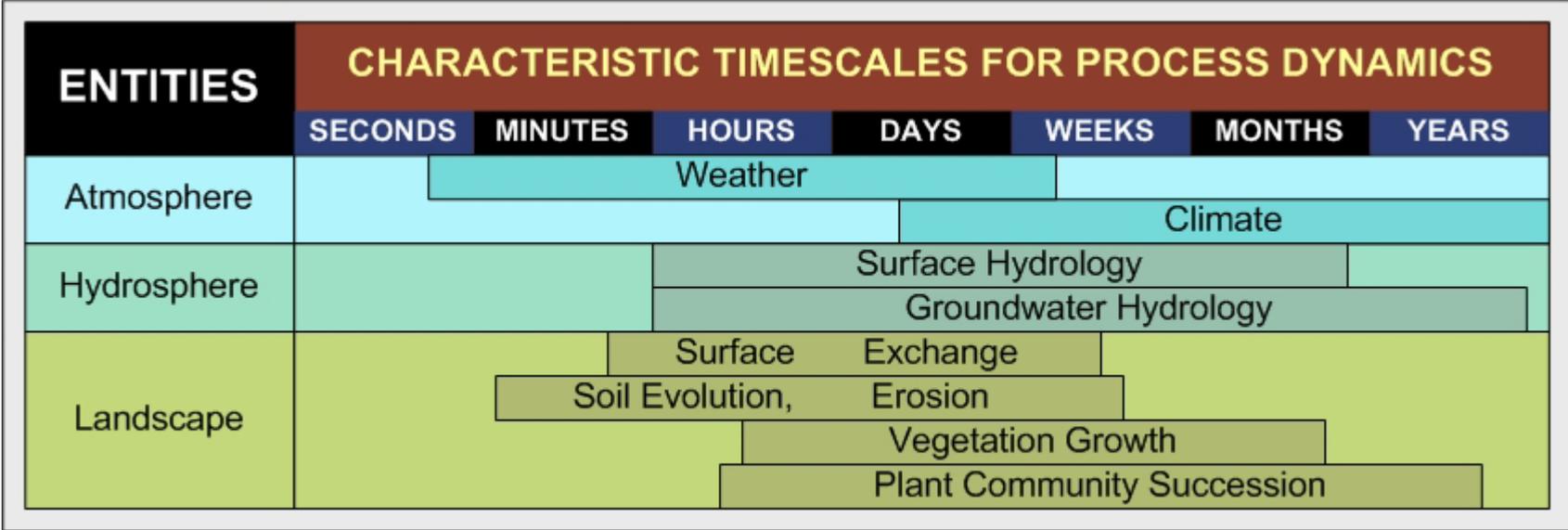
- The way forward plan involve developing an integrated framework that dynamically couples environmental, industrial, and social processes and evolves them over generational time scales



# Incorporating Impacts of Climate Change in National Security Planning

## The Computational Challenges in Climate Modeling are Considerable

- The current raft of climate models are already pushing the state of the art in the supercomputer community

