

## Space-Based Hydrology of the Everglades Wetlands, South Florida

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The Everglades is a complex ecosystem providing critical habitat for a wide variety of plant and animal species. Anthropogenic changes in the past 50 years, mainly for water supply, agricultural development and flood control purposes, have disrupted natural water flow and severely impacted the regional ecosystem. In 1994, the U.S. Congress signed the Everglades Forever Act, providing an impetus for restoring this ecosystem, and in particular the natural water flow. This restoration involves precise measurement of water levels, near-real-time reporting of these data, assimilation into a numerical model, and appropriate decision-making and action by flood control managers to mimic long-term natural flow conditions. Everglades' water level is currently monitored by about 200 stage (water level) stations, which provide good temporal resolution, but suffer from poor spatial resolution, as they are distributed several, or even tens of, kilometers from one another.

Wetland application of Interferometric Synthetic Aperture Radar (InSAR) provides the needed high spatial resolution hydrological observations, complementing the high temporal resolution terrestrial observations. Although

conventional wisdom suggests that interferometry does not work in vegetated areas, several studies have shown that both L- and C-band interferograms with short acquisition intervals (1-105 days) can maintain excellent coherence over wetlands [Alsdorf et al., 2000; Lu et al., 2005; Wdowinski et al., 2004].

InSAR observations of South Florida provide spatially detailed, quantitative images of water levels in the Everglades. The new data capture dynamic water level topography, providing the first three-dimensional regional-scale picture of the Everglades sheet flow. The observations show localized radial sheet flow in addition to the well-known southward sheet flow. The space-based observations have been used to constrain both simple and detailed numerical models of the Everglades surface flow.

### References

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**Figure 1.** RADARSAT-1 interferogram of central south Florida, showing water level changes in the Everglades wetlands during a 24-day period at the end of 2004. The interferogram overlies Landsat ETM band8 and vectors maps showing the geographic location of the interferogram.

