ESS 505 Term Project Presentation: Temporal Changes in SWE on a Glacier Using InSAR

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What is SWE?

Snow water equivalent quantifies the amount of water in snowpack

We usually measure by

Snow water equivalent is important to know because

What is InSAR?

Interferometric Synthetic Aperture Radar is a remote sensing technology that measures the phase difference between consecutive SAR images of a location and

InSAR is sensitive to.... Phi_atm + phi_dialectricprops + phi_def + phi_ .....

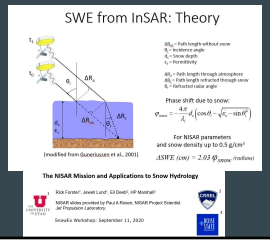
InSAR is traditionally used to

Measuring Change in SWE using InSAR

DRY snow --- and why

Proven in areas where dialec phase change >> phase change due to def

Measuring Change in SWE using InSAR



Complications on a Glacier

However, if we can remove the phase change due to perceived deformation due to glacier movement, we can isolate phase from snow and then calculate change in SWE from previous equation

$$\phi = \phi_{\text{flat}} + \phi_{\text{topo}} + \phi_{\text{atm}} + \phi_{\text{snow}} + \phi_{\text{noise}}$$

Removing the Phase Contribution due to Glacier Motion

Take two DEMs taken at the same time as the SAR image pair, difference the DEM, convert difference to phase difference, subtract out phase difference from interferogram, bulk of phase left over should be due to change in SWE?

Results

Study area results

If we can produce results, compare with scg radar derived swe? When were these taken?

Summary

References

Conde, V., Mateus, P., Catalao, J., & Gritsevich, M. (2019). On the Estimation of Temporal Changes of Snow Water Equivalent by Spaceborne SAR Interferometry: A New Application for the Sentinel-1 Mission. *Journal of Hydrology and Hydromechanics*, *67*, 93–100. https://doi.org/10.2478/johh-2018-0003

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Questions?