HadISDH.land Update Document
Kate Willett (MOHC), 12th April 2021

General Notes:
The HadISDH.land.v4.3.1.2020f contains all 12 months of 2020. It is a minor new version (Y element + 1) because some of the code base has been changed from IDL to Python 3 and from Python 2.7 to Python 3. This has resulted in a very minor change to the adjustment uncertainty estimation. All other processing steps for HadISDH.land remain identical. A bug fix was applied to correct the uncertainty pull through from station to grids which had resulted in the combined station and sampling uncertainty in v4.2.0.2019f being too small by half. These code changes warranted an increment of the Y variable from 2 to 3. The new version of HadISD (3.2.1.202101f) has pulled through additional stations and some historical changes to stations which are passed on to HadISDH.land. Although the initial station count increased by 1139 to 9278, those long enough to begin the HadISDH processing were only 4520, an increase of 23 from v4.2.0.2019f. The end station count is further reduced after homogenisation. This, and the additional year of data results in small changes to station selection. There have been several bugs found and fixed during the code conversion which are documented below which have also led to some small changes in regional and global average values and coverage. The homogeneity adjustments differ slightly due to sensitivity to the addition and loss of stations, historical changes to stations previously included and the additional 12 months of data. Note that there was a prior version of v4.3.0.2020f but most of the data from April 2015 was found to be missing for some reason. This was a problem with the ISD archive that was actually discovered, and present, in v4.2.0.2019f. The data have now been retrieved and hence the increment of the Z variable from 0 to 1. More information can be found at
https://hadisdh.blogspot.com/2021/04/2021-updates.html.

Version Number X.Y.Z.0000p/f:
4.3.1.2019f

Major Changes X:
- None

Minor Changes Y:
- All processing steps for HadISDH.land remain identical but all of the code is now written in Python 3 rather than IDL and Python 2.7 and every step is automated by code.
- The only technical change has been in the fit of the gaussian curve to the detected homogeneity adjustments. This is used to estimate the missing small adjustments in the middle of the distribution and is then used to calculate the standard deviation in missed adjustments. This becomes part of the homogeneity adjustment uncertainty which contributes to the station uncertainty. It is a very minor change.

Bug fixes / historical data updates Z:
- Retrospective improvements to the historical data in the ISD archive are ongoing and have been incorporated here. These have not been documented but this includes recovery of the data for April 2015 which was almost entirely missing across the globe in v4.2.0.2019f and an earlier v4.3.0.2020f version which is now obsolete.
- There has been an increase in the number of stations selected to process for HadISDH.land (not all of these make it through to the final processed product) from 8139 in the previous version to 9278 in this version, although this reduces to 4497 and 4520 respectively when only stations with long enough records over the climatology period are included.
- Bug fix 1: Output gridded uncertainties were stated to be 2 sigma but were in fact 1

sigma due to an error in the code which has now been fixed.

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Start Date DD.MM.YYYY: 1973-01-01

End Date DD.MM.YYYY: 2020-12-31

Hadisdh Data Format (Baseline documentation): Updated to include marine and blend data and correct the uncertainty to state 2 sigma uncertainties – URL: http://cedadocs.ceda.ac.uk/1477

Reference: No change

Other notes: The update blog post is here: https://hadisdh.blogspot.com/2021/04/2020-updates.html