

Reprocessing of Hydrometeorological Automated Data System Hourly Precipitation Data

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Background



As NCDC became the archival Center of HADS data, we began assessment of historical HADS data for their potential climatic value in high resolution precipitation database. The period is from July 1996 – present, and spatial coverage extends to Alaska and Latin America.

(<http://www.nws.noaa.gov/oh/hads/>)

Reprocessing Steps

- Collect all station names from SHEF format data
- Decode SHEF format HADS for precipitation related variables
- Make all reports in 15min bin for each station
- Detect missing values and restore if accumulated precipitations are the same before and after the missing period (less than 24 hours)
- Produce hourly precipitation by backward differencing on top-hour

The output of this process is Baseline Product.

Quality Issues and Control

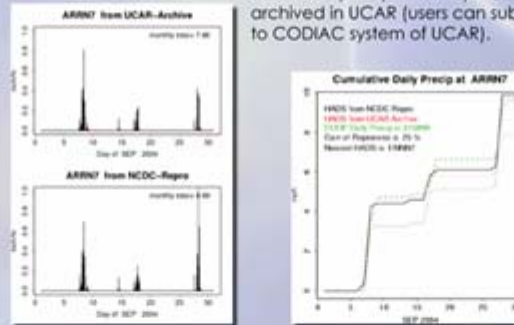


(From <http://www.nws.noaa.gov/oh/hads/>)

Exemplified above are accumulated precipitation that result in negative hourly precipitation. Such spikes and noise (or small spikes) are detected and controlled during reprocessing. Output of this post-processing is Level-1 Product.

Comparisons with Real-time Product

OHD's HADS program has been generating hourly precipitation in real-time in support of time critical missions such as flash flood warning and Multi-sensor Precipitation Estimates by River Forecast Centers. This real-time hourly product is being collected along with non-HADS precipitation by NCEP and archived in UCAR (users can subscribe to CODIAC system of UCAR).



Figures show an example of the station ARR77 during September 2004. The real-time product has 40 missing values (red dots in both top-left and top-right) which were all recovered in the reprocessed product. The recovery of 0600 UTC September 28, 2004 is crucial, so that the monthly total becomes very close to that of daily COOP station (green dashed in top-right) 10km away. The gain in the monthly total over real-time product is 25%. The nearest HADS station ENNN7 (black dots in top-right) is about 15km away.

Three quality measures of the product

- Average percentage of missing hourly obs in the domain
- Average percentage of top-hour obs in the domain
- Average gain in the monthly total rainfall in the domain

Table 1. Three quality measures between reprocessed Level-1 product and real-time product during warm season, 2003-2005 in the Carolinas.

Any gauges which have more than 100 missing values in the month are deleted from the computation for fear of bad gauge. The improvement is the difference of monthly total rainfall (reprocessed minus real-time) showing a recovery of rainfall by reprocessing. A couple of days of original SHEF-format HADS data were not recoverable for reprocessing during June and July, 2005 thus they ended up with more missing values in the reprocessed product than those of the real-time product and a loss of monthly total rain. The third column is the number of gauge stations in North Carolina and South Carolina.

Year	Month	% Missing Data (1)	% Top-hour Obs (2)	% Gain in Total (3)
2003	Apr	0.8	99	0.20
2003	May	1.0	99	0.11
2003	Jun	1.0	99	0.14
2003	Jul	1.7	94	0.14
2003	Aug	0.8	95	0.03
2003	Sep	0.6	97	0.03
2004	Apr	1.0	99	0.17
2004	May	1.0	97	0.24
2004	Jun	1.0	97	0.24
2004	Jul	1.0	97	0.12
2004	Aug	1.0	97	0.12
2004	Sep	1.0	97	0.12
2005	Apr	1.0	97	0.12
2005	May	1.0	97	0.12
2005	Jun	1.0	97	0.12
2005	Jul	1.0	97	0.12
2005	Aug	1.0	97	0.12
2005	Sep	1.0	97	0.12

Current Status in All Domain

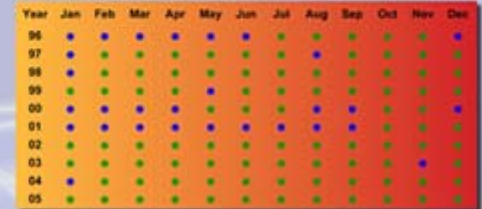


Table 2. The green cells represent Level-1 hourly precipitation product reprocessed from the original SHEF format HADS data at NCDC. The blue cells represent real-time product archived at UCAR because historical HADS were computed and/or unrecoverable.

The number of daily gauge stations which report at least four times a day. When historical HADS data were unrecoverable, we filled with the NCEP real-time product from the UCAR archive for the completeness of record. The sudden jumps are explained by the inclusion of non-HADS precipitation in the NCEP product.

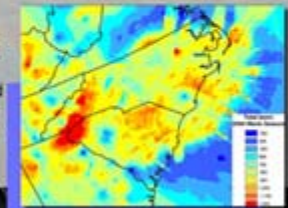


How to get them?

The original SHEF format HADS data can be ordered through NCDC customer service (DSI number 6328, document is in preparation). The Baseline and Level-1 products are in beta version. Request directly to Dongsoo.Kim@noaa.gov

Product Under Development

Multi-sensor Precipitation Reanalysis (MPR) is an extension of real-time Multi-sensor Precipitation Estimate by merging reprocessed hourly precipitation, daily COOP precipitation with NEXRAD Precip product. The MPR uses parameters optimized under both short and long term time scales of precip events.



NCDC is developing several climate data records from the remote sensing data. Please take an attached flyer for a list of products which are under development.



Higher Level Product

Level-2 Product: Output of Spatial Consistency Check
Level-3 Product: Output of Multisensor Precip Reanalysis