

Remote Sensing of Soil Moisture in The Great Dismal Swamp National Wildlife Refuge, Virginia, USA

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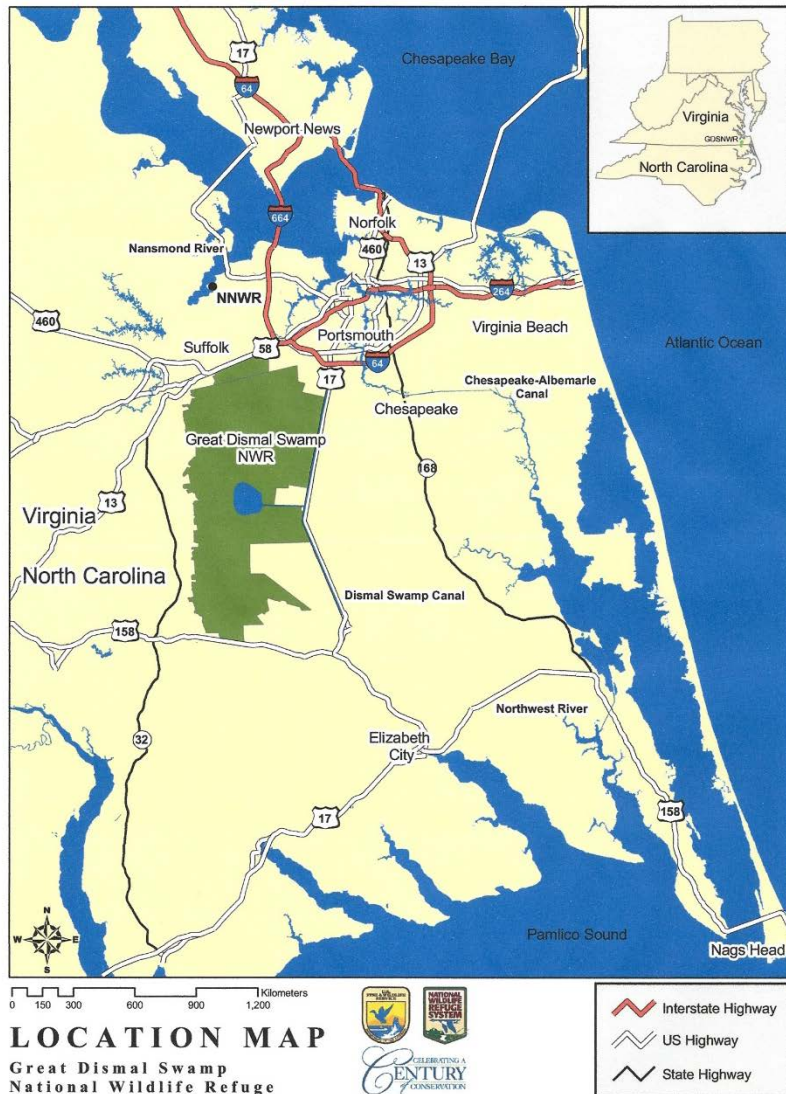
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Site Map and Information

