Near-Term Climate Risks and Solar Radiation Modification: A Roadmap Approach for Physical Sciences Research

Alex Wong (awong@silverlining.ngo) and Kelly Wanser (SilverLining, Washington, DC, USA)

Background/Objectives. Current impacts and escalating risks of climate change highlight the urgency of research to enhance safety for human and natural systems, especially for those most vulnerable. This is reflected in two recent U.S. National Academies of Science, Engineering, and Medicine studies that recommended a national focus on advancing our understanding of how to manage urgent current and near-future climate risks, and the need to study approaches for increasing the reflection of sunlight from the atmosphere to reduce global warming, commonly known as solar radiation modification (SRM). We build on these recommendations by proposing a roadmap approach for the planning, coordination, and delivery of research to support a robust physical science assessment of SRM to reduce near-term climate risks in an urgent timeframe.

Approach/Activities. The roadmap approach is designed to support the evaluation of SRM as a possible rapid, temporary, additive measure to reduce catastrophic impacts from anthropogenic climate change, while emphasizing that SRM is not a substitute for aggressive GHG mitigation. Assessing SRM is proposed to be undertaken in the context of near-term climate risks (e.g, through 2050), weighing the impacts associated with likely climate change trajectories against scenarios of possible SRM implementations. As such, the research roadmap would address two main objectives. First, it would characterize key physical processes of SRM approaches, particularly constraining uncertainties in aerosol science in a way that would also reduce uncertainties in near-term climate prediction generally. Second, it would evaluate near-term climate impacts and risks under multiple SRM and non-SRM scenarios. This “risk-risk analysis” is essential to evaluating SRM in the context of maximizing near-term climate safety.

Results/Lessons Learned. We propose a five-year research roadmap which would parallelize improvements in observational capacity, Earth system modeling and impact analyses, and indoor and outdoor aerosol studies. Provided that research is undertaken openly and that scientific resources are made widely available, the transparency of the process and the evidence generated will support the democratization of information, participation by diverse stakeholders, more informed decision-making, and better opportunities for all people to weigh near-term climate risks with and without climate interventions.