Reprocessing Plan

GHCN-Monthly Version 4 Mean Temperature

Version 1.0 / September 28, 2016

1. Introduction

The GHCN-M version 4 dataset will be reprocessed on an as-needed basis. Reprocessing can occur due to updates in the foundational data or because of bug fixes or other improvements to any part of the process including data acquisition, quality control, bias correction, or data output.

Reprocessing as described in this document will be accompanied by the release of a new version; either a moderate or a minor update. A moderate update results in an increment of the second digit of the version number and is accompanied by a technical report. A minor update results in an increment of the third digit of the version number and is accompanied by a note in the status log that resides on the GHCN-M website. The versioning process is described in the ATBD.

2. Data source updates

The International Surface Temperature Initiative (ISTI) Databank is the source of raw data for GHCN-M. It consists of more than 50 sources of summary of the month and summary of the data in situ temperature data. The sources are merged using a process described in the ISTI Databank ATBD. If additional sources are added to the merged dataset or significant revisions or updates are made to any of the data sources, a new version of the databank is released. The new version is then a candidate to become the foundational dataset for a new version of GHCN-M. However, more than one release of the Databank may occur before the data become a part of GHCN-M. The Databank serves the wider needs of the international community and as such there may be beneficial reasons for releasing a new version of the Databank without the new version being of a significance that would require immediate inclusion in GHCN-M.

3. Bug Fixes and other Improvements

Improvements to the processing software typically occur between major releases of new GHCN-M versions. The software improvements can consist of bug fixes or advances to the quality control or bias correction algorithms. These improvements are incorporated into new minor or moderate version updates.

4. Quality Assurance

Any changes to the GHCN-M data or system software are subjected to verification and validation and described in the Verification and Validation report. This includes software code reviews and tests against a golden dataset. The quality of the new version is further assured through analysis and review of the resulting data including comparisons of local to global anomalies and trends against the previous version. Examples of analyses conducted for reprocessing updates for the previous version of GHCN-M (version 3) are shown in Exhibits 1 through 5. The reprocessing updates and analyses are briefed to the NCEI Science Council following the standard Operational Readiness Review process.

5. Exhibits

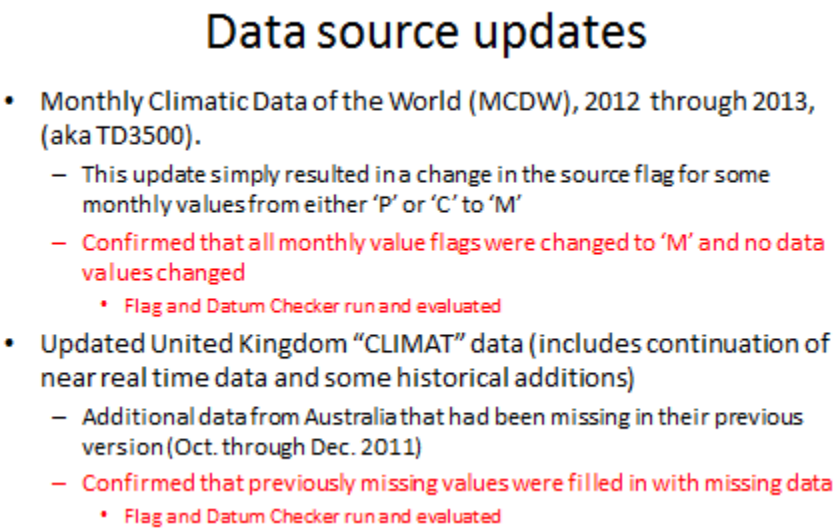

Exhibit 1. Example of data source updates made in moving from GHCN-M version 3.2.2 to 3.3.0. A description of changes made and methods use to confirm validity of change.

