

Assessment of Climate-Change-Induced, Physical and Societal Security Dynamics

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The mission of Sandia National Laboratories (SNL) is (inter)national security. It strives to be the “laboratory that the U.S. turns to first for innovative, science-based, systems-engineering solutions to the most challenging problems that threaten peace and freedom for our nation and the globe.” SNL maintains close working relationships among the many agencies within the Intelligence Community (IC) and DoD. Further, it actively contributes to the climate-change community through the advancement of innovative high-resolution methods and high-performance computing.¹ In addition SNL’s Consequence Evaluation and Validation component has spent years developing analysis capabilities to address climate-induced conflict creation, impacts, and mitigation.²

Both the Intelligence Community (*The War on Terror*³) and the Department of Defense (*Global Warming Called Security Threat Future*,⁴ *National Security and the Threat of Climate Change*,⁵ *Impacts of Climate Change*⁶) now recognize the urgent need to address the near-term impact of climate change on emergent security dynamics and intervention capabilities. The UK Ministry of Defense previously devoted over one-third of its analysis on threats due to climate change (*Global Strategic Trends: 2007-2036*⁷). SNL has previously recognized all the security concerns that the current reports now acknowledge. SNL briefed both Intelligence Agencies and DoD representatives over the last few years on evolving climate-induced threats and nation-state destabilization.



As discussed in the aforementioned reports, climate will provide conditions that increase border tensions, reduce the abilities of allies to respond, and produce an environment ripe for breeding terrorism and extremism. The military authors of the CNA report note “that climate instability will lead to instability in geopolitics and impact American military operations around the world.” Most importantly, the DoD report (*Impacts of Climate Change*), notes the critical need to substantiate climate concerns by developing analytical tools to

ensure self-consistency, realism, validation, and a concrete foundation for strategic/tactical and operational execution. SNL’s long history of high performance simulation and analysis, along with its expertise in high-resolution climate change⁸ and behavioral socioeconomics⁹ modeling, makes it an ideal source for the comprehensive, integrated (and often classified) analytical

¹ Spatz, William F, Mark A Taylor, “[A Massively Parallel Scalable Atmospheric Model](#),” *SAND Report*, December 2006.

² Boslough, Mark B, GA Backus, et. al., “[Climate Change Effects on International Stability Paper](#),” *Report*, December 2004.

³ http://grist.org/news/muck/2007/04/05/climate_NIE/index.html

⁴ <http://www.nytimes.com/2007/04/15/us/15warm.html>

⁵ <http://securityandclimate.cna.org/report/>

⁶ <http://www.gbn.com/climatechange/index.html>

⁷ <http://www.mod.uk/DefenceInternet/AboutDefence/CorporatePublications/DoctrineOperationsandDiplomacyPublications/DCDC/>

⁸ <http://www.cs.sandia.gov/capabilities/ClimateSimulation/index.html>

⁹ <http://www.cs.sandia.gov/capabilities/AgentBasedModeling/index.html>

support required to address the interacting dynamics of climate change and (inter) national security.

The recent studies focus on conditions the authors believe will affect future security, both by comparing historical analogies and recognizing approaching, unprecedented circumstances. The SNL work indicates that this approach will miss the more critical dynamics and feedback processes that affect (and control) outcomes. Dynamics that lead to failed-nations, societal destabilization, or military conflict are driven by coping-capacity combined with drastic changes in circumstance versus expectation. SNL can rigorously simulate the migratory, social disruption, conflict evolution, and interregional dynamics of climate-induced security concern.¹⁰ Further, local problems, such as those to extreme weather events, are what lead to global crises. SNL can provide the probabilistic forecasts of local climate conditions, as well as evaluate the transformation of military assets and capabilities needed to respond to the new physical and political conditions – including operational mission support on a global basis.

For example, SNL can implement climate-responsive tools to:

- Determine population and economic migration from water, disease, and agricultural stresses.
- Evaluate interregional tensions and potential conflict evolution.
- Assess evolving nation-state societal and political stability (including terrorist exploitation).
- Analyze economic shifts and conflicts from Arctic-route trade expansion.
- Examine economic/political dislocations from Subcontinent/Chinese loss of glacial water and increased extreme weather.
- Establish requirements for transformed military intervention needs.
- Provide tools for IC and military logistics in light of climate change extremes.
- Assist the IC and military in studies and reports for strategic and tactical planning.



SNL is partnered with the National Center for Atmospheric Research, and the combined organizations have the ability to validly quantify climate change impacts as they affect security and Intelligence Community/Military responsibilities. SNL will work diligently to ensure it serves its mission that the “primary national security laboratory that federal agencies call on to help solve the nation’s most difficult problems.”

¹⁰ Backus, George A, MB Boslough, "[Agent Model Development for Assessing Climate-Induced Geopolitical Instability.](#)" *SAND Report*, December 2005; Sprigg, James A, Jr., "[On the Use of Social, Economic, and Political Factors to Forecast Instability.](#)" *Report*, February 2005; Sprigg, James A, Jr., "[A Maximum-Likelihood Search for Escalatory Ethnic Dominance.](#)" *Journal Article*, International Political Science Review, Report 2005; Backus, George A, RJ Glass, "[An Agent-Based Model Component to a Framework for the Analysis of Terrorist-Group Dynamics.](#)" *SAND Report*, February 2006; Sprigg, James A, Jr., G A Backus, et. al., "[A Framework for Modeling the Impacts of Terrorism on Confidence and the Economy.](#)" *SAND Report*, March 2006.