

From grid-based uncertainty to hydrologically credible precipitation ensembles

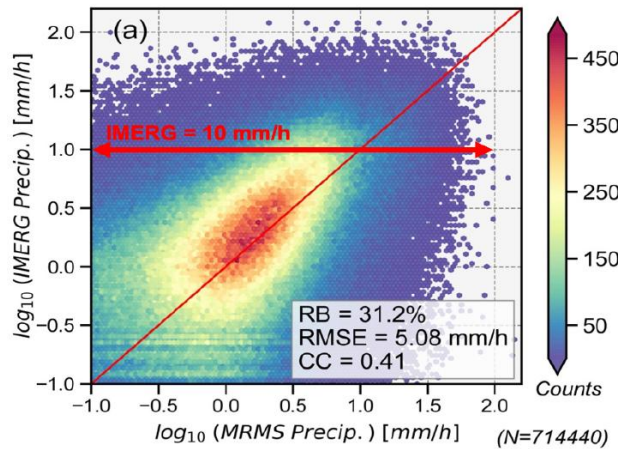
Yagmur Derin, Assistant Professor, Civil and Environmental Engineering, University of Iowa, Daniel Wright, Associate Professor, Civil and Environmental Engineering, University of Wisconsin-Madison

IOWA

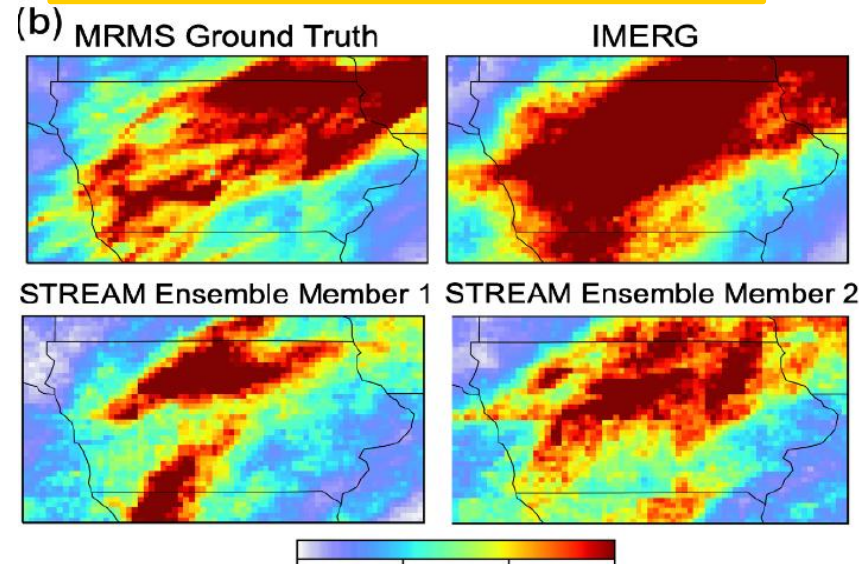
The end application dictates the form! A flood model can't run on a PDF. It needs rainfall fields.
Uncertainty must come as an ensemble of realistic rainfall fields!



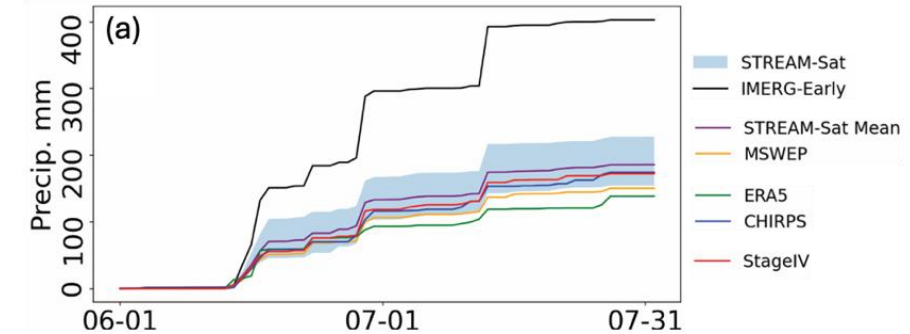
1) The spread you can fit



2) The structure a PDF can't see



3) The range you can see



Satellite QPE errors are storm-dependent, anisotropic, advected, and temporally persistent.

STREAM-Sat: Satellite-only ensemble quantitative precipitation estimation

- Grid-based uncertainty modeled using GPM's own radar (no gauges needed and global)
- Errors sampled with realistic space-time correlation which provides equally likely rainfall fields
- Spread of the ensemble is the uncertainty and each member is a rainfall field a hydrologic model can run

THE FUTURE

- Deliver STREAM-Sat to end users with dockerized open-source software
- Judge UQ at different basin scale accumulation, flood probabilities and extremes
- Precipitation Structure Atlas: map how rain is organized to calibrate ensembles and judge AI weather models