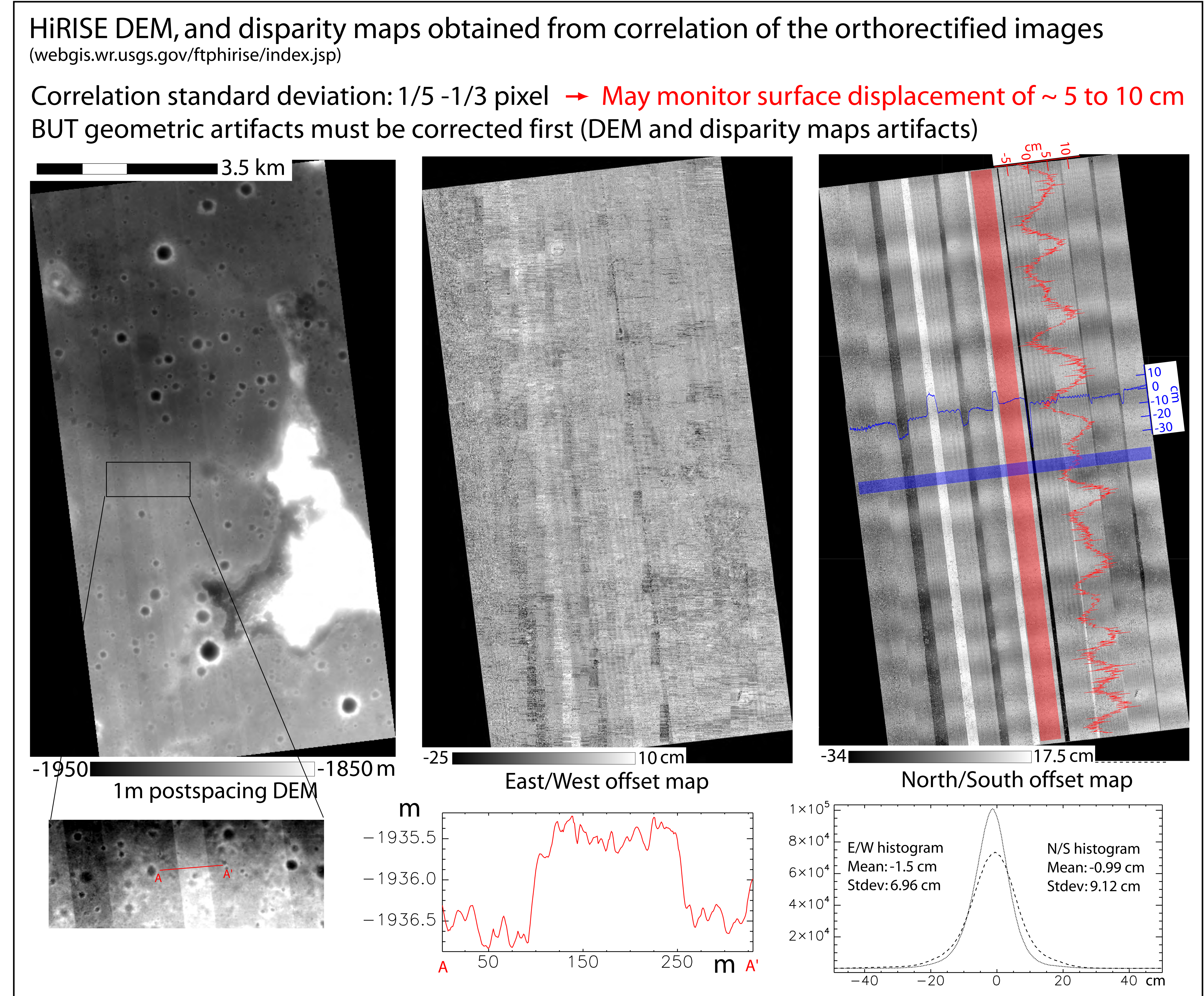
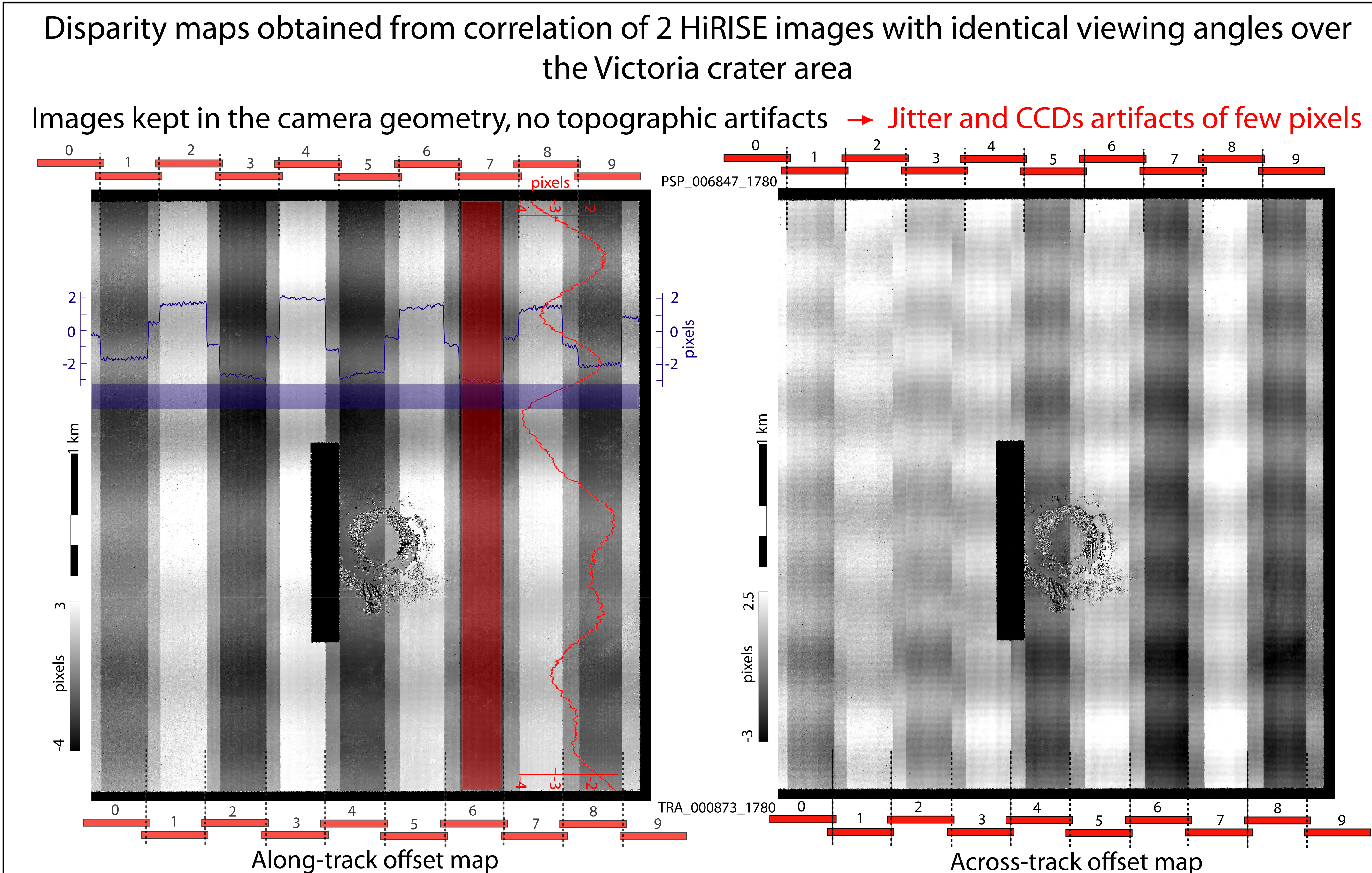
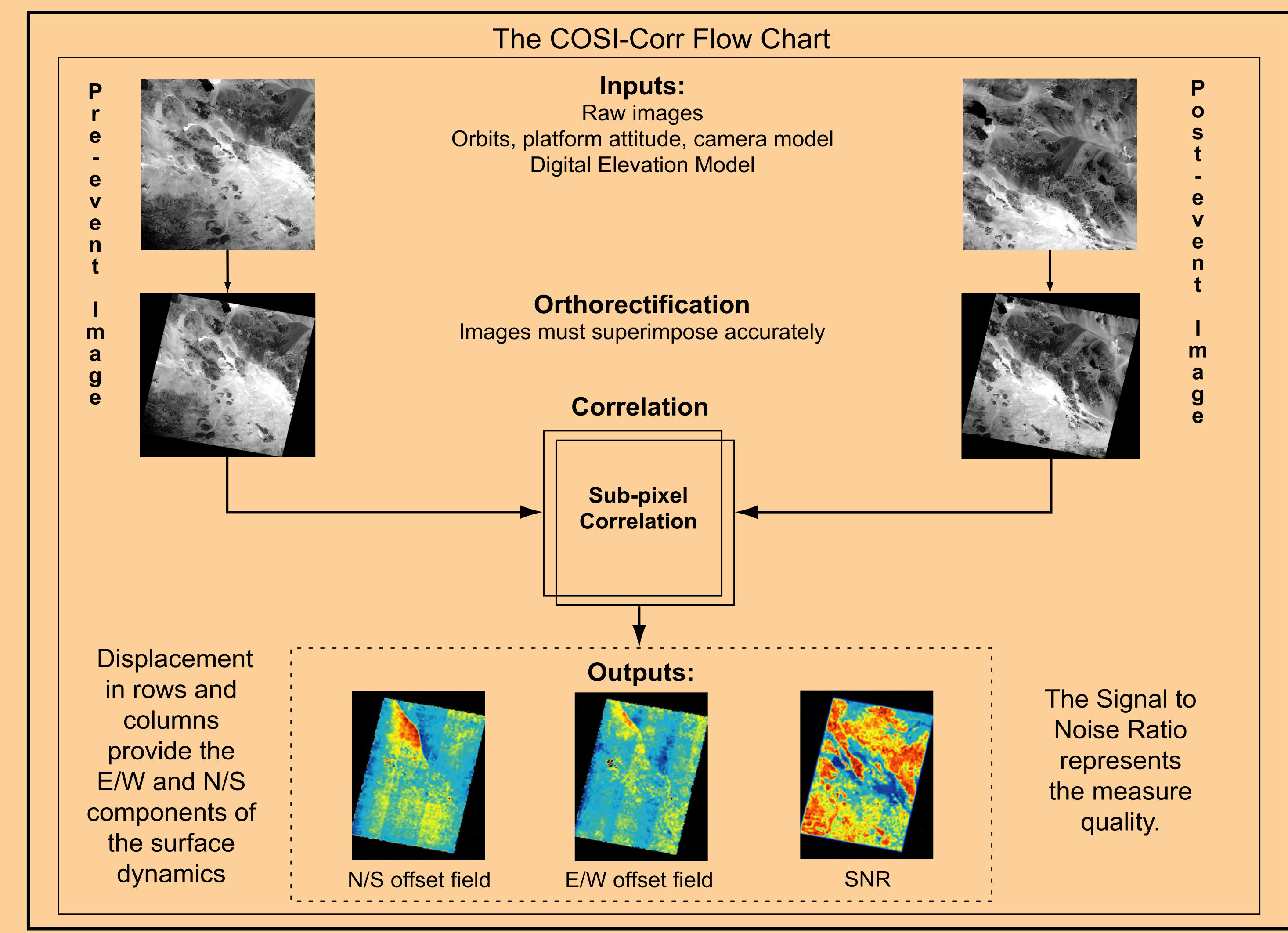


ABSTRACT: We evaluated the possibility to co-register accurately HiRISE images (~30 cm resolution) for change detection applications or surface displacements measurements. Our preliminary tests show an excellent correlability of HiRISE images using COSI-Corr. In principle it should be possible to co-register images with accuracy ranging from 3 to 10 centimeters, such that changes at this scale and coarser can be measured. Two major sources of artifacts currently limit the technique application. A first source is due to uncertainties on the acquisition geometry: unmodeled attitudes of the spacecraft during the images acquisitions introduce distortions in the offset maps with amplitude of up to a few pixels; the staggered arrangement of the CCD detectors in the focal plane, combined with the unmodeled attitude variations, introduce along-track stripes in the offset maps; static misalignments of the CCD detectors around their nominal location are also suspected. The second source is due to topographic error, which leaves parallax effect in the orthorectified images, and is ultimately retrieved in the offset maps. The correction of the geometric artifacts and a high quality DEM extraction are currently the most limiting factors. Their correction is therefore the next necessary step to take.

