# Los Angeles Water Resources

## *Monitoring Streamflow Regimes using NASA Sensor Data to Aid Classification-Based Decision Making for Stream water Management in Los Angeles County*

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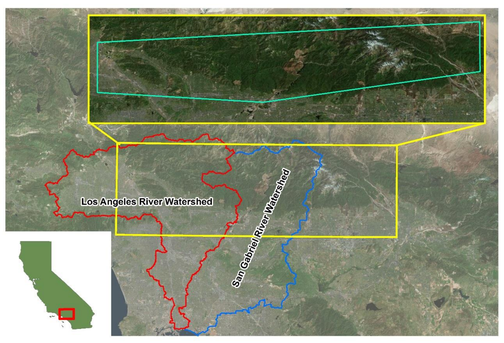
## Abstract

Resource agencies such as the Council for Watershed Health (CWH) and the Southern California Coastal Water Research Project (SCCWRP) rely on accurate knowledge of the entire watershed system to monitor, model and manage water resources. The current methods to detect streams and predict flow regimes (perennial/intermittent) in California's watersheds mostly use field measurements. Intermittent stream identification is challenging using these methods, and field verification is labor intensive and expensive. NASA has publically available Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR) data within most of California at a resolution of 6 meters. UAVSAR sends and receives either horizontal (H) or vertical (V) L-Band radio waves, and past studies have used UAVSAR to highlight different land cover, such as surface water and soil moisture. It is not known if UAVSAR has a high enough resolution to locate intermittent waterways within Los Angeles County, or if UAVSAR can show changes in water flower during wet versus dry periods. For this study we manipulated UAVSAR data using ArcGIS and determined that UAVSAR does not have a high enough spatial resolution to clearly classify intermittent streams. We also used data from the Shuttle Radar Topography Mission to visualize topography within the area. Findings indicate that UAVSAR is useful in distinguishing changes in larger water bodies, such as reservoirs and lakes, which can be important within California given the current drought conditions.

## Objectives

- Asses the feasibility of using NASA's UAVSAR to locate intermittent streams or waterways

## Study Area




## Methodology

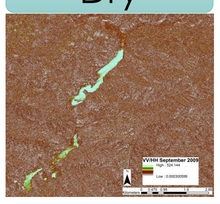
Phase 1: Download Data/Correct data

Phase 2: Process Data (ArcGIS)

