



Met Office
Hadley Centre

HadISD: Quality Controlled, Sub-daily in-situ data

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WCRP Workshop “Grand Challenge: Extremes”, UNSW, Sydney, February 2015

What data are required for the WCRP Grand Challenge?

1. How can we improve the collation, dissemination and quality of observations needed to assess extremes and what new observations do we need?

Major challenges exist in the derivation of suitable and reliable observational datasets for extremes. Despite continuous improvements in observing systems, the high-frequency information (e.g. daily, sub-daily and even finer time scale precipitation, temperature, wind, waves, and sea level records) and quality are still inadequate to properly assess many high-frequency extremes remains unavailable for many regions. In addition, observations for hydro-climatic extremes (e.g. soil moisture for droughts, runoff for floods) are still very sparse and not

• WCRP White paper:

- High frequency (\leq daily)
- High quality
 - Using common system

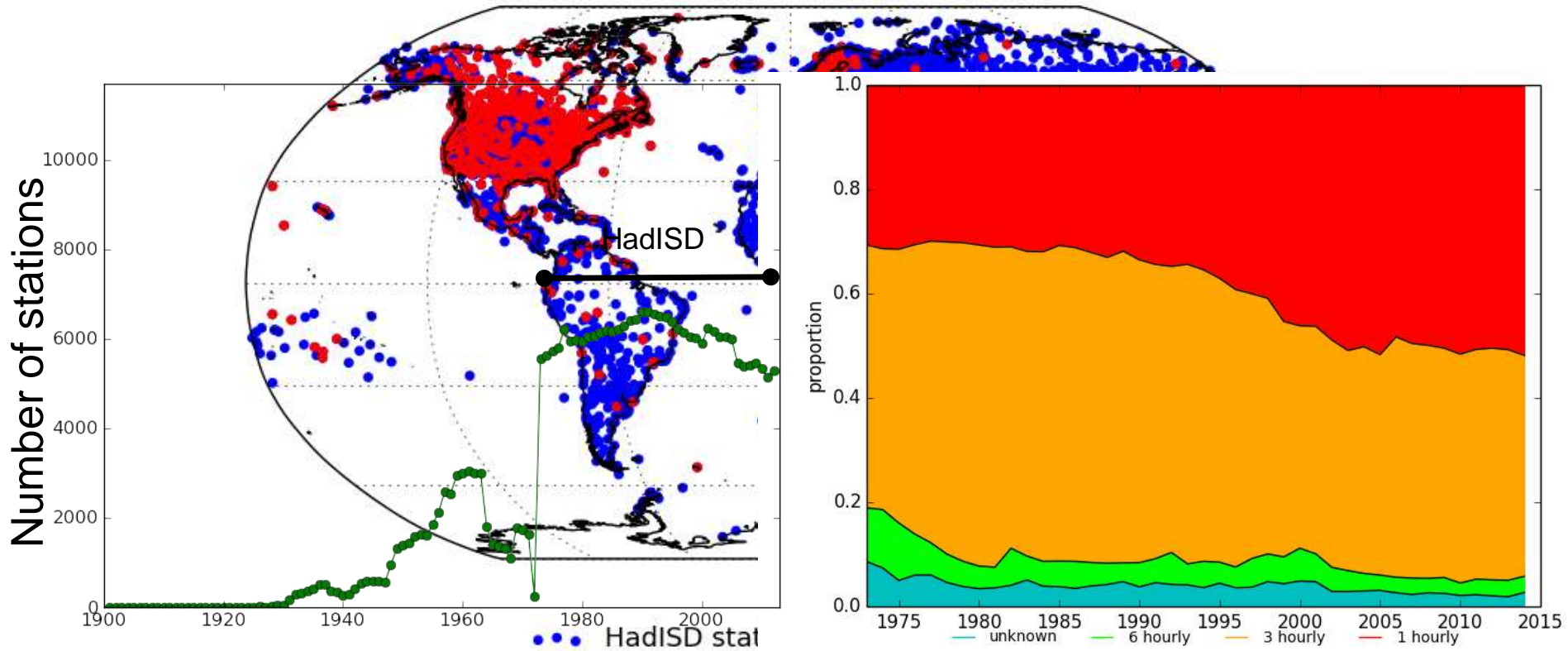
Actions:

Effort should be made to ensure that, as much as possible, data adhere to common data quality assurance and metadata standards, and that they are disseminated using a common format, thereby improving the exchangeability of existing data. The development of community data analysis tools. We also need to continue to request free and open international exchange of existing high time resolution data to improve global coverage of daily and sub-daily observations for temperature and precipitation extremes, and identify steps that would improve data sharing. The coordination of existing digitization of weather observations that reside in