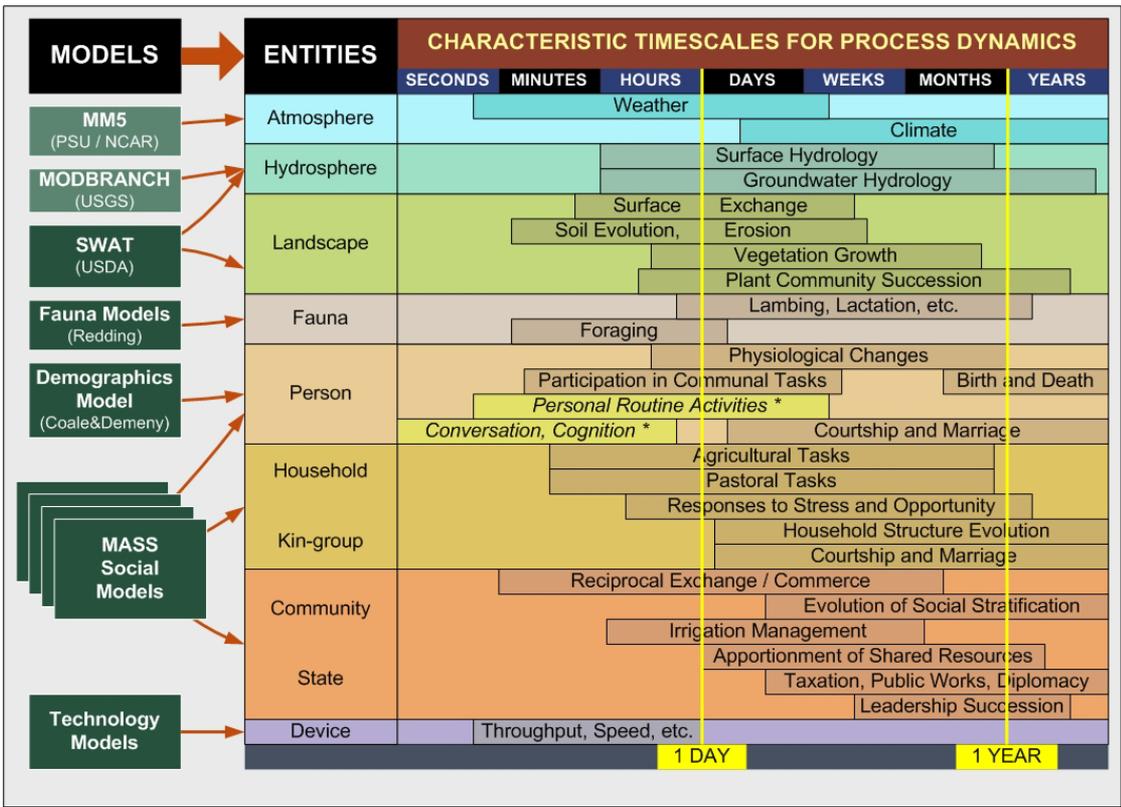


From Argonne's "Modeling of Ancient Settlement Systems"

# Incorporating Impacts of Climate Change in National Security Planning

## The Computational Challenges In Considering the Integrated Impacts on Society are Even Greater!

- Adding in the industrial and social processes will considerably increase the scales of the modeling processes and the computational resources required (i.e., petascale levels)



From Argonne's "Modeling of Ancient Settlement Systems"

