SNOPOST Estimating snow water resources from satellite observations, NASA SnowEx aircraft and ground observations, and land surface modelling

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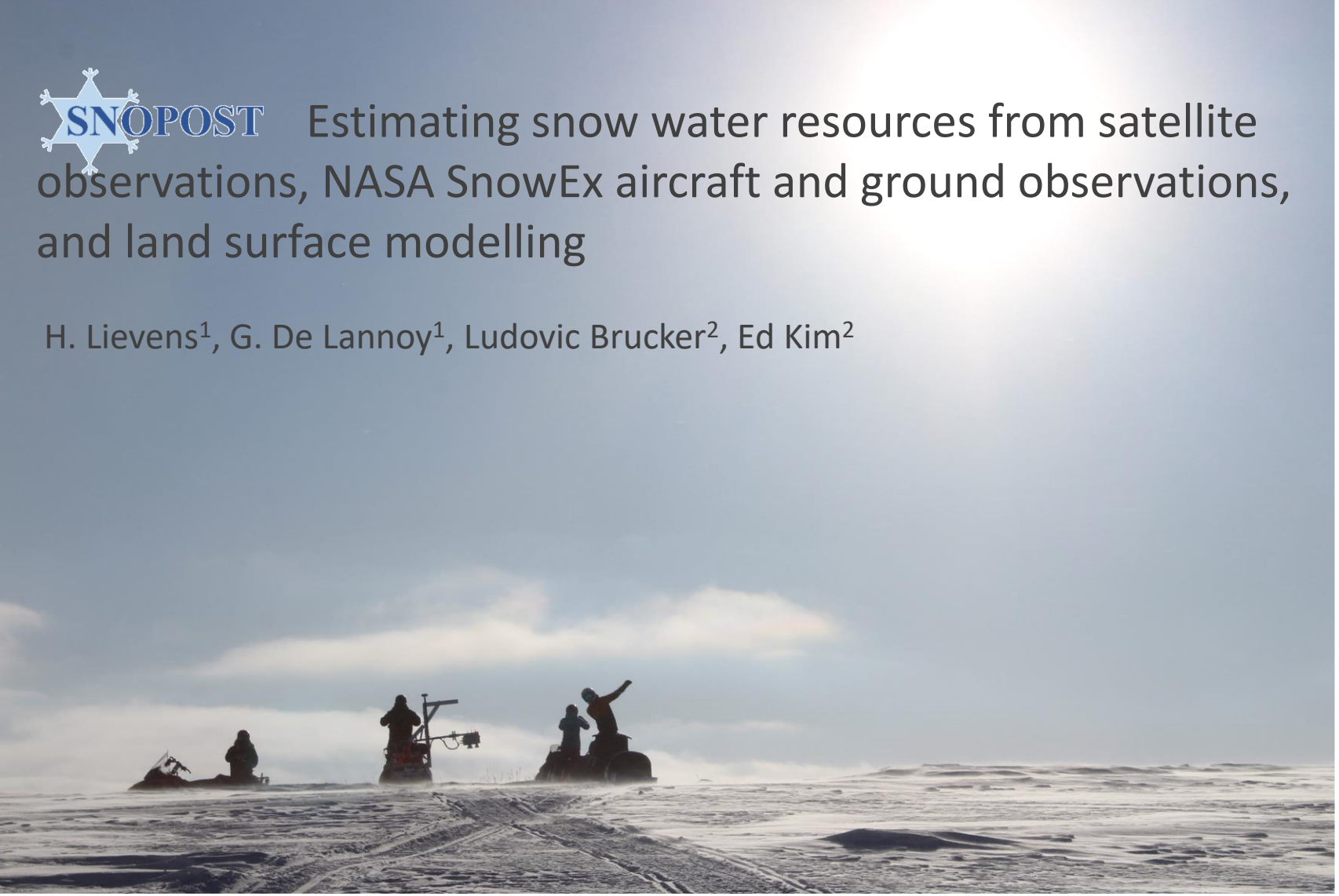

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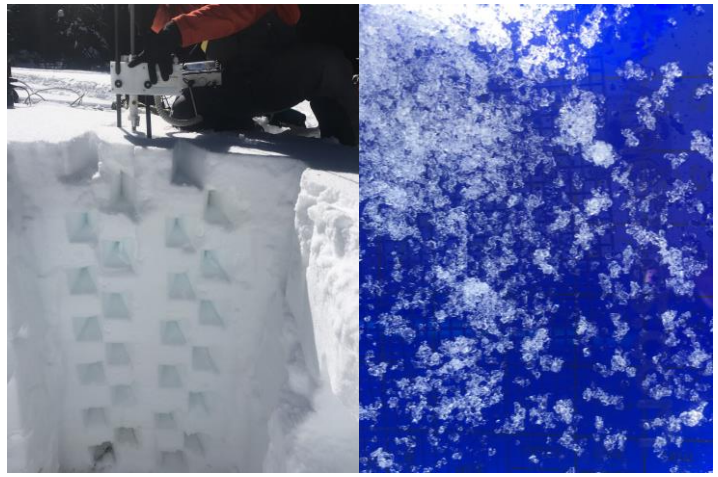
NASA

