

Introducing and evaluating two new station-enhanced and interoperable gridded satellite precipitation datasets: the IMERG_{late} based CHIMES and the Geostationary IR-based CHIRPS3

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Over the last six years, the impacts and losses associated with droughts, floods, and hurricanes surged through the interaction of increasing exposure and more extreme weather and climate (Funk 2021). As hazards mount, models indicate more variable precipitation, and observations indicate increasing extremes in humid regions, yet the small number of available gauge observations is declining. So, timely, station-enhanced satellite quantitative precipitation are a critical tool for understanding and mitigating hydro-climatic risks.

To this end, the Climate Hazard Center, in collaboration with NASA, has developed four interlocking components that represent major improvements over the Center's current version 2 of the Climate Hazards center InfraRed Precipitation with Stations (CHIRPS). These components are:

- 1) A much-expanded set of station data inputs at three time-scales
 - a. Long term climate normals,
 - b. Time-varying monthly data, and
 - c. Time-varying pentadal data;
- 2) An improved gauge undercatch-corrected high resolution precipitation climatology;
- 3) A new gauge-enhanced 2001-present Climate hazards center IMERG with Stations dataset (CHIMES), and
- 4) 4) an improved 1981-present CHIRPS version 3 (CHIRPS3).

As discussed in our BAMS paper ([here](#)), AGU presentation ([here](#)) and AMS presentation ([here](#)), the IMERG-basis of CHIMES generally offers superior performance to the IR-based CHIRPS products. The CHIRPS products, however, have a longer period of record. CHIMES and CHIRPS3 will use the same background climatology and station data.

Our presentation begins by describing enhancements to the CHC station archive at monthly and timely scale. Additional data sources have led to an enhancement of the number of unique monthly final stations from about 25,000 to 36,000, while the number of pentadal preliminary stations has increased from about 6,000 to 20,000. The methods used to develop the revised climatology, CHIMES and CHIRPS3 are then briefly described.

We then conclude with a station-based evaluation/comparison of CHIRPS2, CHIRPS3, MSWEP, IMERG_{late}, IMERG_{final} and PERSIANN CCS. At monthly and pentadal time-scales, stations independent of those used to derive MSWEP and IMERG_{final} are identified. As described in our recent BAMS CHIMES [paper](#), cross-validated spatial interpolation is used to assess the relative accuracy of CHIMES, CHIRPS2, and CHIRPS3. The cross-validated estimates are compared with stations observations, and other satellite estimates. The relative performance at pentadal and monthly time-scales is discussed, and evaluated over different geographic and climatic regimes.