- Accessible
 - Common format
 - data and metadata standards

High Frequency

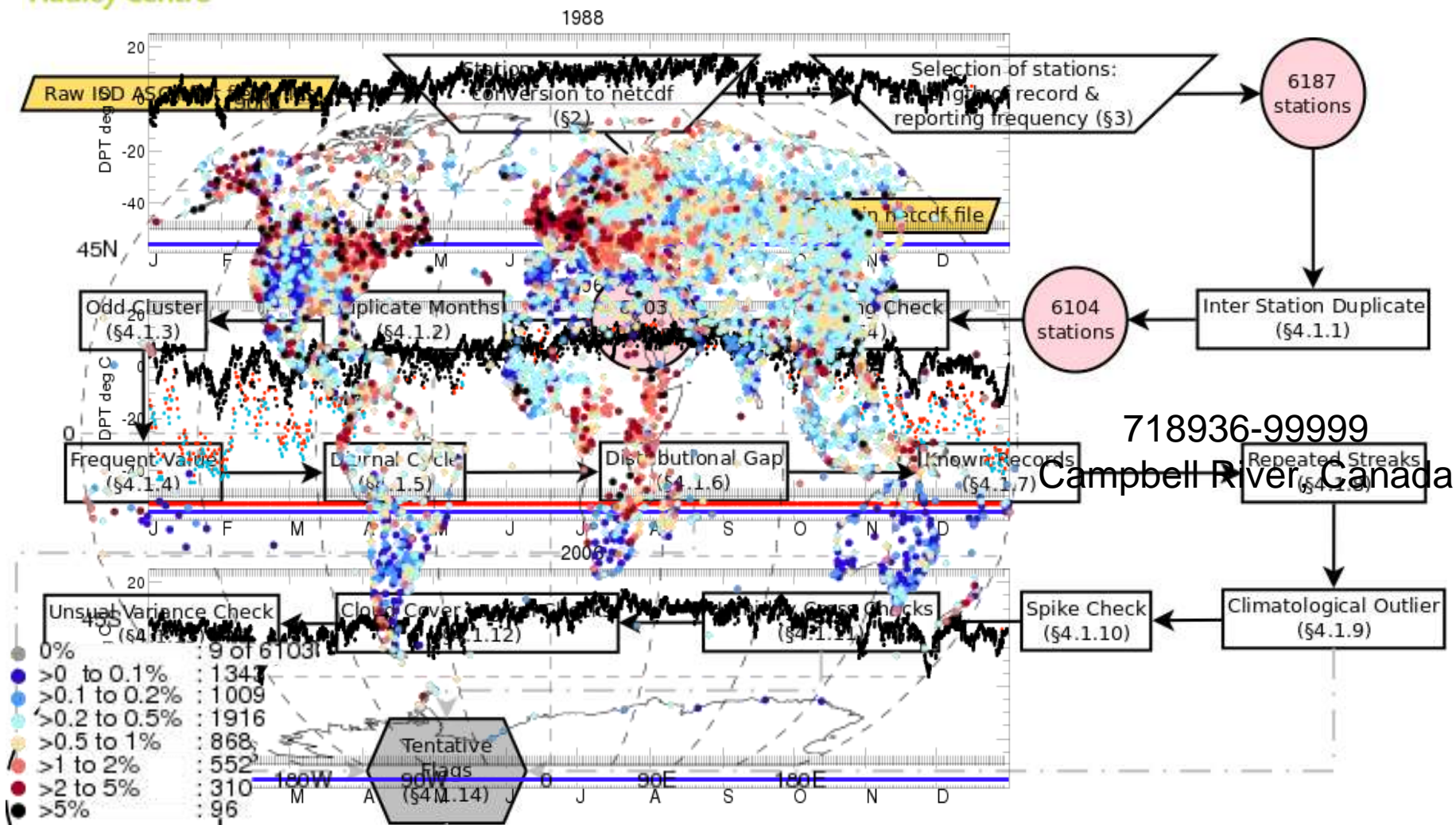
6103 stations



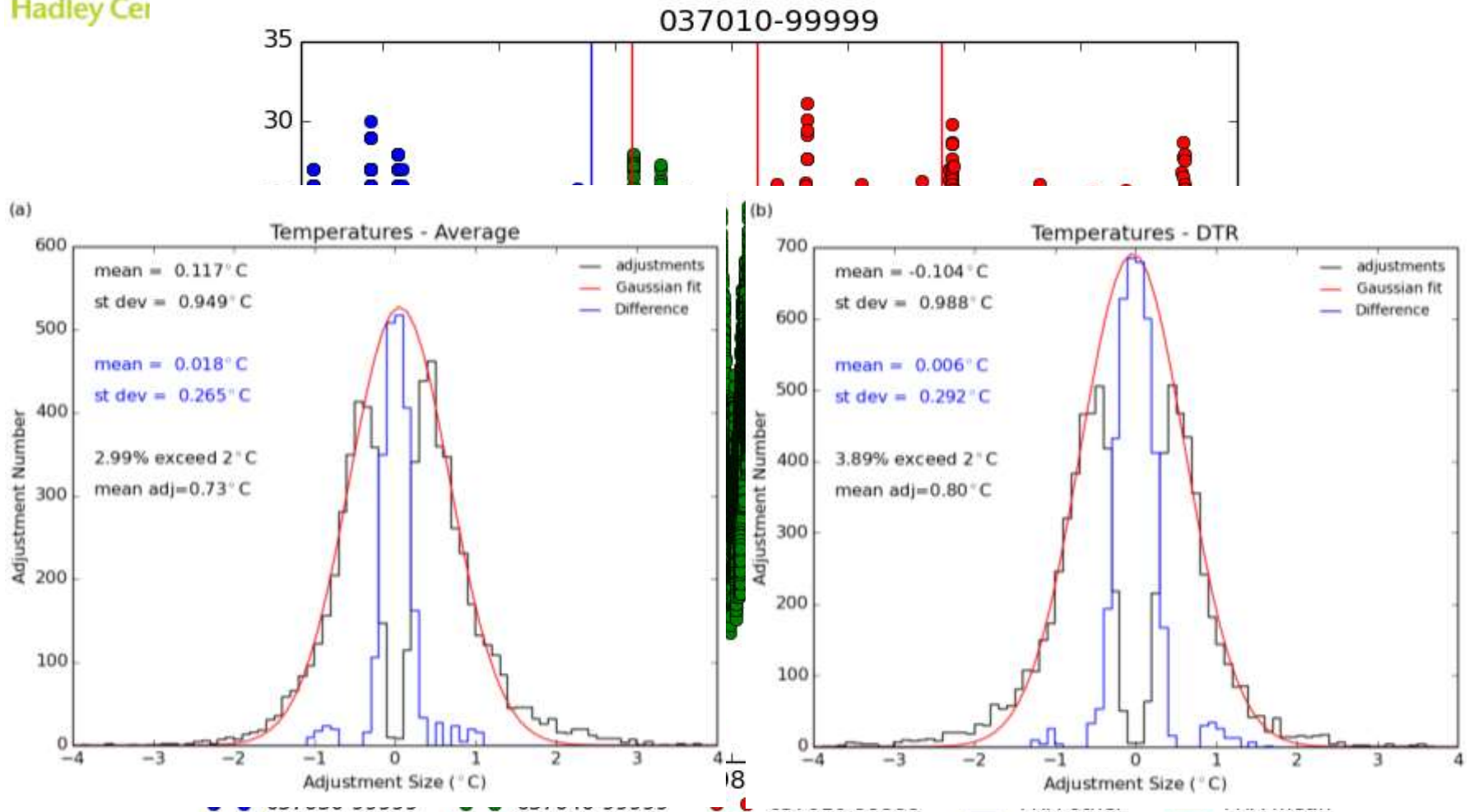
HadISD/analyses/general/trunk/hourly_reporting.py 12-Feb-2015 18:15

talks/2015/plot_hadisd_stations.py 11-Feb-2015 15:36

High Quality – QC Suite



High Quality – homogeneity





Accessible

- User dialogue using Twitter [[@metofficeHadOBS](https://twitter.com/metofficeHadOBS)] and blog [hadisd.blogspot.co.uk]
- netCDF data freely available for research
- Open Access paper with Open Review
- Quality control code released (IDL)
- Annual updates on hadobs website www.metoffice.gov.uk/hadobs



Met Office Hadley Centre observations datasets

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The Hadley Centre collaborates with www.metoffice.gov.uk/hadobs/hadobs/ on existing and planned datasets.