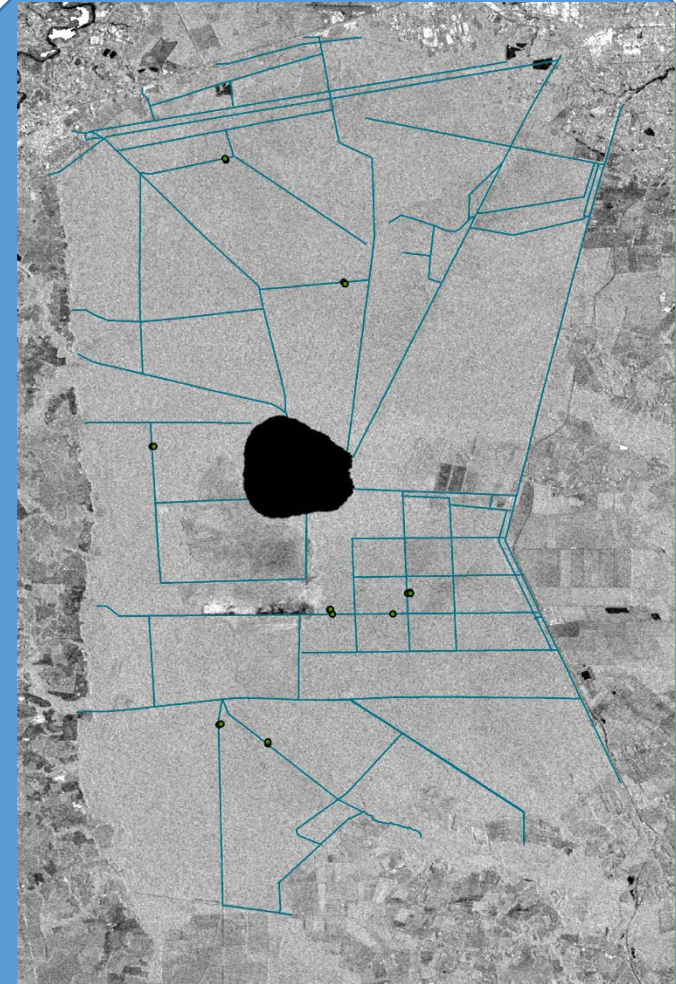


The Great Dismal Swamp is a forested peat wetland with dense biomass and hydrology that has been altered by human management and resource extraction.

Forest types include remnant Atlantic white cedar stands and pine pocosin, with red maple filling in the most affected areas.

This study focuses on obtaining soil moisture across the GDS to model soil carbon flux and look at impacts of management on fire and other ecosystem services.

Ground measurements of soil moisture coinciding with Sentinel 2 data were collected at sites representing a range of moisture regimes and forest covers.



Sentinel 2, June 15 2017 with ditches and sampling sites

RESULTS

Initial study using PALSAR and other sources with depth to groundwater level shows promise for using radar in the GDS.

Sentinel 2 data from February, April and June of 2017 shows highest correlation between radar backscatter and SMC in pocosin sites, followed by cedar, with less correlation in maple sites.

FUTURE
Improving accuracy by accounting for texture, biomass, and inundation.

