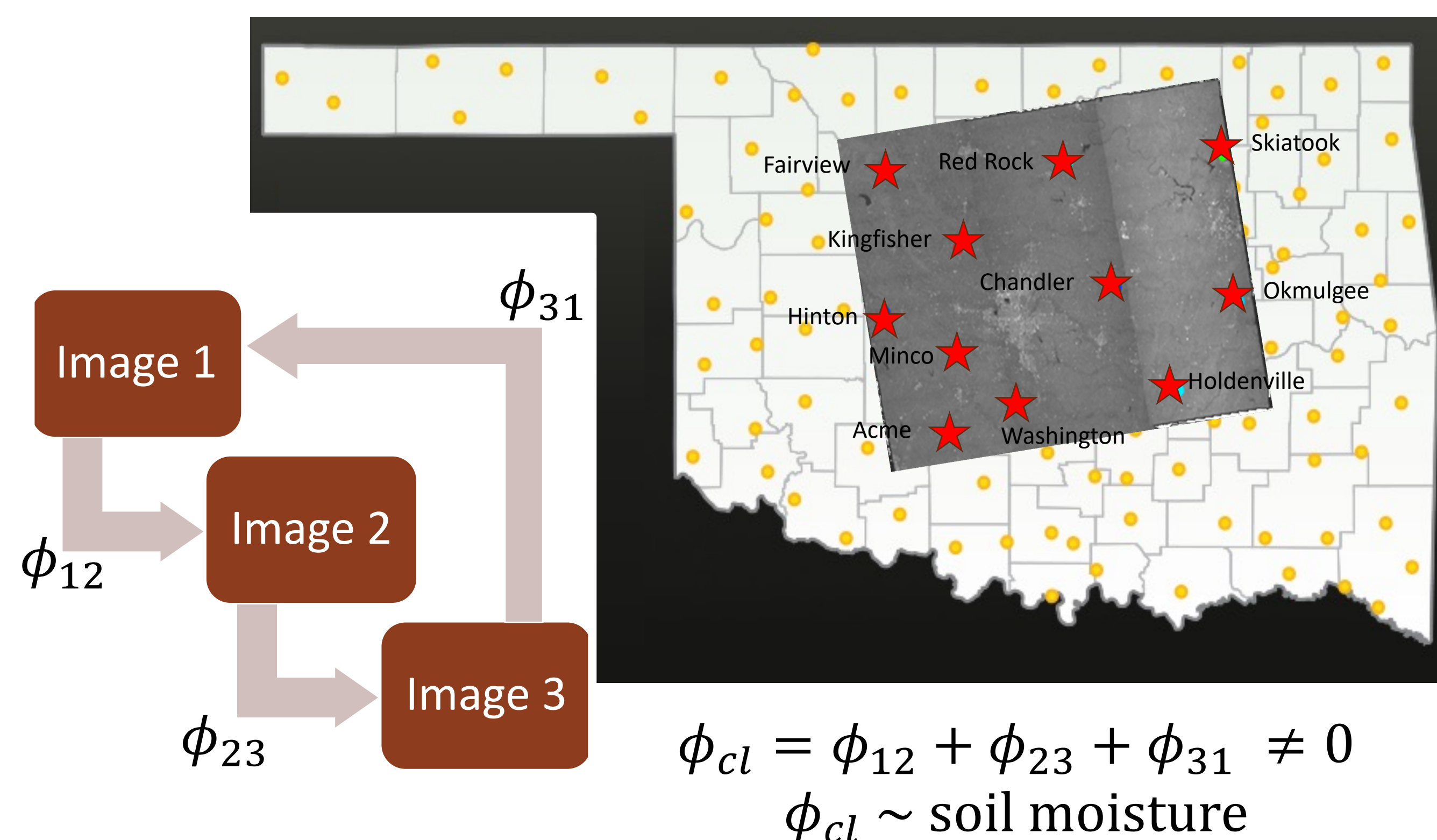


1. Abstract

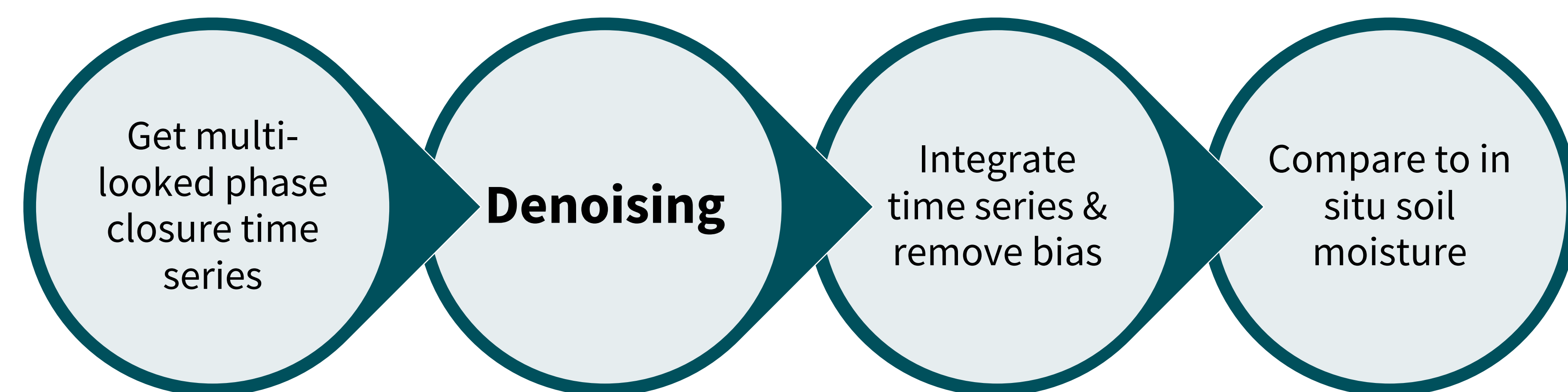
Goal: high-resolution soil moisture data in remote regions

- Interferometric synthetic aperture radar (InSAR) phase closure corresponds to in situ soil moisture data
- Noisy. Currently, only linear averaging.
- Test other types of denoising.
- Challenge: no real training data

