**Proposed Study for NASA Research Announcement (**[**NNH17ZDA001N-HAQ**](https://nspires.nasaprs.com/external/solicitations/summary%21init.do?solId=%7BD8C7A6B4-ABDC-C9DD-6EC7-09B41E02A5C7%7D&stack=open)**)**

**entitled "Earth Science Applications: Health and Air Quality"**

**Short Title**: Improving Mongolian Air Quality Monitoring and Forecasting

**Title**: Utilizing Earth Observations to Improve Air Quality Monitoring and Forecasting in Ulaanbaatar, Mongolia

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Air quality forecasting and associated decision-making will be improved for the highly polluted and densely populated Ulaanbaatar, Mongolia basin using NASA earth observations on the basis of recent research on winter air pollution in urban basins in complex topography in the United States. A critical component of this study will be intensive hands-on training of Mongolian officials to utilize the forecasting tools and techniques developed as part of this study, so that sustainable improvements in air-quality forecasting, public communication, monitoring, and decision-making are realized within the National Agency for Meteorology and Environmental Monitoring (NAMEM) of Mongolia and the Mongolian National Broadcaster (MNB; the National Agency for Television and Radio). The realized enhancements to NAMEM and MNB will be rigorously demonstrated through a comprehensive pre- and post-evaluation study. The managers of both the air quality and meteorological sections of the NAMEM and the Mongolian National Broadcaster (MNB; the National Agency for Television and Radio) are willing to work with us to ensure the effective implementation and sustainability of this project.

This study will rely on a step-by-step approach (Fig 1). First, we will develop effective tools and “forecast funnel” conceptual models for analysis and forecasting of wintertime pollution episodes in urban basins using NASA earth observations. The tools will be carefully tested to determine the strengths and weaknesses of the earth observation components. Second, we will visit Mongolia and collaborate on the most effective ways to develop training material and transfer of expertise and capabilities to the Mongolian agencies. Third, we will conduct several multi-week training workshops at NAMEM to train operational forecasters and scientists in using the developed tools.

The proposed synthesis of extensive NASA earth observations with expertise on wintertime stable boundary layers, air quality, and pollution forecasting has never before been conducted. The suite of NASA earth observations utilized are expected to result in a "mountain basin" particulate pollution forecast and analysis capability that will be among the best in the world. This step-by-step approach will be well-documented and disseminated publically so that it is portable and relevant to other urban basins. The strengths and weaknesses of existing NASA earth observations for use in air quality monitoring and forecasting in complex terrain during wintertime pollution episodes will also be illuminated through the rigorous evaluation of the NASA earth system products.

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| Figure 1. Flow chart illustrating the key infrastructure, air quality analysis and forecasting deliverables and decision-making pathways in this study. Please see the project management and schedule section for dates of deliverables and listing of corresponding NASA Application Readiness Level (ARL). |