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HadISDH.marine Update Document
Kate Willett (MOHC), 16th April 2024

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General Notes:
The HadISDH.marine.1.6.0.2023f contains all 12 months of 2023. There are no major changes (X). A new wet-bulb temperature algorithm is used to keep in line with HadISDH.land, resulting in incrementing the Y element of the version number to 6.

Although only last year we implemented a new algorithm (Stull, 2011) to remove the large errors at high temperature/low humidity in the previous Jensen et al., (1990) method, a new method is now available which reduces moist bias errors at high temperature/low humidity (reaching +1.3 °C) and dry bias errors at low temperature/high humidity (approaching -1 °C). The new Non-iterative Evaluation of Wet-bulb Temperature (NEWT) method has been developed by Rob Warren at the Bureau of Meteorology and coded in python. Its errors are far smaller at ± 0.01 °C. Rogers and Warren (2024) introduce the new method and compare it against the Stull (2011) and other methods (https://essopenarchive.org/users/714325/articles/698601-fast-and-accurate-calculation-of-wet-bulb-temperature-for-humid-heat-extremes). Here we use their python code to calculate adiabatic wet-bulb temperatures using polynomial fits from surface pressure, air temperature and specific humidity. This change only affects the wet-bulb temperature fields and differences are negligible in large-scale means and far less than 1 °C for the most part. Differences are largest over hot/dry and cold/humid air conditions. We still use the Stull (2011) method to decide whether to calculate vapour pressure with respect to ice or water because it is faster to implement so there is no change to other variables.

The only other change is the additional year of data.

Keep up to date with subsequent changes and analyses at https://hadisdh.blogspot.com/2024/04/2023-update-from-hadisdhmarine1602023f.html.

Version Number X.Y.Z.0000p/f:
1.6.0.2023f

Major changes X:
- None

Bug fixes and minor changes Y:
- A change to using the NEWT algorithm for calculating wet bulb temperature.

Minor bug fixes / historical data updates Z:

Start Date DD.MM.YYYY: 1973-01-01
End Date DD.MM.YYYY: 2023-12-31
Hadisdh Data Format (Baseline documentation): https://zenodo.org/record/7963175
Reference: No change
- Willett, K. M., Dunn, R. J. H., Kennedy, J. J., and Berry, D. I. *2020*: Development of the HadISDH marine humidity climate monitoring dataset. Earth System Science Data. 12, 2853-2880, doi.org/10.5194/essd-12-2853-2020.
- Freeman, E., S.D. Woodruff, S.J. Worley, S.J. Lubker, E.C. Kent, W.E. Angel, D.I . Berry, P. Brohan, R. Eastman, L. Gates, W. Gloeden, Z. Ji, J. Lawrimore, N.A. Rayner, G. Rosenhagen, and S. R. Smith, 2016: ICOADS Release 3.0: A major update to the historical marine climate record. Int. J. Climatol. (doi:10.1002/joc.4775).

Other notes: The HadISDH update/analyses blog is here:

https://hadisdh.blogspot.com/2024/04/2023-update-from-hadisdhmarine1602023f.html.