NASA SnowEx 2017 campaign

- Community effort (>100 scientists) to investigate remote sensing of snow water equivalent
- 3-week measurement campaign at Grand Mesa, Colorado, Feb 2017





SNOPOST objectives

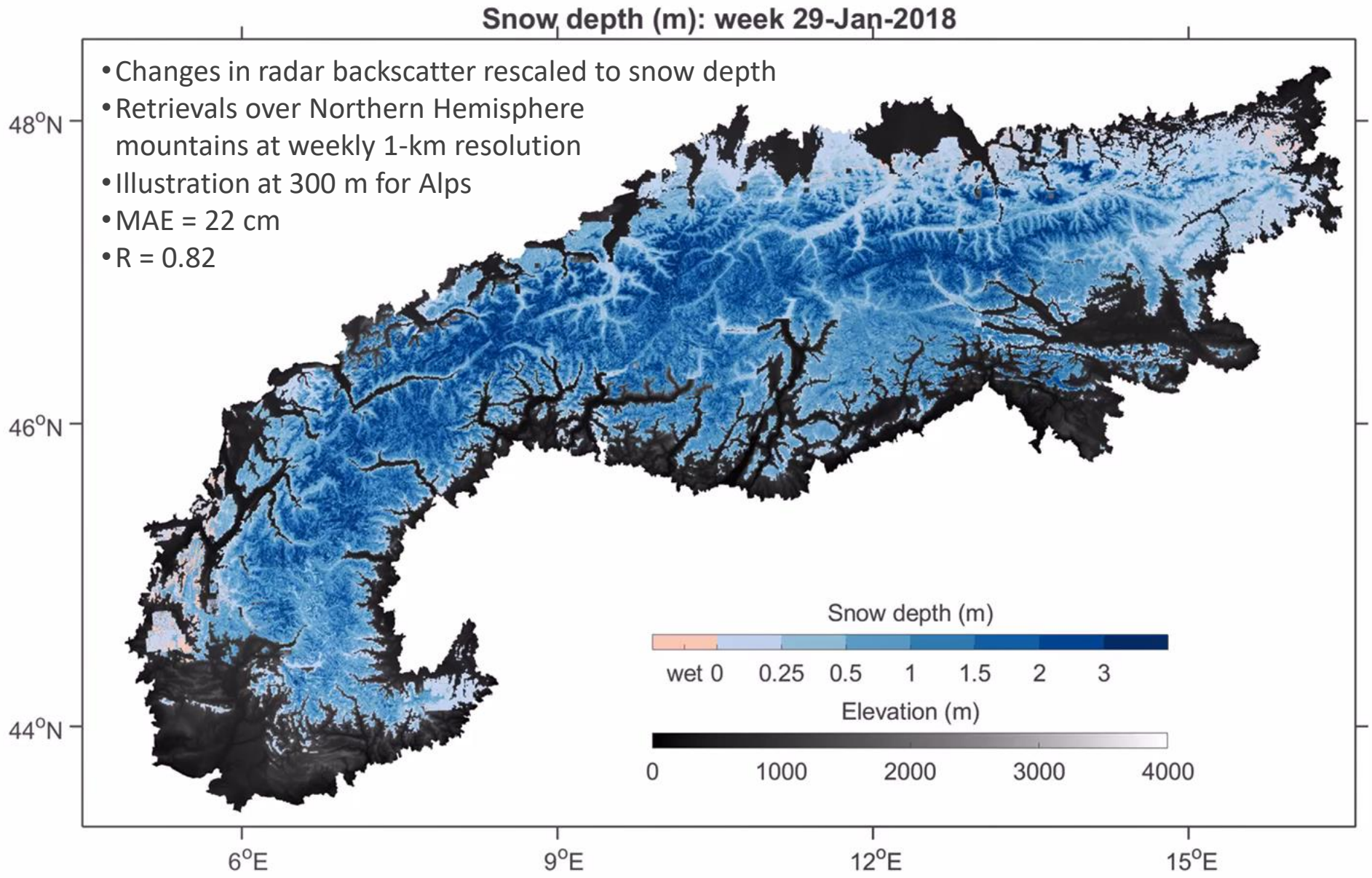
1. Compare snow remote sensing observations (airborne and satellite) with in situ measurements
2. Assess land surface model simulations of snow
3. Assess whether remote sensing can improve snow modeling through data assimilation