# Energy-Environment-Security Interactions

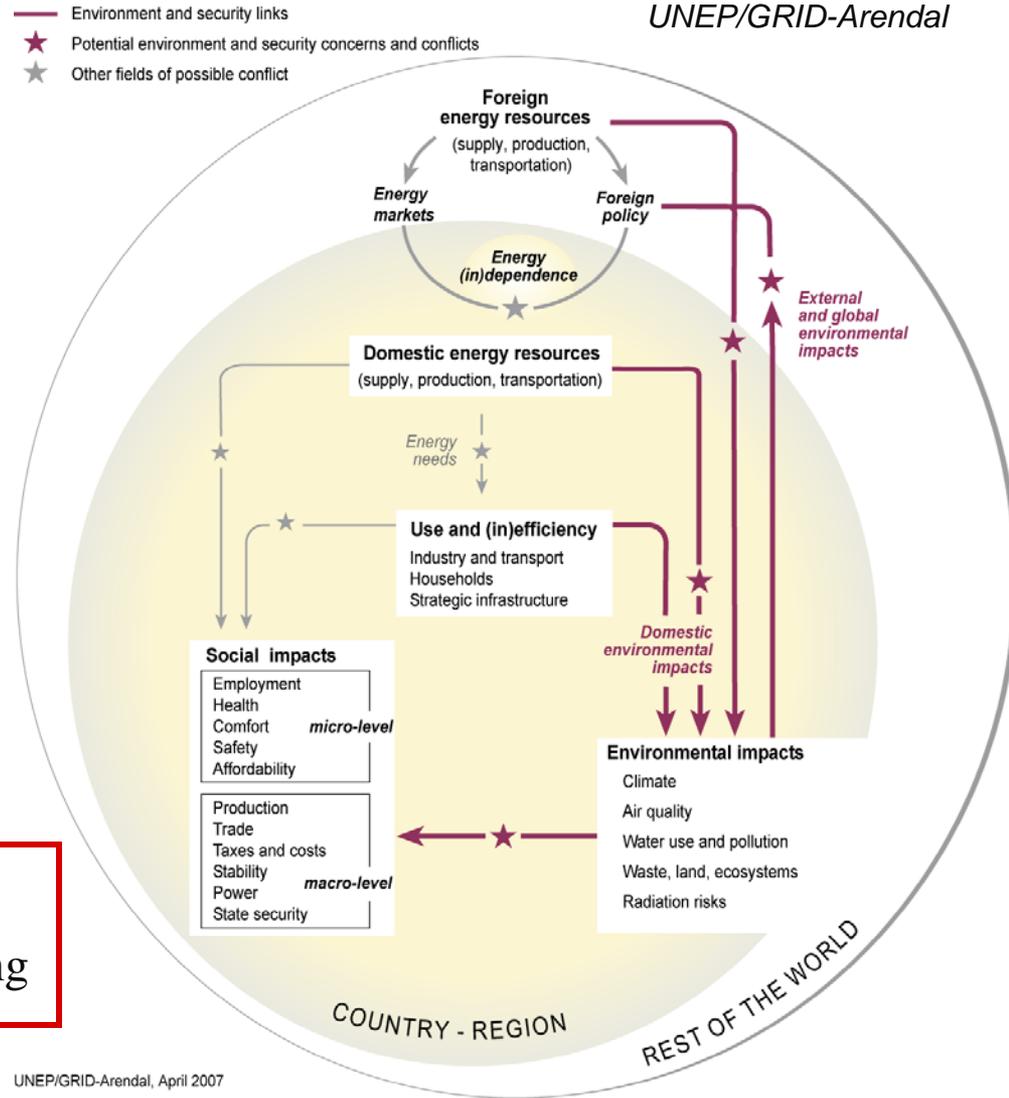
Viktor Novikov,  
UNEP/GRID-Arendal

## Another View - Russia

### ■ Concerns

- Energy resources and uses, domestic and foreign, impact the environment
- Environment impacts foreign policy impacts society at micro and macro levels
- All societal impacts interact to affect national security

Environment Impacts Need to be Quantified for National Security Planning



# Generating Climate Change Data for use in National Security Planning

- Proposed Steps (based on generation and use of 40-yr NCEP data sets)
  - Start with an existing GCM and climate change data sets
    - *Several GCMs exist (NCAR, GISS, COLA, CSIRO, etc.)*
    - *Data sets generated for climate studies do not have sufficient resolution (temporal or spatial) for National Security Planning*
  - Select a regional mesoscale atmosphere model
    - *Use the climate change data sets as boundary and forcing conditions for the mesoscale model*
    - *Generate atmosphere data sets with adequate spatial and temporal resolution for National Security Planning*
- Potential Issues
  - GCMs differ but not significantly for this application
  - Climate change data sets depend on initial assumptions
  - Updates may be required with changing knowledge

# Summary

- The observational evidence of the sources and continuing increases in CO<sub>2</sub> is conclusive
- The observational evidence of significant changes in critical environmental factors (e.g., glacier retreat, ice pack melting, habitat loss, vanishing species, etc.) is compelling that something is causing the climate to change with potentially significant environmental, political, social, and economic consequences

# Conclusions

- Is the modeling and simulation mature enough to make definitive predictions – no.
- However, it is felt to be mature enough to start the development of response and mitigation strategies.

“We never have 100 percent certainty. We never have it. If you wait until you have 100 percent certainty, something bad is going to happen on the battlefield.”

Gen Gordon R. Sullivan, USA (Ret), Former Chief of Staff, U.S. Army  
Commenting on Risk in the CNA Report “National Security and Threat of Climate Change”

# Questions?

