Regional-scale hydrological monitoring of wetlands with Sentinel-1 InSAR Observations: Case study of the south Florida Everglades

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S1. Sentinel-1 SAR data information

In this section, we present two tables that contain important technical information for our study. The first table (Table S1) presents the acquisition dates of all Sentinel-1 data used in the study. The second Table (Table S2) lists the main acquisition parameters used for acquiring the Sentinel-1.

Acquisition data						
2016	2017	2018	2019			
20160927 20161009 20161015 20161021 20161102 20161114 20161126 20161208 20161220	20170101 20170113 20170125 20170206 20170302 20170314 20170326 20170407 20170513 20170525 20170618 20170724 20170817 20170829 20170910 20171004 20171004 20171016 20171028 20171121 20171203 20171215	20180108 20180120 20180201 20180213 20180225 20180309 20180321 20180402 20180402 20180414 20180426 20180508 20180520 20180613 20180625 20180707 20180719 20180719 20180731 20180731 20180824 20180905 20180917 20180917 20180929 20181011 20181023 20181104 20181128 20181128 20181210	20190103 20190115 20190127 20190208 20190220 20190304 20190316 20190328 20190409 20190421 20190503 20190515 20190527 20190608 20190620 20190702 20190714 20190726 20190726 20190807 20190819 20190819 20190831 20190906 20190912 20190924 20191006 20191018 20191030 20191111 20191123			

Table S1. Acquisition dates of all Sentinel-1 data used in this study

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Sentinel-1 SAR data technique	Swath Coverage	Pixel Spacing (m)	Polarimetry		
configurations	(km)	i mor sprong (m)			
Parameters	~250 km	range x azimuth: ~2.5 x14	VV		

Table S2. Sentinel-1 data technique configurations

S2. Accuracy analysis of the InSAR derived water level change measurements

The accuracy analysis is conducted by comparing valid InSAR and gauge measurements (represented by the blue solid circle in following subplots), invalid InSAR gauge measurements including low coherence InSAR estimate (red 'x'), dry gauge measurements (red '+'), dynamics gauge measurements (red rectangle), outliers (red square). Details of these invalid cases are explained in detail in Sec 4.4.1 in the paper). We analyzed a total of 74 InSAR-derived water level change maps by plotting the all reliable InSAR vs gauge water level change measurements. We also calculated the RMSE estimates based on all reliable InSAR-gauge pairs.















Figure S1. Accuracy analysis of each Sentinel InSAR derived water level change map by using all reliable InSAR vs Gauge water level measurements (each subplot corresponding to one dataset).

S3. Water level time series of two representative gauges (G-3437, G-596)

In this short section we present hourly water level record of two gauges (G-3437, G-596), in order to show the origin of the discrepancy between InSAR and gauge derived water level maps.



Figure S2. Time series hourly water level at gauges G-3437, G-596 for time period 20161008—20161022. Ground surface elevation at gauge G-3437 and G-596 are marked with horizontal dash blue lines. From SAR acquisition time 1 to SAR acquisition time 2, water level at gauge G-3437 drops from above surface to below surface; while at gauge G-596, the water levels corresponding to the two SAR acquisition times are both below surface but experience an increase. These below water level changes are captured by gauge measurements, however, above the surface there is little change detected by InSAR. This is why we see the big discrepancies from the InSAR- and gauge- derived water level change maps.

S4. InSAR derived water level change maps

There is a total of 74 interferograms. Two water level change maps are presented in the main paper, remaining are presented below. Each map corresponding to one interferograms, the acquisition dates of the InSAR data are labeled in each sub-figure. For the water level change maps, area with low coherence below 0.5 are masked to eliminate unreliable results.











cm ∎ 10

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cm ∎ 10

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cm

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-81.2 -81 -80.8 -80.6 -80.4 Water level change (InSAR)



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(a)

Water level change (InSAR)





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-81.2 -81 -80.8 -80.6 -80.4

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Water level change (InSAR)





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Water level change (InSAR)









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-81.2 -81 -80.8 -80.6 -80.4



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Figure S3. The remaining 72 Sentinel-1 InSAR derived water level change maps (each subplot stands for one interferograms dataset).