Assessing Climate-Induced Change in River Flow and Economic Output using Satellite Remote Sensing and Process and Economic Modeling in High Mountain Asia

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Snow- and glacier-fed river systems originating from High Mountain Asia (HMA) support diverse ecosystems and provide the basis for food and energy production for more than a billion people living downstream. Climate-driven changes in the melting of snow and glaciers and in precipitation patterns are expected to significantly alter the flow of the rivers in the HMA region at various temporal scales, which in turn could heavily affect the socioeconomics of the region. Hence, climate change effects on seasonal and long-term hydrological conditions may have far reaching economic impact annually and over the century. We are developing a decision support tool utilizing integrated microwave remote sensing datasets, process modeling and economic models to inform water resource management decisions and ecosystem sustainability as related to the High Mountain Asia (HMA) region's response to climate change. The availability of consistent time-series microwave remote sensing datasets from Earth-orbiting scatterometers, radiometers and synthetic aperture radar (SAR) imagery provides the basis for the observational framework of this monitoring system. We discuss the assembly, processing and application of scatterometer and SAR data sets from the Advanced Scatterometer (ASCAT) and Sentinal-1 SARs, and the enlistment of these data to monitor seasonal melt and thaw status of glacier-dominated and surrounding regions. We present current status and future plans for this effort. Our team's study emphasizes processes and economic modeling within the Trishuli basin; our remote sensing analysis supports analyses across the HiMAT domain.