Airborne Snow Observatory (JPL): lidar

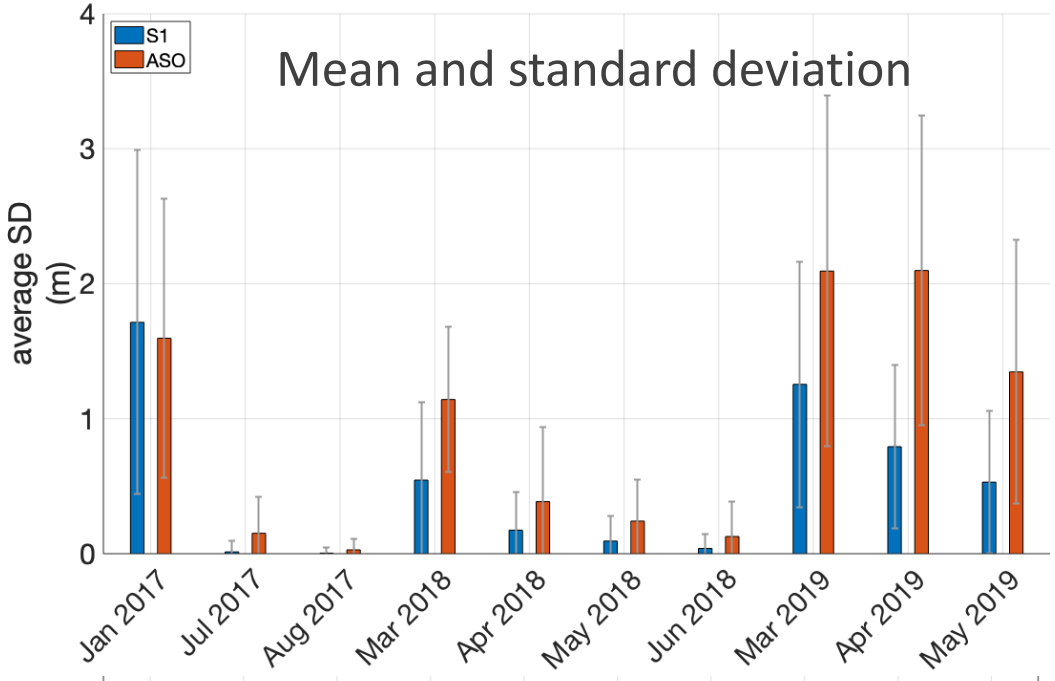
Sentinel-1 satellite (ESA): radar

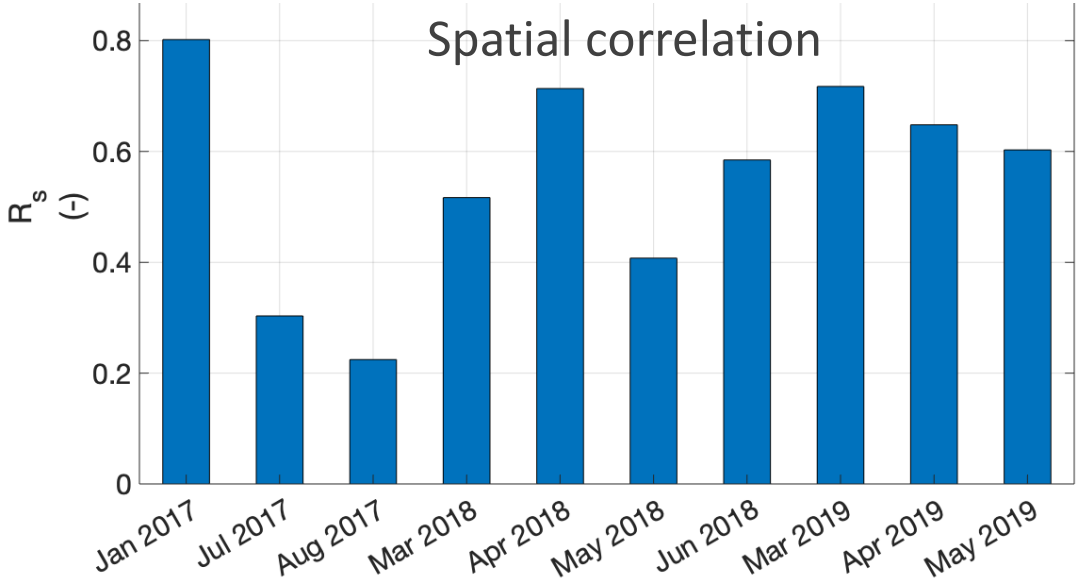