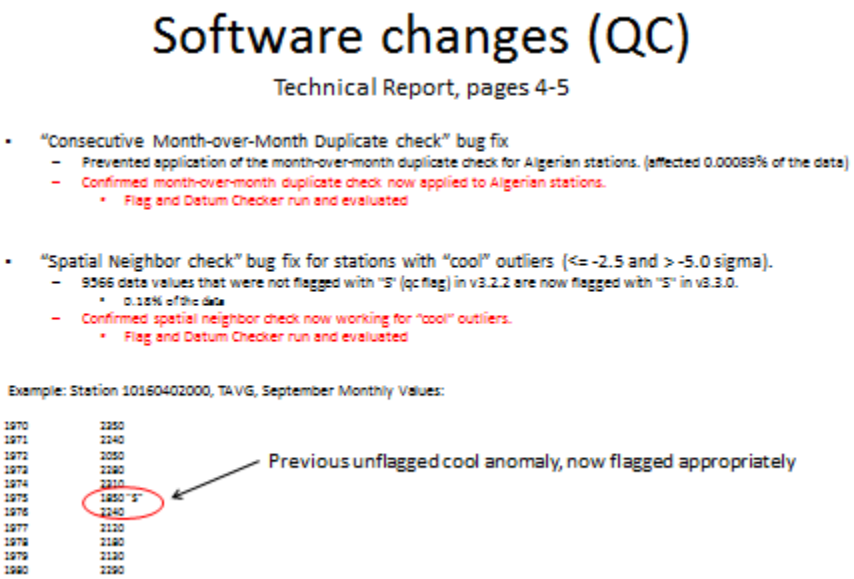

Exhibit 2. Example of software changes made to quality control algorithms to correct bugs; made in moving from GHCN-M version 3.2.2 to 3.3.0. A description of changes made and methods use to confirm validity of change.

Software changes (Bias correction)

Changes that affect flags only

- Days missing flags for USHCNv1 were changed to lower case to agree with GHCNMv3 format. And moved to flag position 1.
  - Confirmation that flags are now lower case.
- PHA output flags for missing data were fixed to indicate reason for removal. Q = QC program marked bad. X = PHA algorithm detected an inhomogeneity but could not compute an adjustment.
  - Independent and automated evaluation of flagging to confirm X now applied appropriately.

Exhibit 3. Example of software changes made to bias correction algorithms made in moving from GHCN-M version 3.2.2 to 3.3.0. A description of changes made and methods used to confirm validity of change.

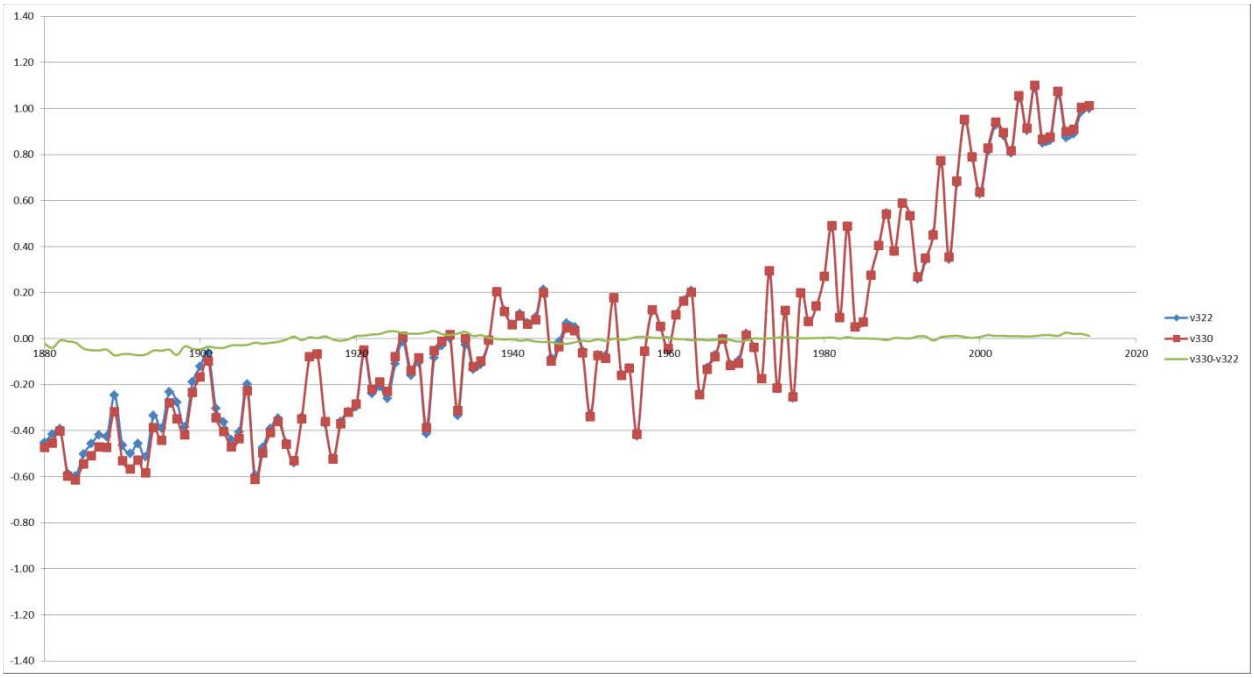

Exhibit 4. Example of global annual average anomalies resulting from GHCN-M version 3.2.2 to 3.3.0 update.

Ranks
Global Land-Only

v322	Rank	v330	Rank
2007	1	2007	1
2010	2	2010	2
2005	3	2005	3
2014	4	2014	4
2013	5	2013	5
1998	6	1998	6
2002	7	2002	7
2006	8	2006	8
2012	9	2012	8
2003	10	2011	10

Exhibit 5. Example of global annual average rankings resulting from GHCN-M version 3.2.2 to 3.3.0 update.