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Utilizing Mobile-Phone-Link Data to Improve Rainfall Monitoring over Cyprus

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There is a need for spatially denser and temporally more detailed observations of precipitation in most countries,including Cyprus. Traditionally, rainfall is measured with rain gauges that are either read manually once a day or automatically at higher temporal frequencies. However, these are point measurements with poor spatial representativeness due to the small sampling area. In Cyprus rain gauges are typically installed close to populated communities and built-up areas, leaving substantial parts of the country only sparsely covered. On the other hand, wireless communication networks are widely spread across the terrain, at heights of only a few tens of meters off the surface. The microwave links, used in these networks, are deployed by cellular providers for backhaul communication between base stations. Since these links operate at frequencies of tens of GHz, atmospheric conditions and particularly rainfall affect the electromagnetic channel causing attenuations to the microwave signals between the radio masts. Cellular networks infrastructures can therefore be regarded as relatively high-precision atmospheric observation system offering fairly dense spatial coverage and high temporal resolution. The principal feasibility of rainfall delineation by microwave attenuation between commercial radio links has been shown by Messer et al. (2006). In the meantime, the group of P. Alpert and H. Messer at Tel Aviv University, and additional groups around the world (e.g. Leijnse et al 2010; Chwala et al., 2012; Wang et al., 2012) have further developed the methodology.
The objectives of the current project, which is still being implemented, can be summarized as follows:
i. to carry out a feasibility study on the utilization of mobile-phone-link-data for rainfall observations in Cyprus;
ii. to evaluate, adapt and implement the analysis methodology/software developed and used at TAU at the Energy, Environment and Water Research Center of The Cyprus Institute;
iii. to carry out a pilot study to evaluate the performance of the methodology in an area of good meteorologicalobservation coverage in Cyprus and based on dedicated field observations.
The rich experience and the successful application of the methodology for using mobile-phone-link-data in Israel offers good prospects for a successful implementation of this methodology in Cyprus. This presentation will provide insights into the background and rationale of the project and will discuss its current status and the next steps to be taken.

References

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