Noah-MP land surface model

S1 snow depth retrievals



Comparison of ASO and S1





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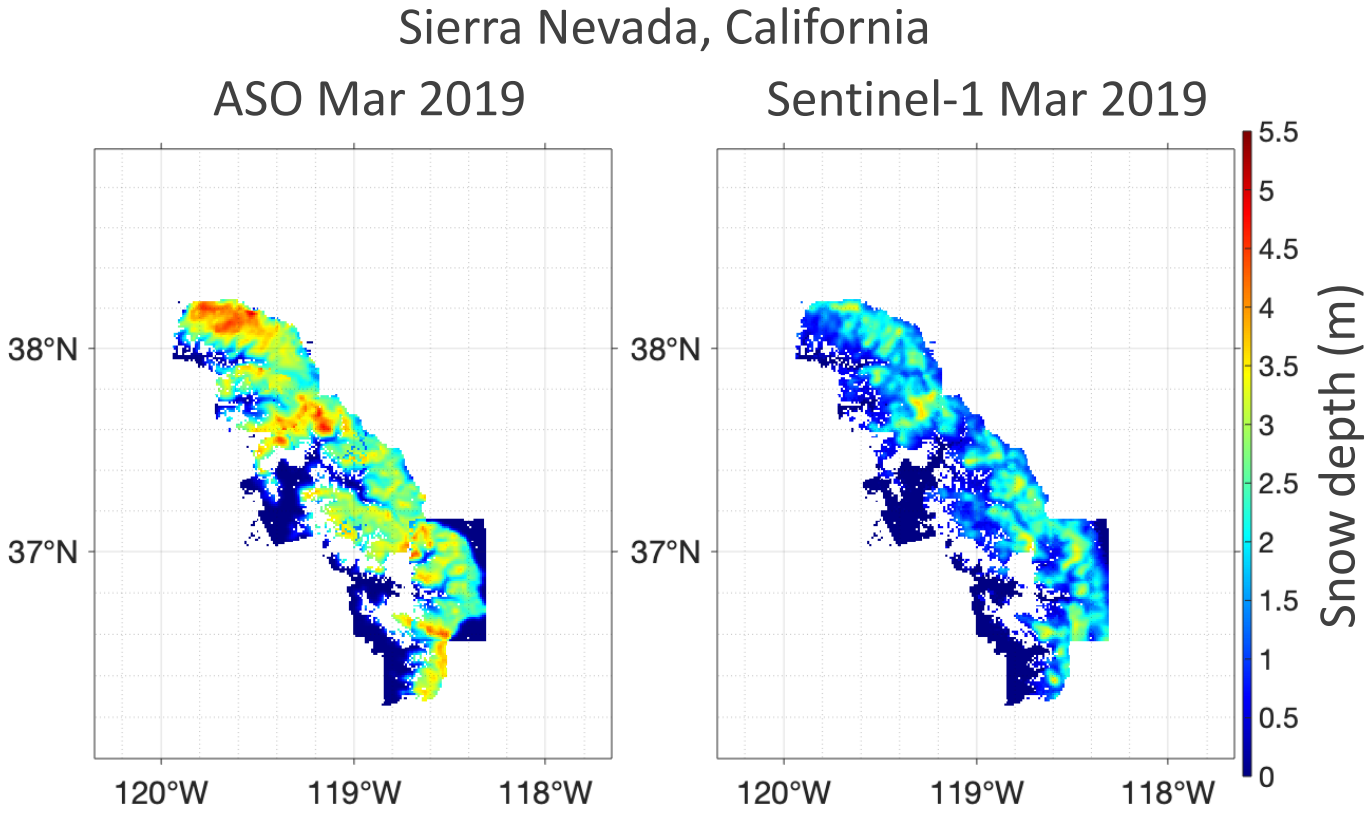
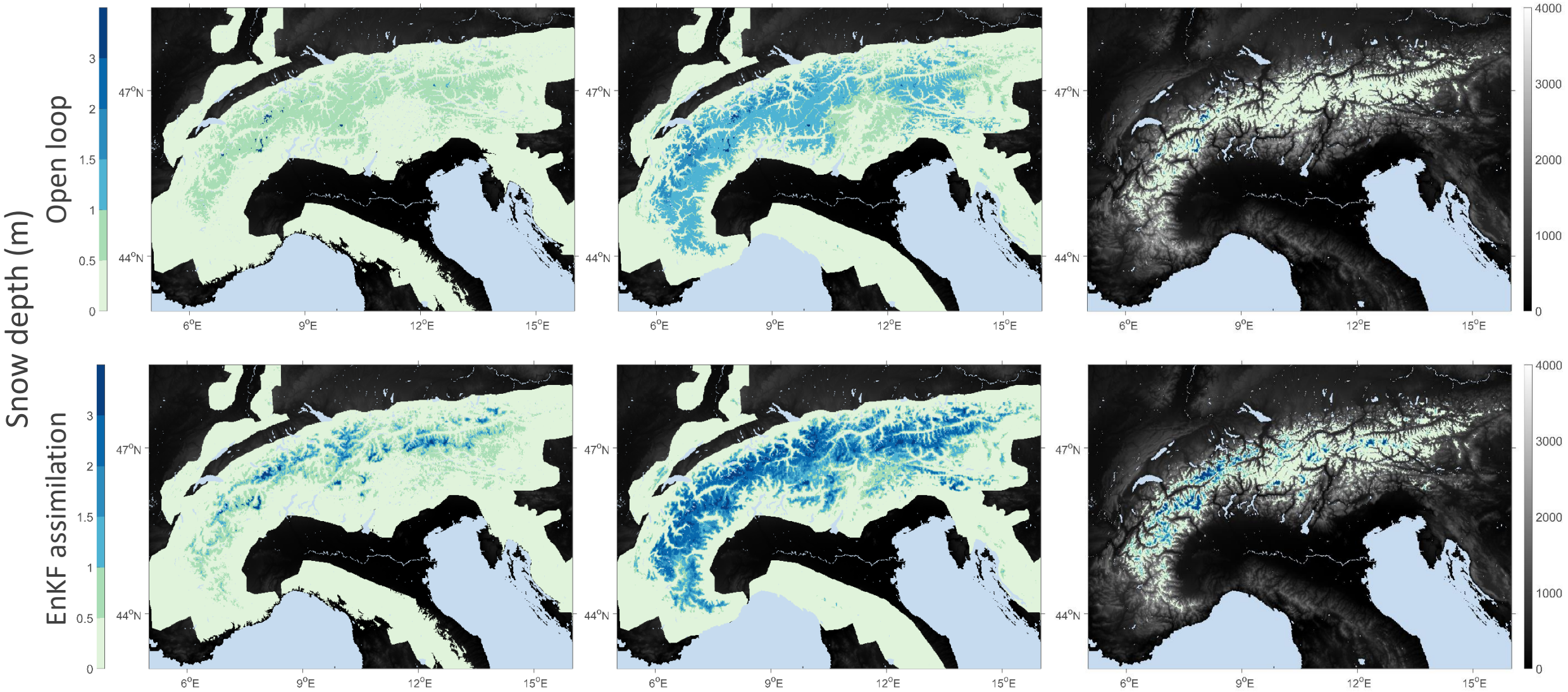
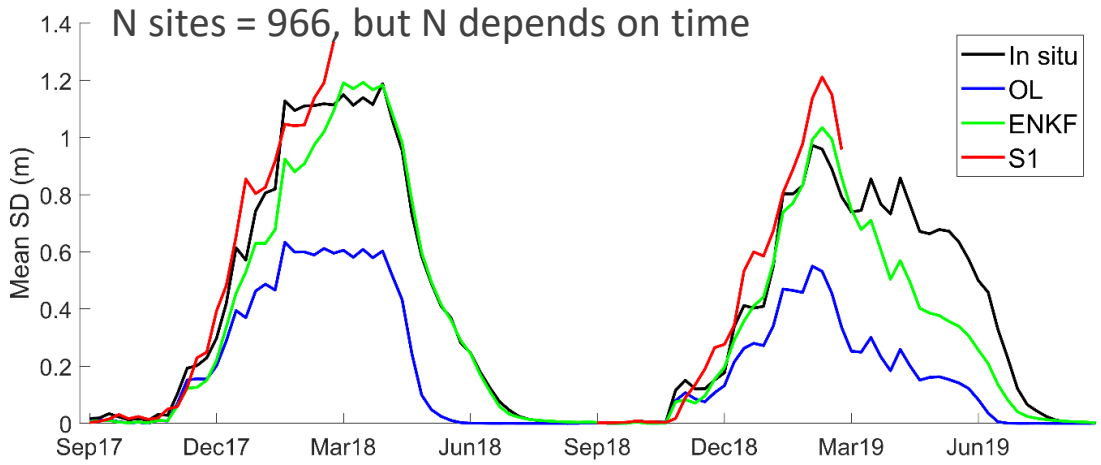
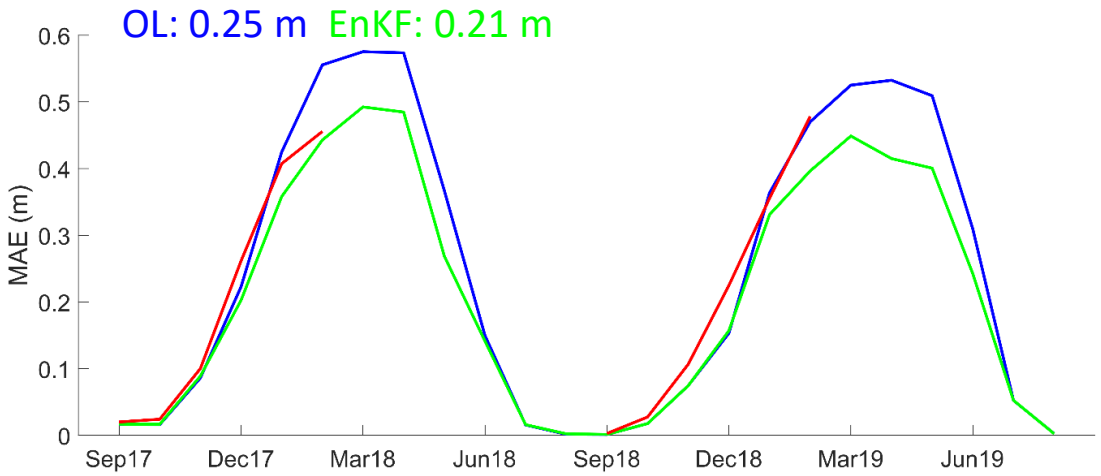