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Surface Temperature Anomalies (°C, w.r.t. 1961-90) 2014 December

Monday (T) difference from 1961-90

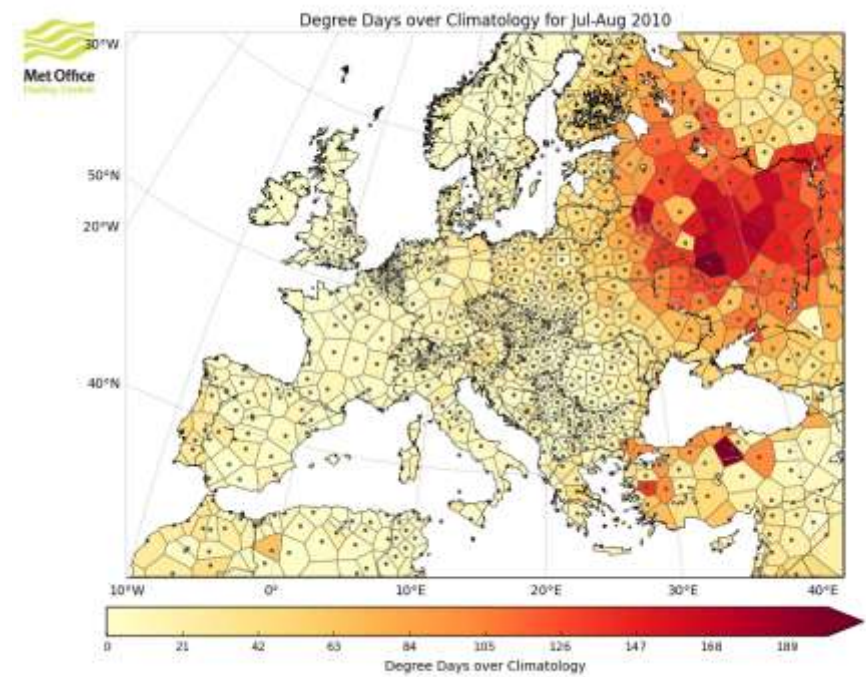
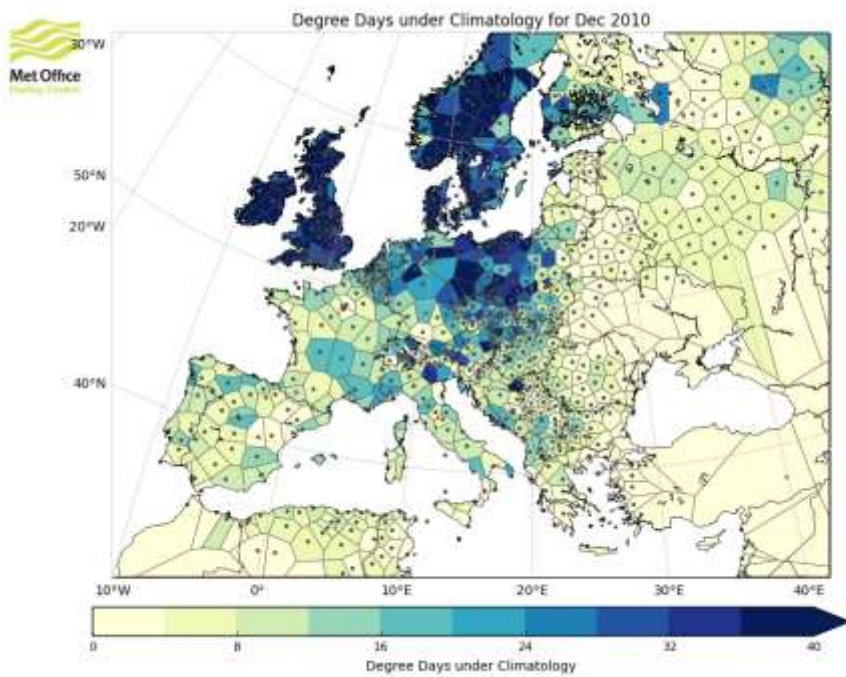
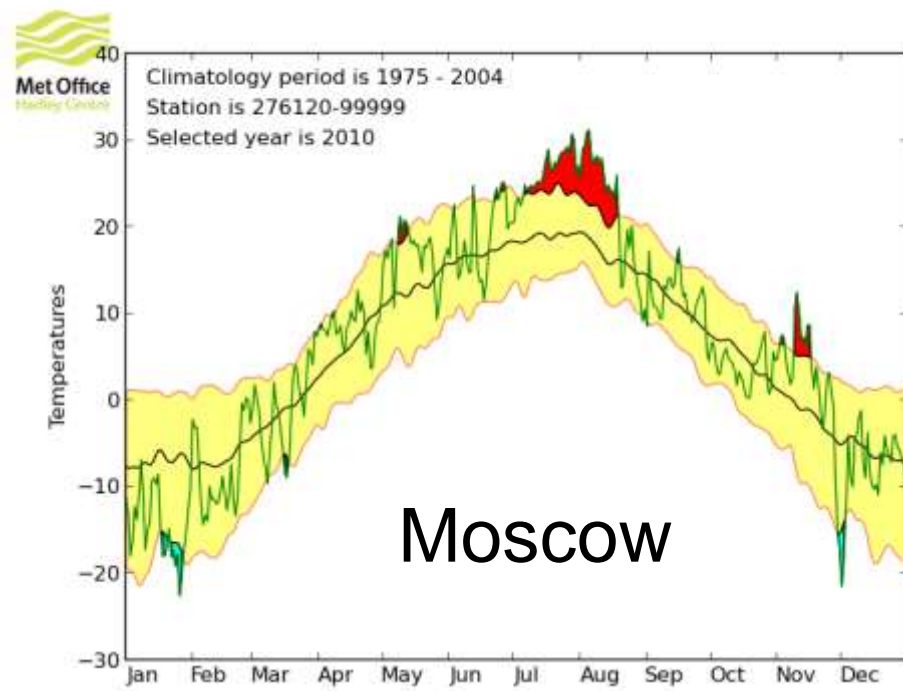
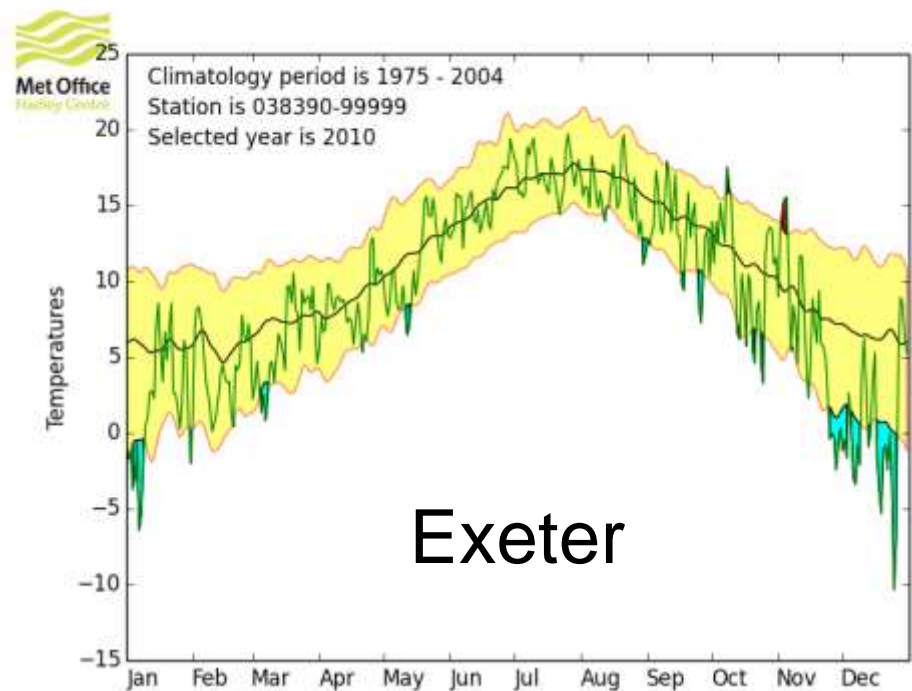