2. Background

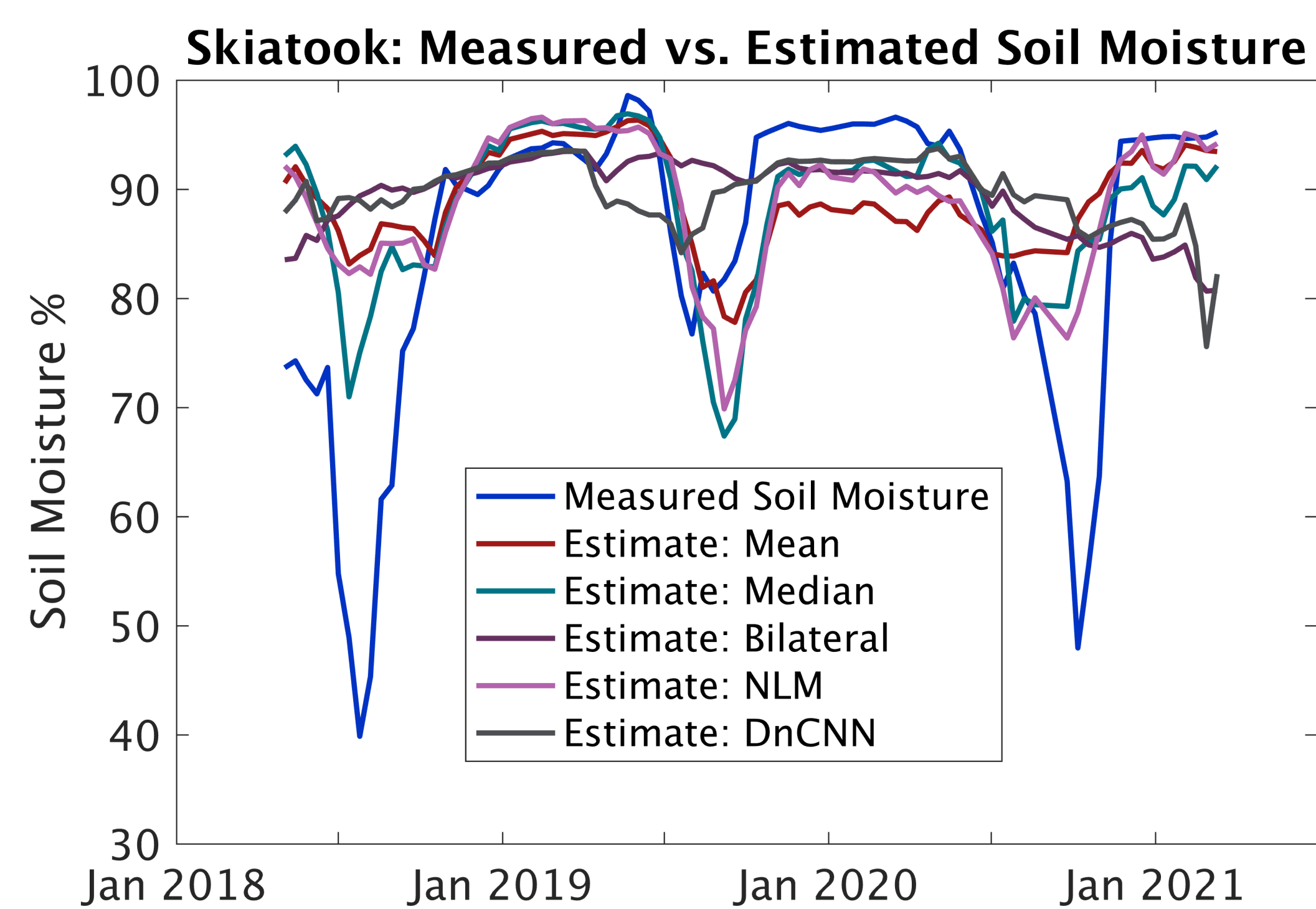


3. Method

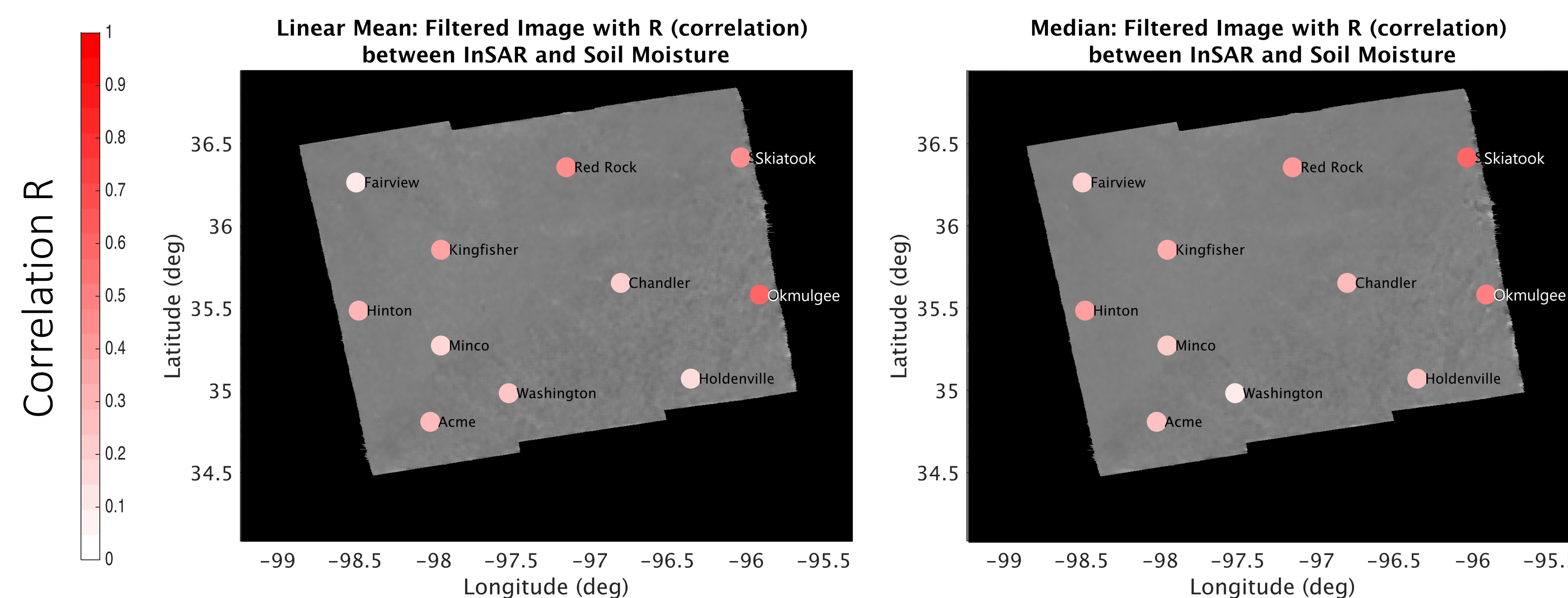


- Sentinel-1 C-band satellite data, soil moisture from Oklahoma Mesonet⁴ sites
- Five Denoising methods:
 - Mean, Median, Bilateral, Non-local Means, DnCNN

