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# Abstract submission for the NCG Symposium 2020

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Presentation title: On the synergy of Standard and Extra-Fine mode Radarsat-2 data for surface deformation mapping

Demo: no

Abstract (~100 words and optionally 1-2 figures):

The study attempts to design and demonstrate a method to concatenate Radarsat-2 satellite datasets with different operational modes and map subsidence dynamics. We propose a strategy with three steps:

1. to generate Persistent Scatterers (PS) and the associated deformation time series by a standard PSI approach for SM (Standard mode) and XFM (Extra-Fine mode) datasets, respectively.
2. to integrate data in space by tie-point pairs. We propose identifying common ground targets from SM and XFM SAR datasets considering the PS geolocation uncertainty described as error ellipsoids. The Monte Carlo method is used to compute the intersection of the error ellipsoids of the potential tie-point pairs (see Figure 1 as an example) and then to define the weight for (deformation) data connection in time.
3. to integrate data in time by concatenating the deformation time series of each tie-point pair. We use a probabilistic approach to modeling the (long-term) deformation time series, see Figure 2 as an example.

We use more than 100 Radarsat-2 data acquired between 2010 and 2017 to demonstrate our approaches.

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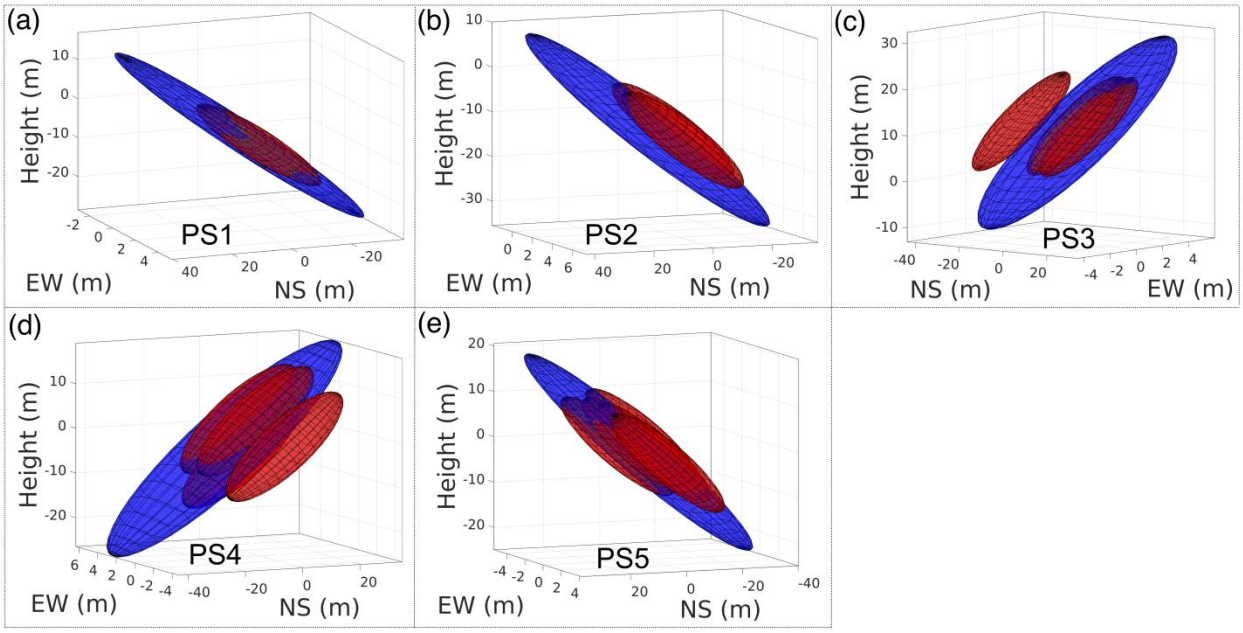


**Figure 1** Five intersection types of the SM/XFM error ellipsoids. Blue ellipsoids, red ellipsoids, and blue dots indicate PS points from SM, PS points from XFM, and cross volume, respectively. The local coordinate system was rotated along the height axis to display the spatial relationship of ellipsoids intuitively. Therefore, although error ellipsoids from five figures have the same size and tilt direction, they seem different.