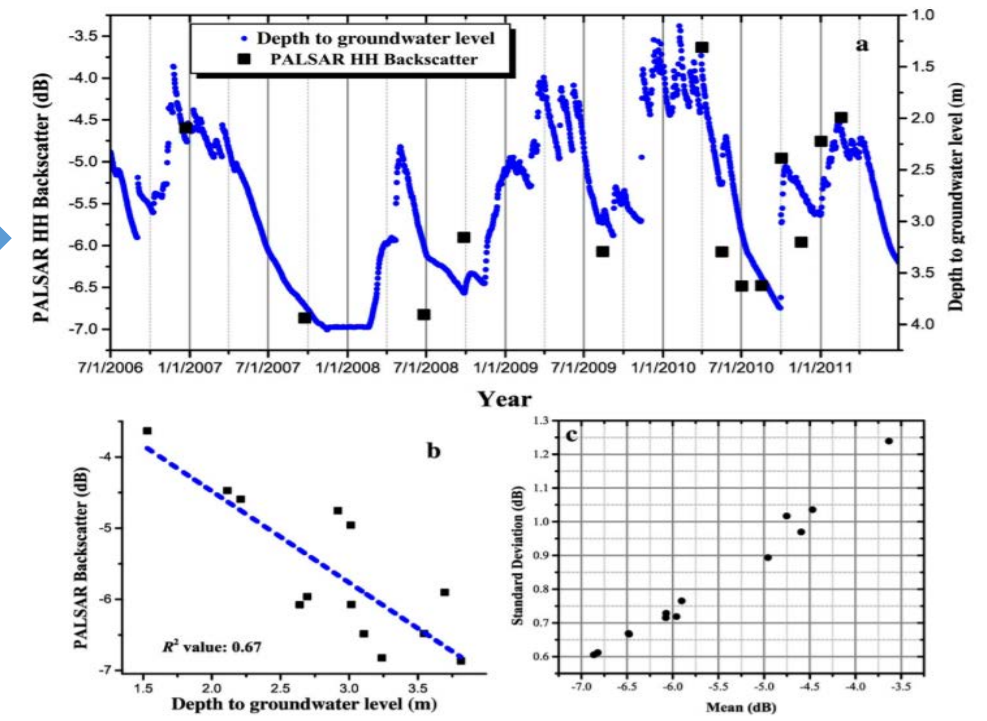
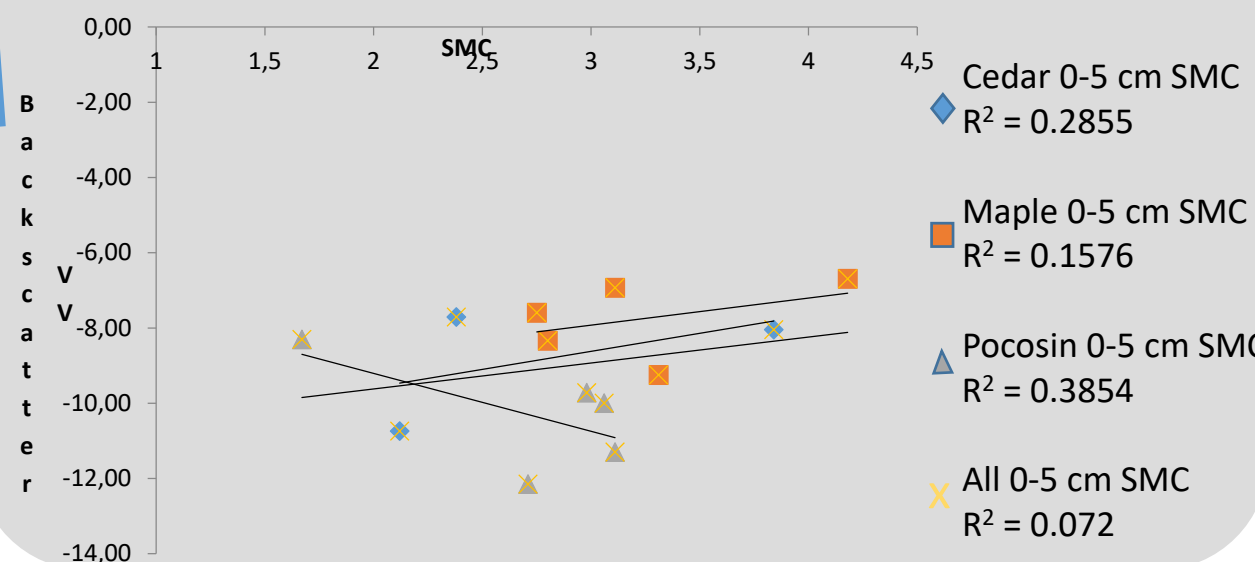


Fig. 5. (a) Comparison between groundwater level and average ALOS PALSAR intensity from 2006 to 2011. (b) Linear regression of groundwater level and ALOS PALSAR backscatter. (c) Scatter plot of average and standard deviation of ALOS PALSAR intensity (R-squared value: 0.98 significant at $p < 0.0001$, $n: 13$, $r: 0.03$, intercept: 1.88 ± 0.11 (95% confidence), slope: 0.19 ± 0.02 (95% confidence)).



APPLICATIONS

To estimate carbon dioxide and methane soil flux.

To use for fire risk management.

FUTURE PLAN:

The next step in this study is to improve accuracy by accounting for texture, biomass, and other biophysical variables that affect radar backscatter, as well as inundated vs non inundated sites.

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