

Comment on hess-2021-330

Anonymous Referee #4

Referee comment on "Monitoring surface water dynamics in the Prairie Pothole Region of North Dakota using dual-polarised Sentinel-1 synthetic aperture radar (SAR) time series" by Stefan Schlaffer et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-330-RC4>, 2021

The manuscript entitled "Monitoring surface water dynamics in the Prairie Pothole region using Dual-Polarized Sentinel-1 SAR time series" by Schlaffer et al. developed a new approach for classifying open water extent dynamic. The manuscript is novel and well organized. Most sections are informative, which can also lead to a long description and thus need to be significantly improved before acceptance. In the revised version, authors need to revise the writing style of this manuscript.

- In this study, authors used many data sources to achieve their goals and these data are not in the same spatial resolution. For instance, the spatial resolution of Sentinel-1 data, the digital terrain model, and land cover are 20 m, 1m, and 30 m, respectively. To upscale the resolution from lower to higher is fine, while to downscale from lower to higher resolution can introduce uncertainty in data analysis, particularly for this study. In this study, land cover data (CDL) in 2015, which scaled from 30 m to 10 m, are used as reference data. Such a downscale can introduce potential uncertainty and should be discussed in the manuscript.
- In this manuscript, for Eqn. (7), the author only included the regression model. However, for data transparency, authors should list the regression parameter in the supplementary material. 3. For section 3.2 surface water dynamic, the authors described their results based on the temporal dynamics, i.e., only describe the results change with time, which helps understand model accuracy. At the same time, the authors compared surface water dynamic with wet or dry conditions. In sum, this section is too long and not well-organized. I suggest authors can describe the temporal dynamics in the first section while discussing how surface dynamics change with hydrological conditions (wet or dry conditions). In this way, the readers can easily get the ideas that you want to express.
- Research title is not specific. The current title can mislead readers that authors had mapped surface water dynamics in the whole prairie pothole region. Actually, this is a case study. Please revise your research title.
- The abstract and introduction are informative, but they are too long. For instance, the authors discussed the many key points, I can easily lose while I am reading the paper. I strongly suggest authors shorten the abstract and introduction. In addition, the

conclusion section is well-written. Please follow this style to revise your abstract.

- In figures 8 and 9, the authors only compared the water body with wet or dry seasons. I recommend authors can plot the hydrography on figures 8 and 9. Authors can compare the relationship between flood and drought conditions. In this way, the relationship between hydrology and water bodies can be quantitatively assessed. Authors can relate the hydrology data to the surface water body.
- Line 89, please list the references here.
- Here are some thoughts for authors' reference. 1) In this study, authors used a high-resolution digital terrain model (1m). For the topography, there are many topographic indices, for instance, topographic wetness index (TWI) and others, which can represent the topographic information in detail. In my thoughts, the appearance of surface water is highly related to topography information. I suggest authors can try to relate water body location with TWI or other indices. This may help authors to validate your results. 2) Authors extracted the water body from Sentinel-1 data. To date, Google Earth has spatial resolution data. In authors' data, authors validated the results using the same data source but for different locations. The validation is good. However, this data is not easy to obtain. Can you try to validate the data through Google Earth. I know this is beyond the scope of this study, but authors can try this in future studies.