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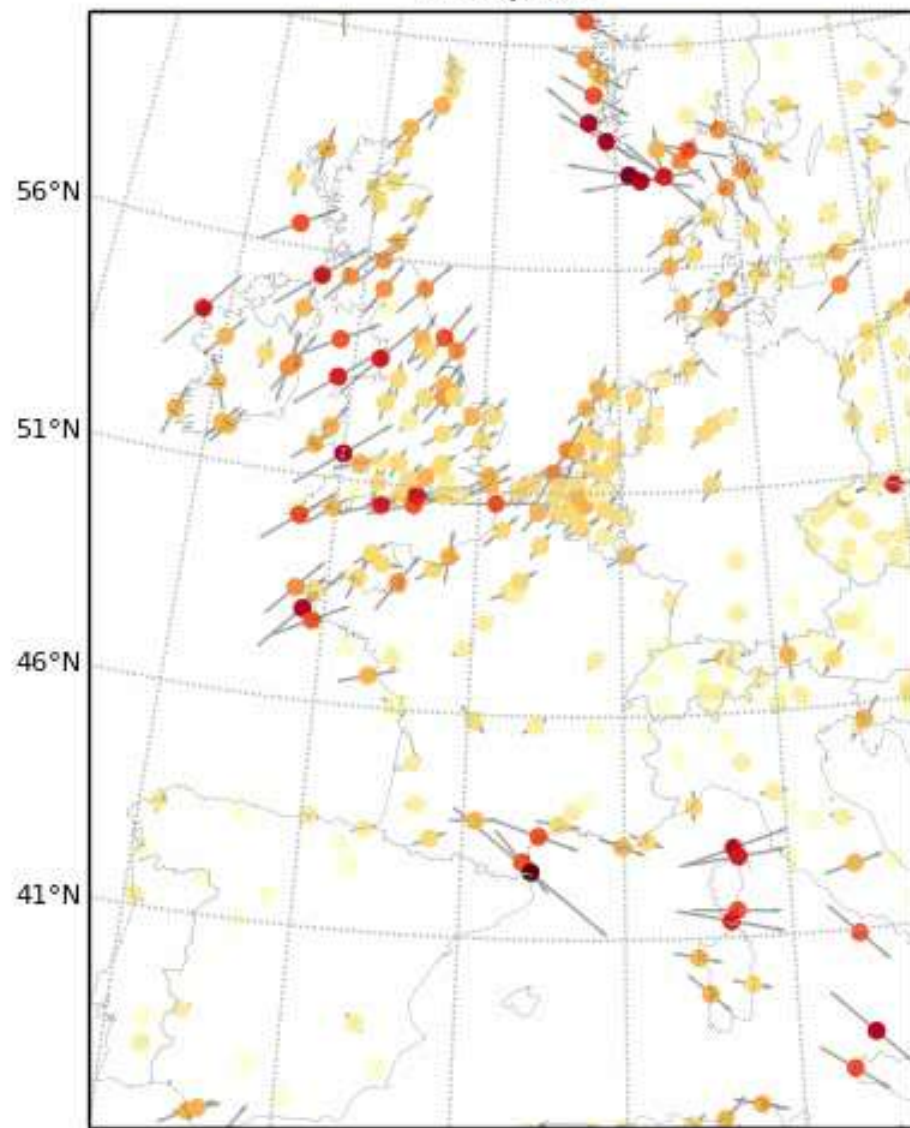
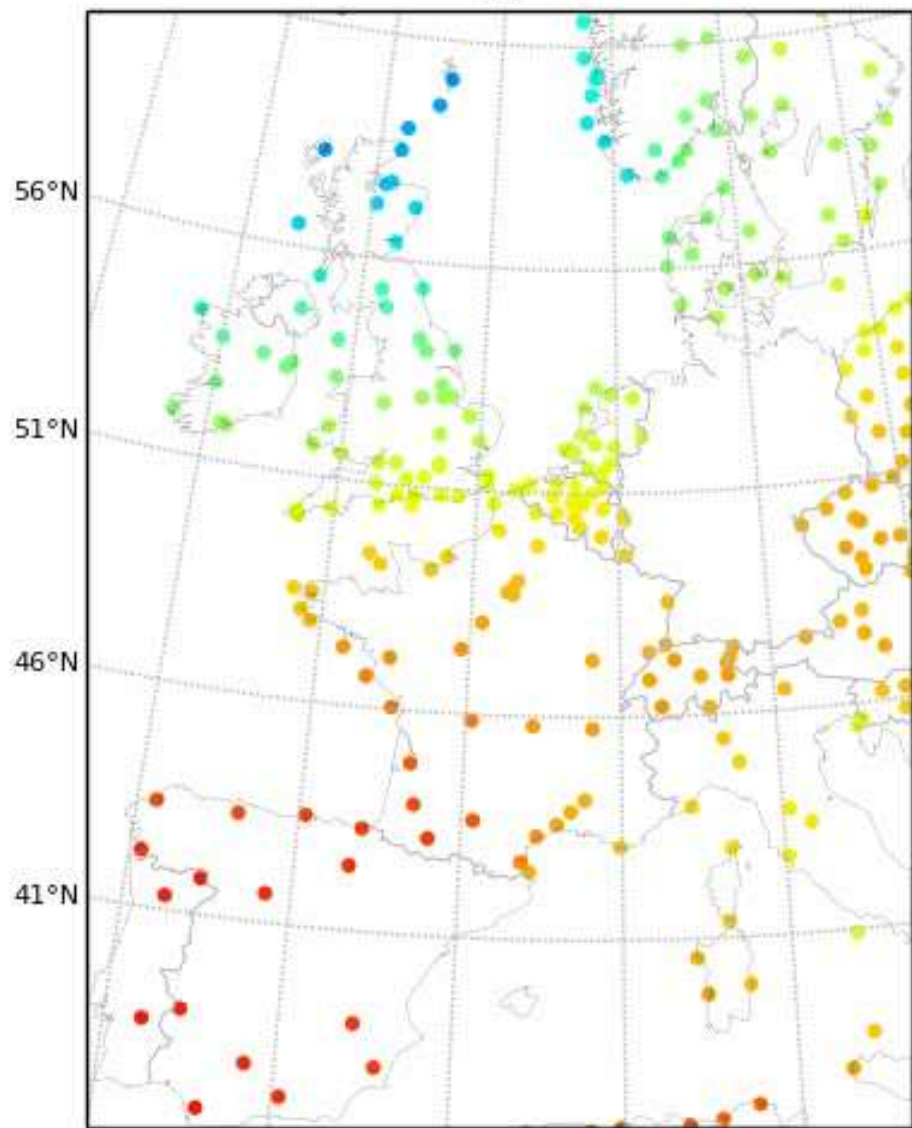
HadISD Applications