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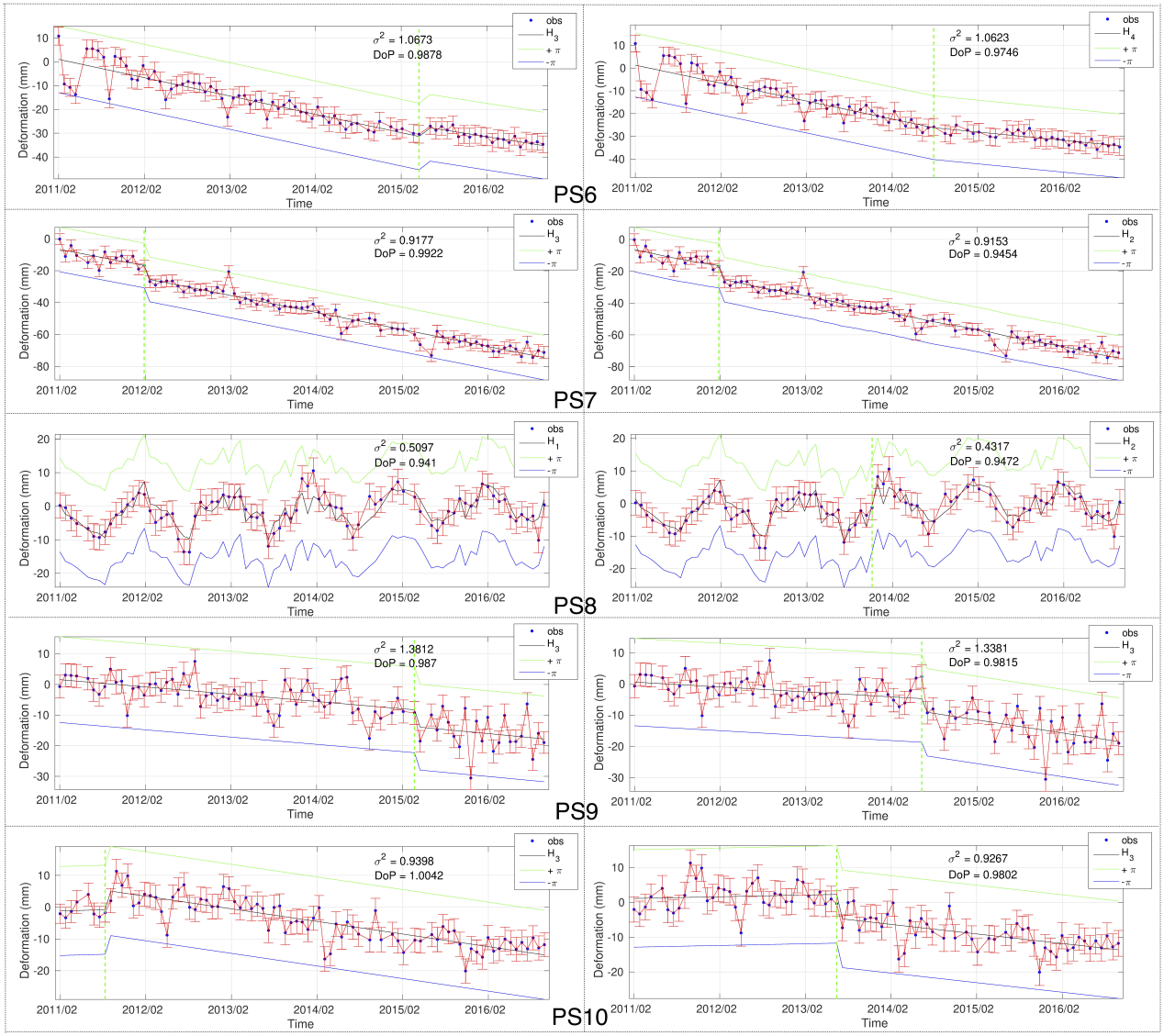


**Figure 2** The best models are distinguished by the maximum test ratio and the proposed method displayed in the first and second column, respectively. Blue dots indicate observation values. The green and blue solid lines are used to recognize the phase unwrapping error. Black solid lines, green dash lines, and error bars represent the estimated best models, the Heaviside step locations, and the standard deviation of residuals, respectively. Their posterior variances and DoP values are marked on every figure.