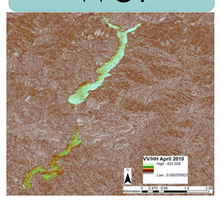
Phase 3: Analyze Results

Corrected data

Dry

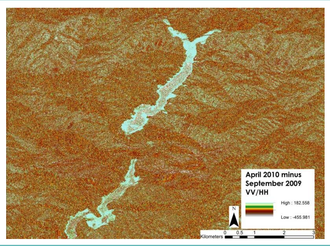


Wet



Band Math - Difference

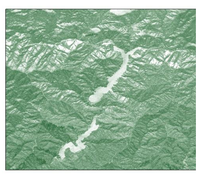
Radar Difference Map



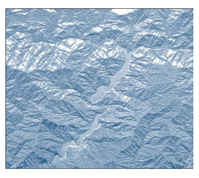

Corrected data

HH

HV

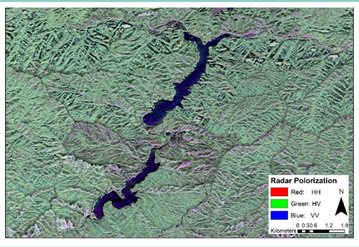


VV



Composite Bands

HH, HV, VV Composite




## Earth Observations

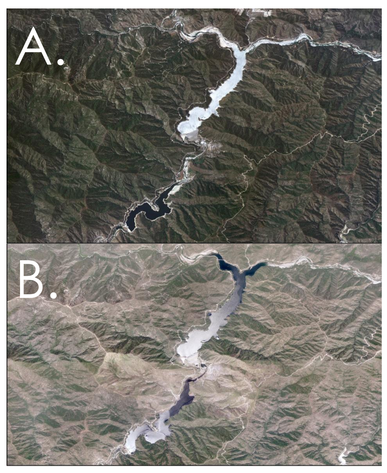
SRTM

UAVSAR on Gulfstream III

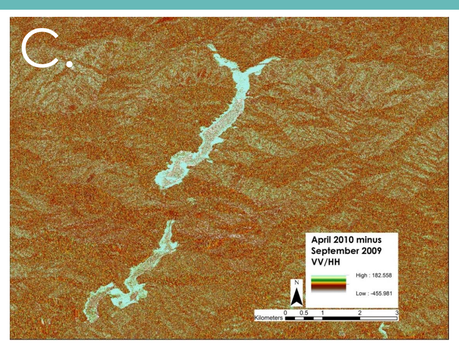
## Conclusions

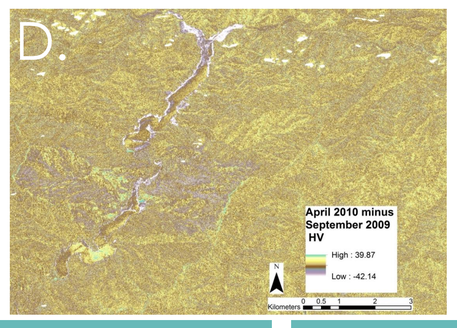
UAVSAR was unable to detect intermittent streams. However, it can detect larger rivers and reservoirs. The limiting factors were resolution and topography.

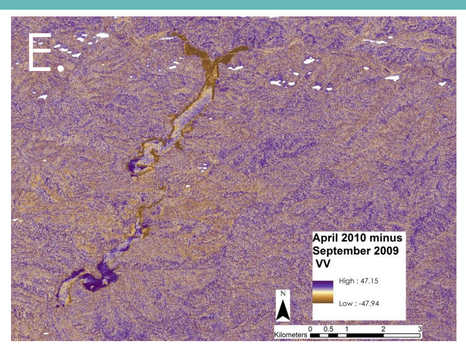
## Results



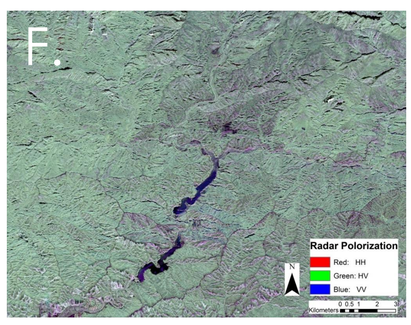

High resolution aerial imagery of the San Gabriel Reservoir and Morris Reservoir taken from the National Agriculture Imagery (NAIP) during a dry period (**A**) and a wet period (**B**).

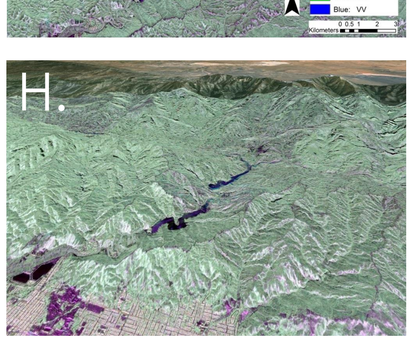


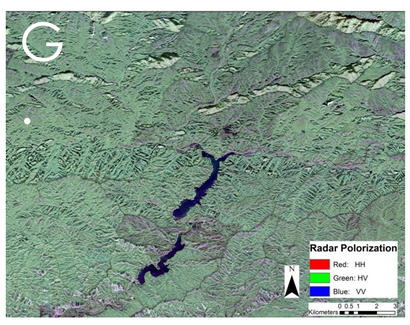




Change detection between a wet period (April 2010) and a dry period (Sept 2009) for different UAVSAR polarizations. Image **C** shows change in soil moisture and image **D** highlights changes in water; positive values indicate more moisture in April 2010. Image **E** shows changes in vegetation with positive values indicating more vegetation in April 2010.




The red, green, blue image composites highlight changes in reservoir size over time (**F** &**G**). The dark lines appear to show water ways, but are often mountain ridges or valleys (**H**).

## Team Members

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## Project Partners

- Council for Watershed Health – CWH, Partner, Boundary Organization, POC: Dr. Kristy Morris, Program Manager/Senior Scientist
- Southern California Coastal Water Research Project – SCCWRP, Partner, POC: Dr. Raphael Mazor, Biologist

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