2014 February 12, 00:00 UT

SLP

Windspeed



960 970 980 990 1000 1010 1020

0 2 4 6 8 10 12 14 16 18

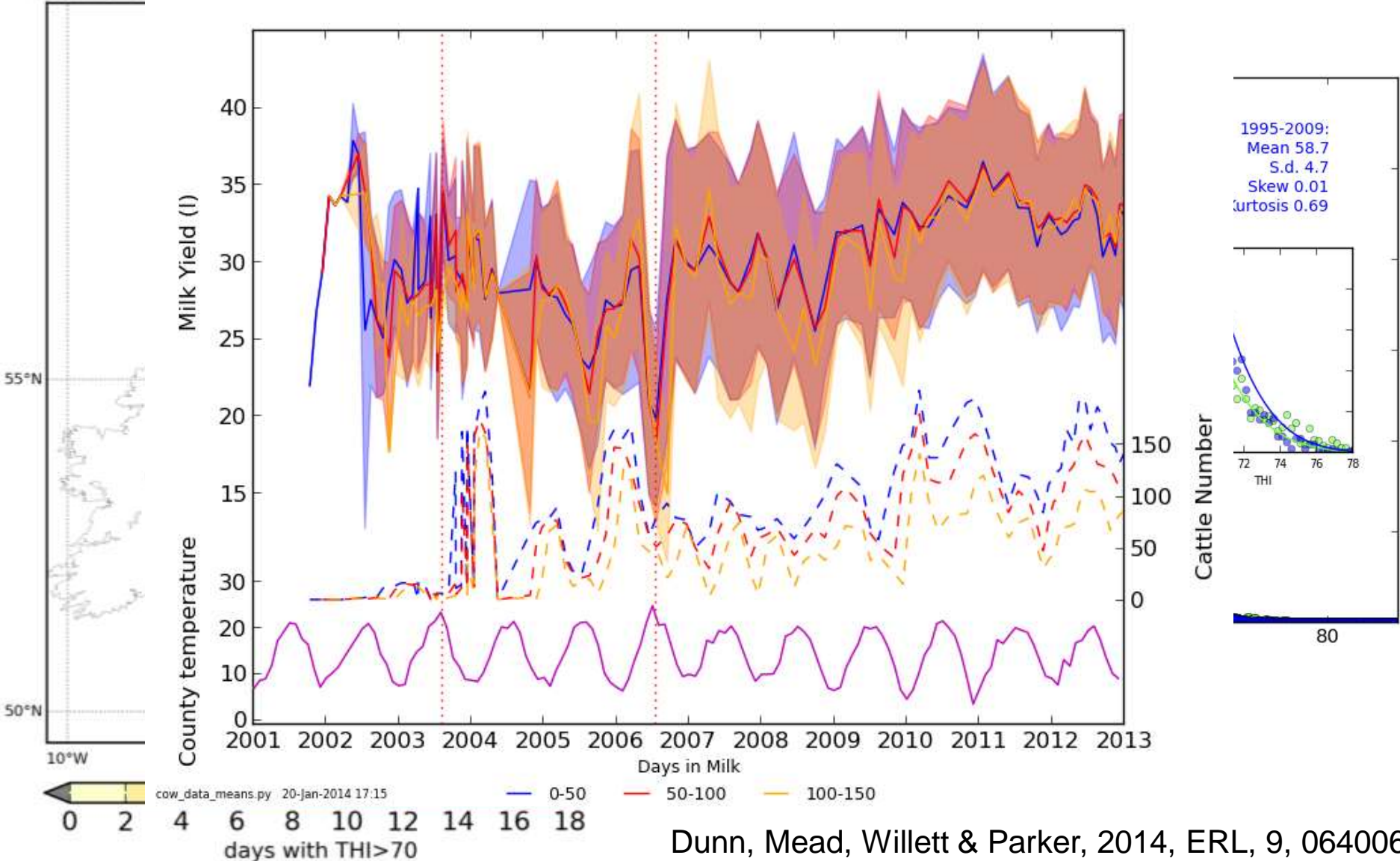
SLP (hPa)

