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Challenges in satellite precipitation estimation across scales

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The observation of precipitation from satellites sensors now extends to nearly 50 years, with the more direct passive microwave observations over the last 40 years. Despite the length of the observational record, and of the associated precipitation products, challenges remain in terms of providing robust, long term records of precipitation for climate-scale studies, as well as for precipitation products in real time, with high resolution and low latency for user applications. Key to both these extremes of scale is the availability of the observations: although at present there is a relative abundance of observations available from which precipitation may be (at best) retrieved or (at worst) inferred, the long term record is not so good. This impacts the generation of any long-term record, not only in terms of the actual values of the retrieved precipitation, but also the confidence we have in these observations. The relative paucity in the quantity of observations in the early years of the satellite precipitation record results in larger random errors and, for example, less complete information of precipitation characteristics needed for assessing extreme events.

The impact of the data availability upon the confidence of our satellite precipitation products, and how it changes over time (from 0.3 B observations/year in 1978 to over 45 B observations/year today) will be presented. The sampling of the precipitation across the diurnal cycle will also be assessed across the years of record, together with the effects of the heterogeneity in the sensors used in precipitation retrievals. In particular, comparison will be made between satellite precipitation retrievals and those of surface measurements to emphasise the need to consider the impact of sampling upon the accuracy of precipitation products across the spatial and temporal scales.