Developing a Versatile Climate Intervention Risk-Risk Framework for National Security Applications

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Background/Objectives. Climate intervention (also referred to as geoengineering or climate engineering) is a large-scale endeavor to alter the Earth's climate to counteract the effects of ongoing climate change. Intervention strategies such as solar radiation management and carbon dioxide removal are being explored as adjuncts to climate change mitigation and adaptation efforts. Even though climate change poses increasing, complex risks to the environment and humanity, there has not been widespread, systematic action to adequately reduce global greenhouse gas emissions. Future climate stressors may compel actors to initiate climate interventions to alleviate climate change impacts, but unforeseen and disparate consequences could result in political, environmental, and humanitarian crises. Assessments of the risks of climate intervention will be needed to inform policy and prepare for potential scenarios. Existing climate models can predict with varying degrees of confidence how certain interventions may impact environmental parameters (e.g., temperatures and precipitation patterns). However, gaps still exist in understanding and connecting environmental changes for any given intervention with scenario-specific national security threats, vulnerabilities, and consequences. We devised a risk-risk framework to assess the unintended consequences of an intervention in comparison to various climate change and global governance futures. The framework provides a logical flow to evaluate unequitable impacts of interventions with a focus on environmental and ecological impacts and downstream political instability.

Approach/Activities. Our risk assessment framework is based on asking a series of questions and follows a tiered approach to assessing the impacts of a chosen climate intervention and a given climate and geopolitical scenario. Importantly, this approach fills a critical gap in that it employs a "risk-risk" methodology wherein an intervention scenario is compared against the risks of the non-intervention scenario where climate change is allowed to proceed unabated. The framework includes a tool for meta-analysis of future geopolitical and climate scenarios, which permits the user to analyze the type of intervention, intended outcome, and scale of deployment that future actors may pursue.

Results/Lessons Learned. For this presentation, we have chosen a worked example with strong literature support for both the climate intervention – stratospheric aerosol injection – and the customer scenario – risk of geopolitical instability due to precipitation changes in South America. We will present a case study on how the framework can be used to determine whether moderate stratospheric aerosol injection exacerbates climate change effects in Peru, a country with underlying political and social inequalities that make it more vulnerable and at higher risk for instability. The framework outputs a relative risk assessment matrix to aid policymakers in weighing positive and negative outcomes, guiding strategic planning decisions. Unique aspects of this approach include end-to-end risk connections, drawing out specific geopolitical risks, and a more formalized risk assessment wherein risks are ranked to better understand severity. Our work has also identified uncertainties and needs to collect more data in order to develop algorithms for improved modeling of political and security risks.