The 36th International Symposium on Remote Sensing of Environment,
11 – 15 May 2015, Berlin, Germany, ISRSE36-216

Title: Environmental Change and Space Infrastructure Resilience

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Abstract—Escalating concerns about the strategic impacts of environmental change will soon begin to affect space system requirements and budget priorities. Recent U.S. governmental policy directives require that potential climate change impacts be considered in Department of Defense and intelligence community planning activities. Various climate impacts are projected globally in this century, including: decreasing ice; rising sea levels; increased flooding; greater competition for water resources; adverse effects on farming and fishing; and increased number, intensity and duration of major weather events. The predicted impacts of these global changes are already becoming difficult to overlook, and the U.S. Department of Defense, the Census Bureau, and the Intergovernmental Panel on Climate Change, as well as numerous other organizations have identified specific regions and phenomena of significant concern. The focus of our research project is to better understand the impacts of changing climate scenarios on various infrastructure issues and requirements, and to explore new mission needs that are arising as a result of changing national and international priorities, missions, and technologies. Our approach is to cross-reference climate change threats with vulnerable geographic regions, then match existing space-based assets with potentially useful capabilities in suitable orbits (e.g., polar, low-inclination, or geosynchronous) to each regional threat pairing. Several examples of vulnerable regions and threats are: melting ice/opening seas in the Arctic; sea level rise near worldwide coastal military bases and launch facilities; severe storms and flooding in the Gulf Coast and Mississippi River Valley regions. This task will help us determine the gaps in our technological capabilities, leading to recommendations for future missions as well as greater interoperability and sharing of environment-related international information and communication assets.