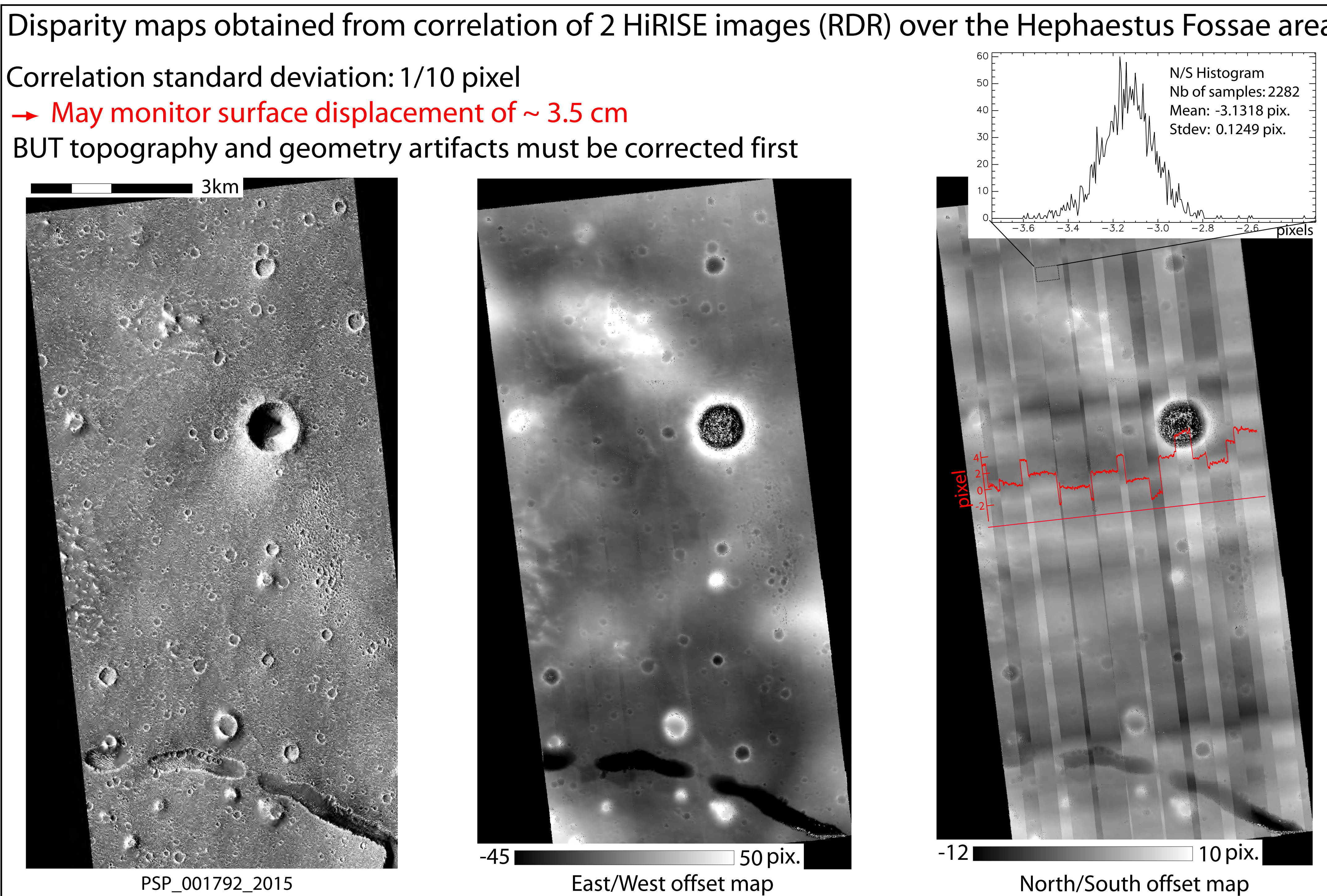
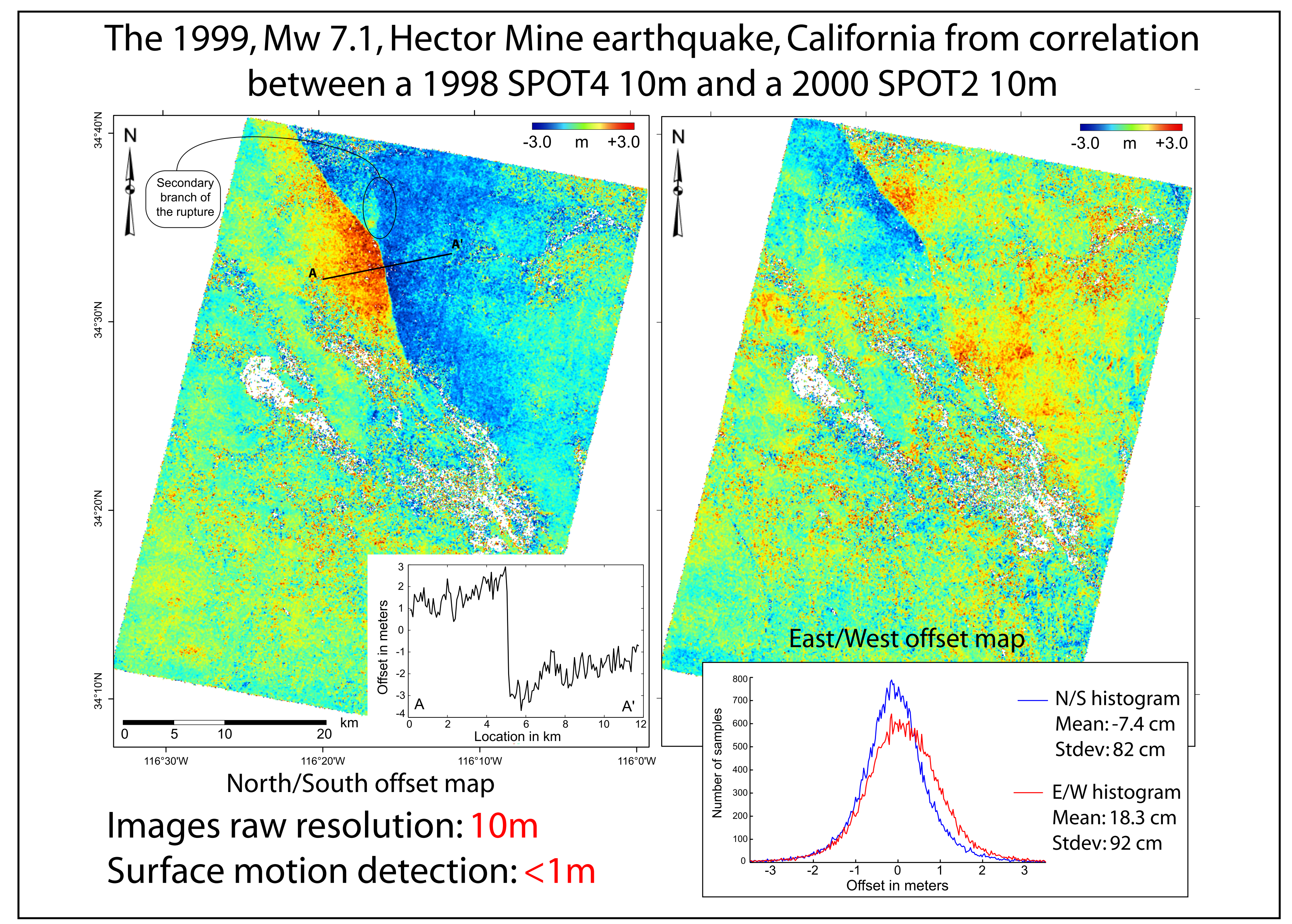
QUESTION: Can surface dynamics being monitored with HiRISE imagery using COSI-Corr ?

Promising results on Mars :

Co-Registration of Optically Sensed Images and Correlation (COSI-Corr), allows for precise orthorectification, coregistration, and correlation of optical images. The software package is available at: http://www.tectonics.caltech.edu/slip_history/spot_coseis.



Successful results on Earth:



CONCLUSION: HiRISE images co-registration and correlation is achieved with an accuracy of few tenths of a pixel. Precise surface dynamics monitoring is possible, but geometric uncertainties (i.e. acquisition, topography) must be corrected first.

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