



## Precipitation uncertainty: How well do we know this critical hydrological variable?

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Humans can only survive three days without water – Human health depends on an adequate supply of clean drinking water, and society depends on water for everything from agriculture to recreation. In 1990, 1.1 billion people did not have access to safe drinking water, mostly in underdeveloped nations. Ultimately, our access to fresh water relies on the fact that water will fall from the sky. However, our ability to measure precipitation is amazingly inadequate. Globally, we measure rainfall over land with an uneven distribution of about 40,000 rain gauges, which together have a total surface area smaller than a football field. We also measure precipitation with ground-based radars and satellites, but these are known to disagree by a factor of two. Measurement of solid precipitation can be off by a factor of five due to gage undercatch, and inadequate satellite wavelengths and algorithms. Further, it is not only the amount of precipitation that determines surface water availability, but knowing its timing and duration is also critical for how that precipitation is partitioned into runoff, recharge, and evaporation. This study compares the precipitation averages, variability, and timing for various regions around the world in an attempt to determine how well we currently know this critical hydrological variable.