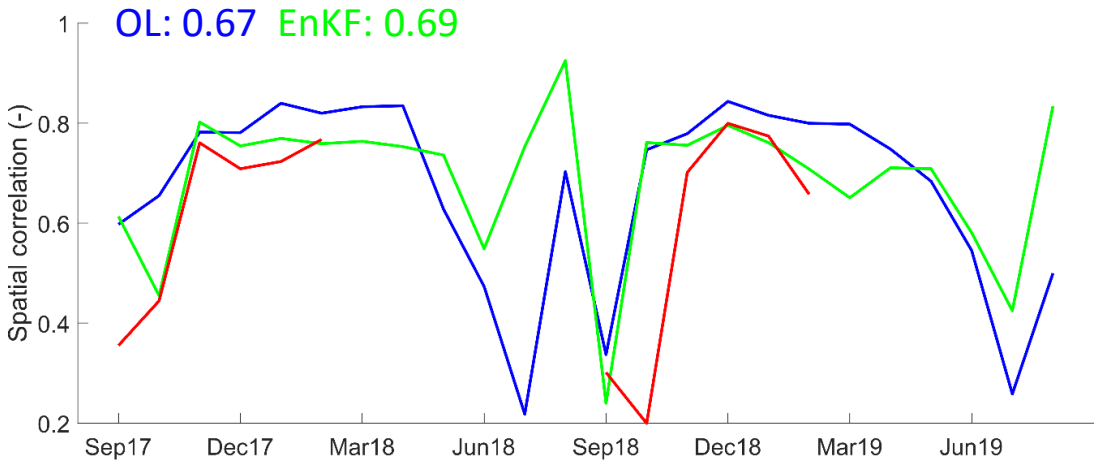
Assimilation of S1 over Alps

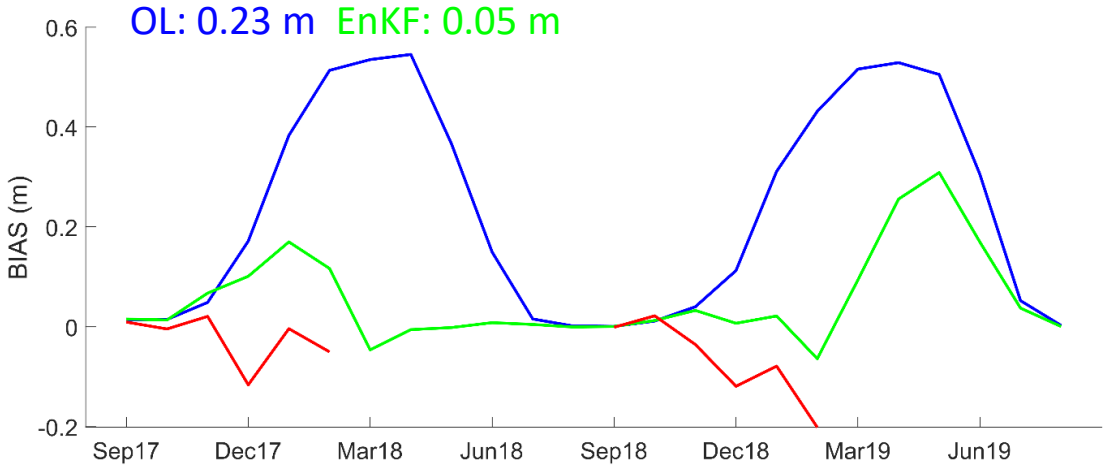


Assimilation of S1 over Alps

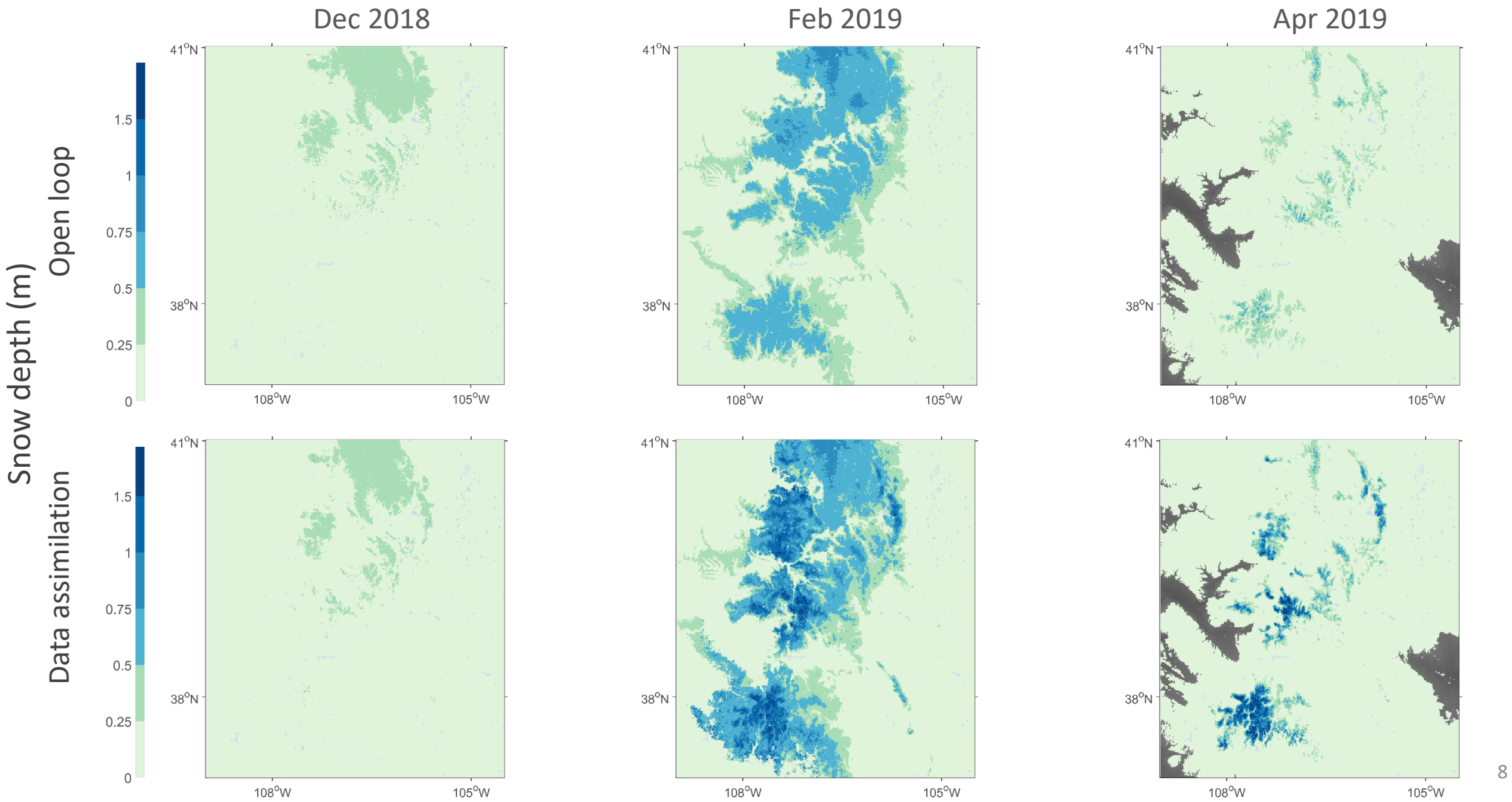




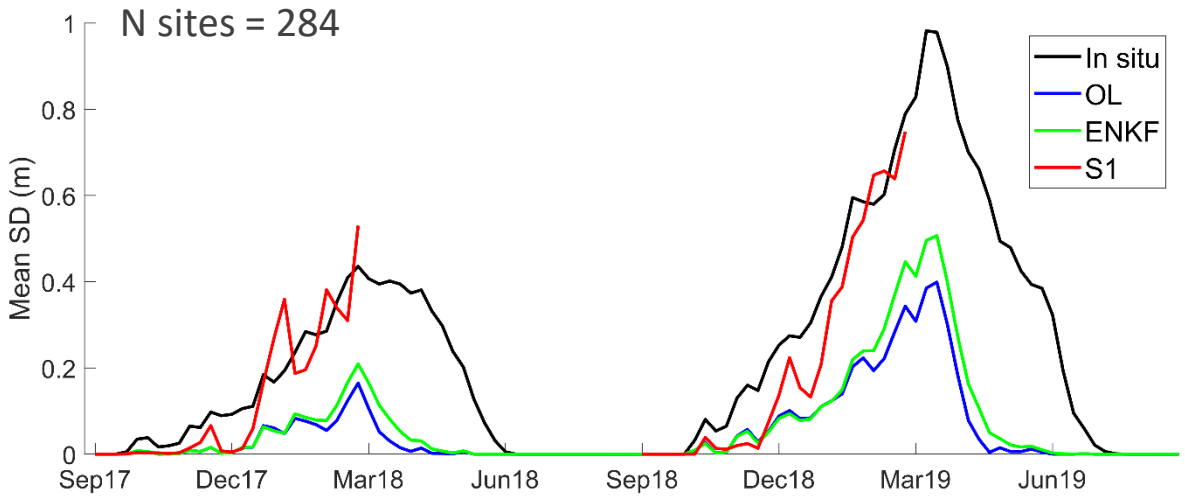


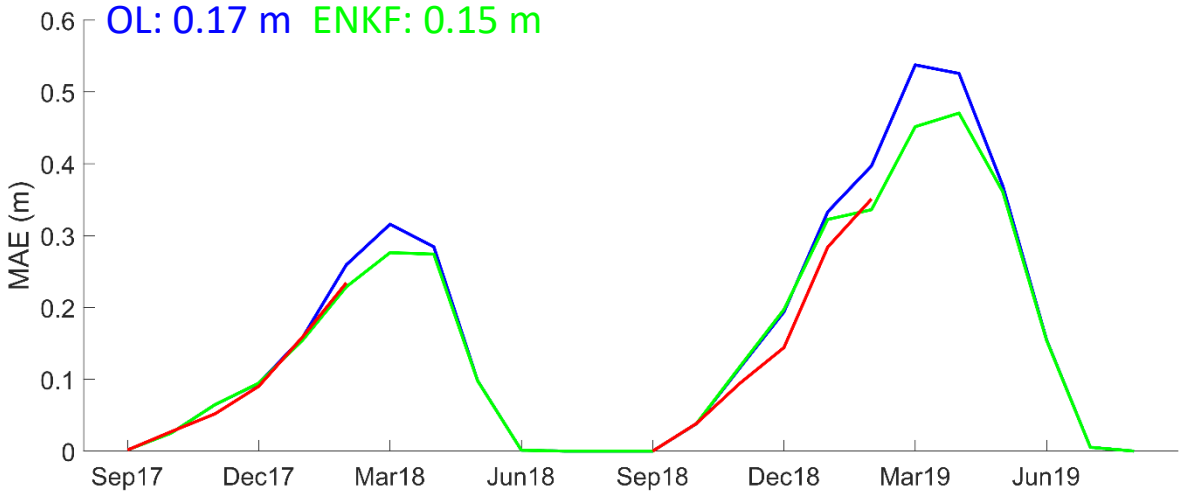


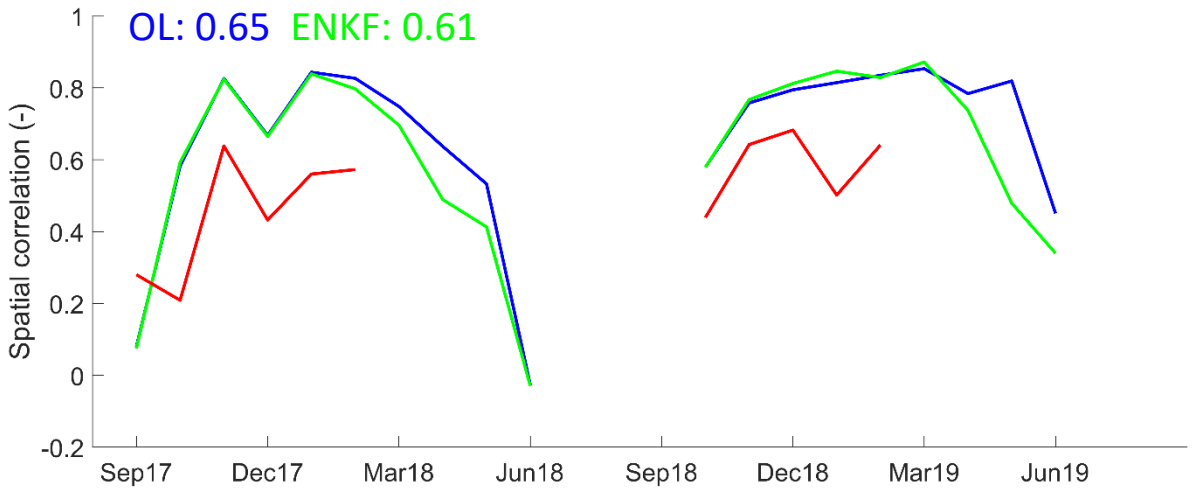