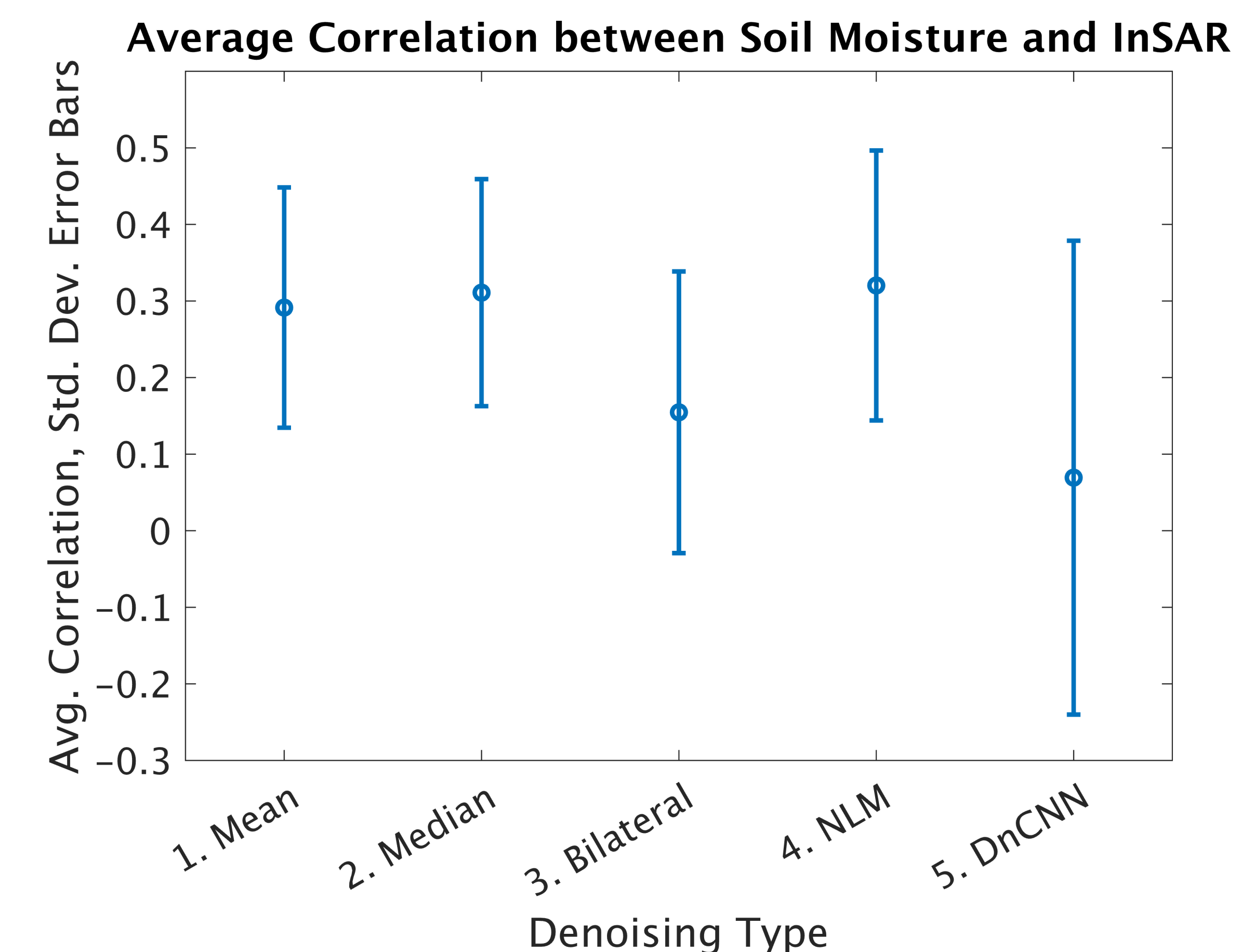
4. Sample Timeseries



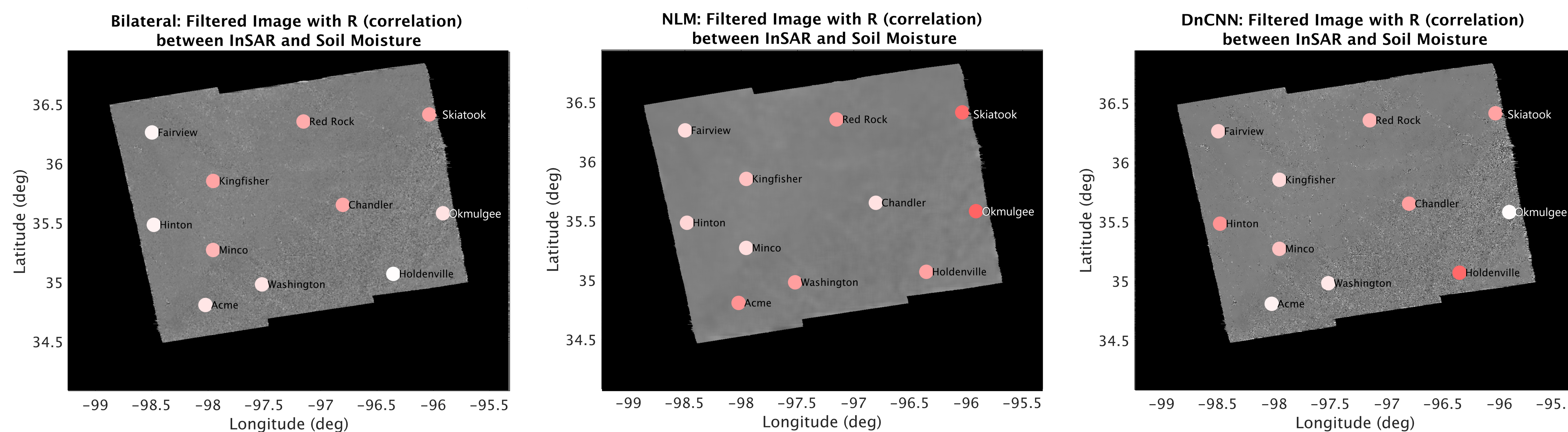
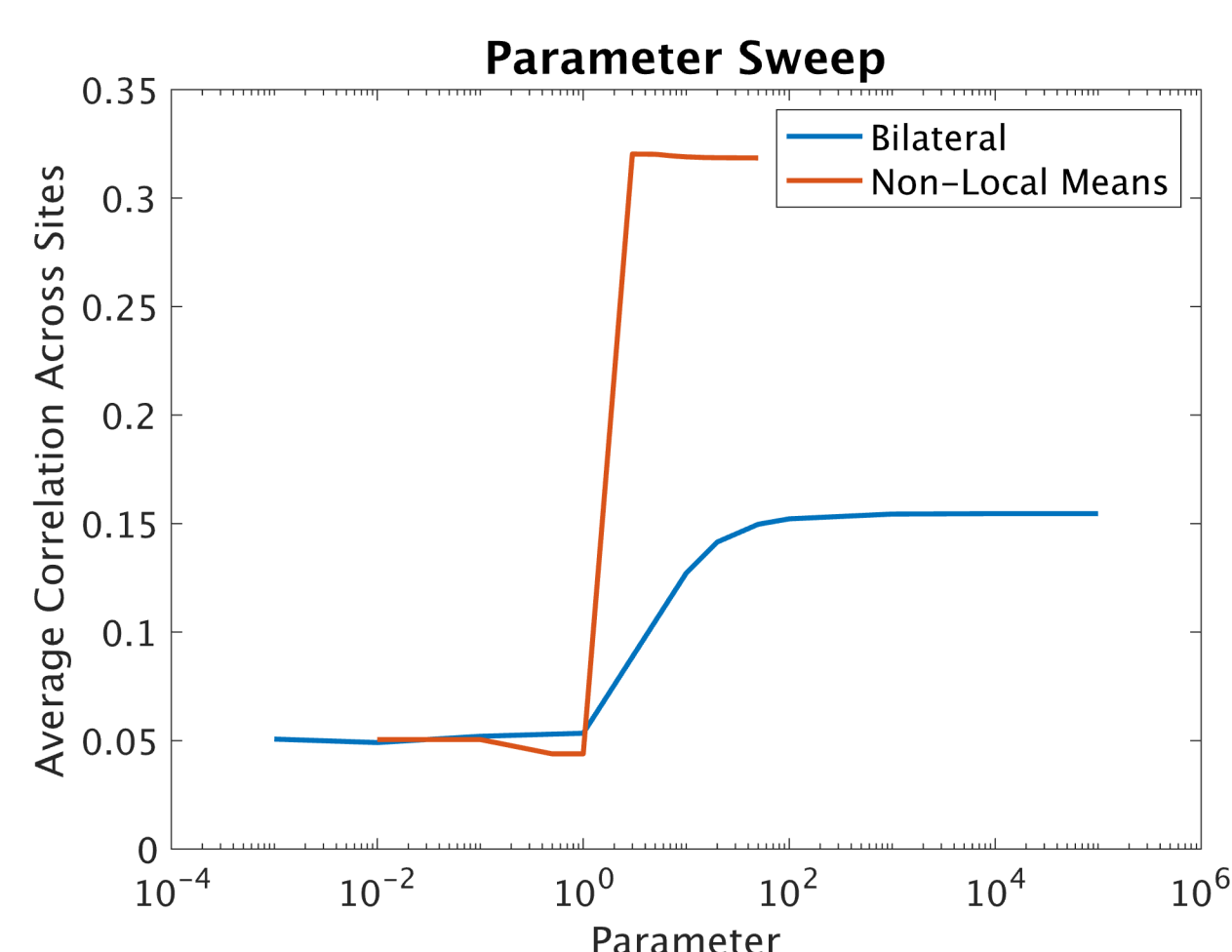
6. Results: Filtered Images at t=1 with site-by-site correlation



7. Method comparison



5. Parameter Sweep



8. Conclusion

- Conventional image filters not optimized for radar, needs more specific training data
- Non-local means best – likely able to pull statistics from similar image areas (e.g. wheat fields)
- Given processing time, mean and median best
- No magic bullet here!

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3. R. J. Michaelides, H. A. Zebker and Y. Zheng, "An Algorithm for Estimating and Correcting Decorrelation Phase From InSAR Data Using Closure Phase Triplets," in *IEEE Transactions on Geoscience and Remote Sensing*.
4. Oklahoma Mesonet dataset F. V. Brock, K. C. Crawford, R. L. Elliott, G. W. Cuperus, S. J. Stadler, H. L. Johnson, et al., "The Oklahoma Mesonet: A technical overview", *J. Atmos. Ocean. Technol.*, vol. 12, no. 1, pp. 5-19, Feb. 1995.

