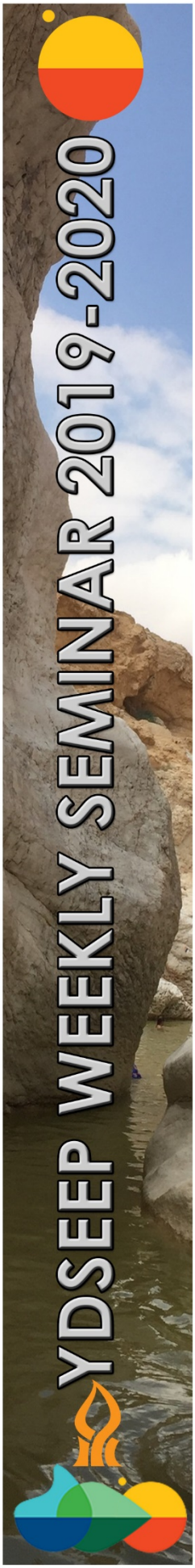

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Improved Precipitation Grids Derived from Microwave Link Attenuation

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Abstract:

Commercial Microwave Link (CML) attenuation data has been used to determine rain rates between microwave antennas, and to produce regional precipitation grids (Chwala et al. (2016), Overeem et al. (2016). The motivation for improving precipitation grids lies in weather now-casting and flood forecasting. CML networks offer a unique advantage for precipitation measurements due to their high density.

However these data experience uncertainty from several sources, initially examined by Berne and Uijlenhoet (2007). This current work determines the reliability of derived rain rates for each individual link by comparing CML rain rates to adjusted weather radar grids at the link location (similar to work by Rios Gaona et al. (2015)), over an extended time span. Dynamic Time Warping (DTW) is applied to the pair of CML/radar time series data. Based on the DTW spatial and temporal distance, unreliable links are identified and flagged. Correlations between rain measurements from an independent set of rain gauges and CML derived precipitation grids are higher for the flagged set of CML than the full, unflagged set. For certain storm events the coefficient of determination for the flagged set of CML is double that of the full set, demonstrating that improved precipitation grids can be obtained by removing unreliable links.

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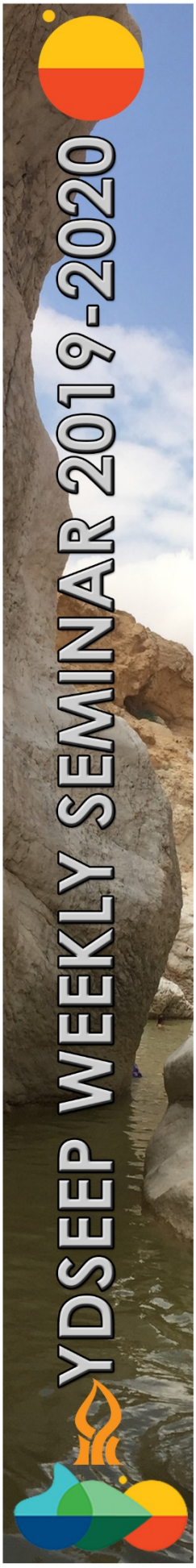
Date & Location:

Tuesday, May 12, 2020, 11:00
Lecture room, Physics Building (ground floor)



References

1. Berne, A., Uijlenhoet, R., 2007. Path-averaged rainfall estimation using microwave links: Uncertainty due to spatial rainfall variability. Geophysical Research Letters 34. URL: http://doi.wiley.com/10. 1029/2007GL029409, doi:10.1029/2007GL029409.

2. Chwala, C., Keis, F., Kunstmann, H., 2016. Real-time data acquisition of commercial microwave link networks for hydrometeorological applications. Atmospheric Measurement Techniques 9, 991–999. URL: http://www.atmos-meas-tech.net/9/991/2016/, doi:10.5194/amt-9-991-2016.

3. Overeem, A., Leijnse, H., Uijlenhoet, R., 2016. Two and a half years of country-wide rainfall maps using radio links from commercial cellular telecommunication networks: TWO AND A HALF YEARS OF RADIO LINK RAINFALL MAPS. Water Resources Research 52, 8039–8065. URL: http://doi. wiley.com/10.1002/2016WR019412, doi:10.1002/2016WR019412.

4. Rios Gaona, M.F., Overeem, A., Leijnse, H., Uijlenhoet, R., 2015. Measurement and interpolation uncertainties in rainfall maps from cellular communication networks. Hydrology and Earth System Sciences 19, 3571–3584. URL: http://www.hydrol-earth-syst-sci.net/19/3571/2015/, doi:10.5194/hess-19-3571-2015