Assimilation of S1 over Colorado

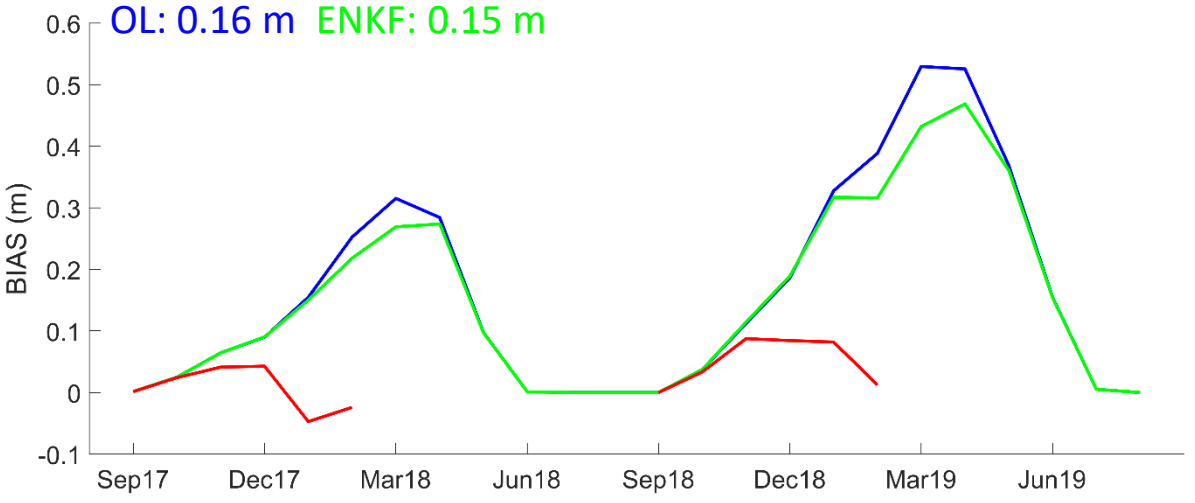


Assimilation of S1 over Colorado









Conclusions

- ASO snow depth observations outperform other approaches, but airborne flights are costly, weather dependent, and limited in areal coverage
- Sentinel-1 snow depth observations are a promising (and free) alternative, but are uncertain in wet snow conditions
- Assimilation of Sentinel-1 snow depth reduces the bias and MAE of model simulations
- Assimilation impact depends on observation frequency (higher over Alps)

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