Windspeed (m/s)



Inter-disciplinary uses

Number of days with THI > 70 in 2003





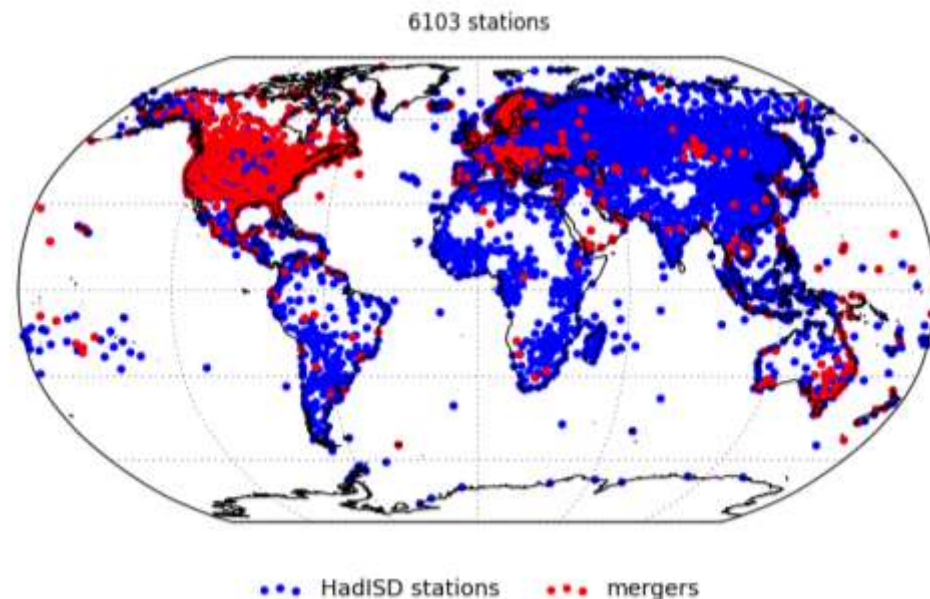
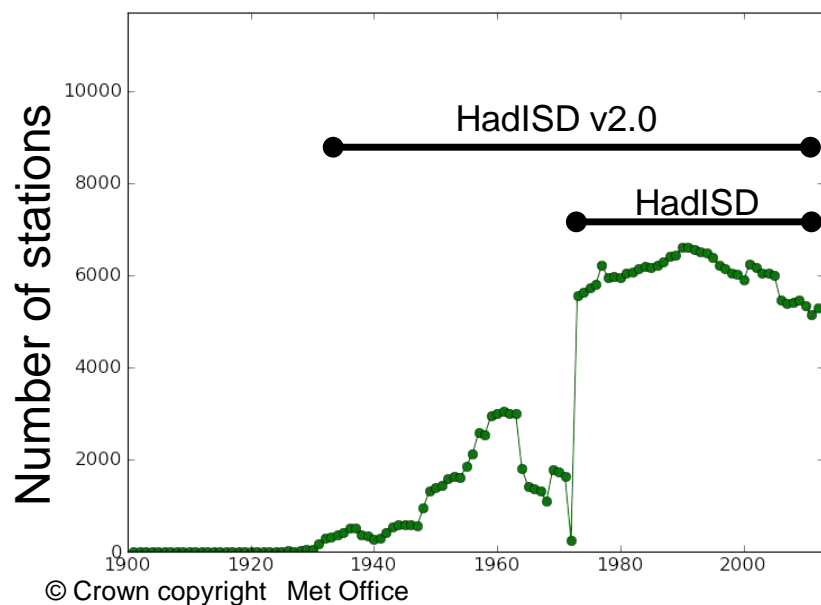
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HadISD v2.0

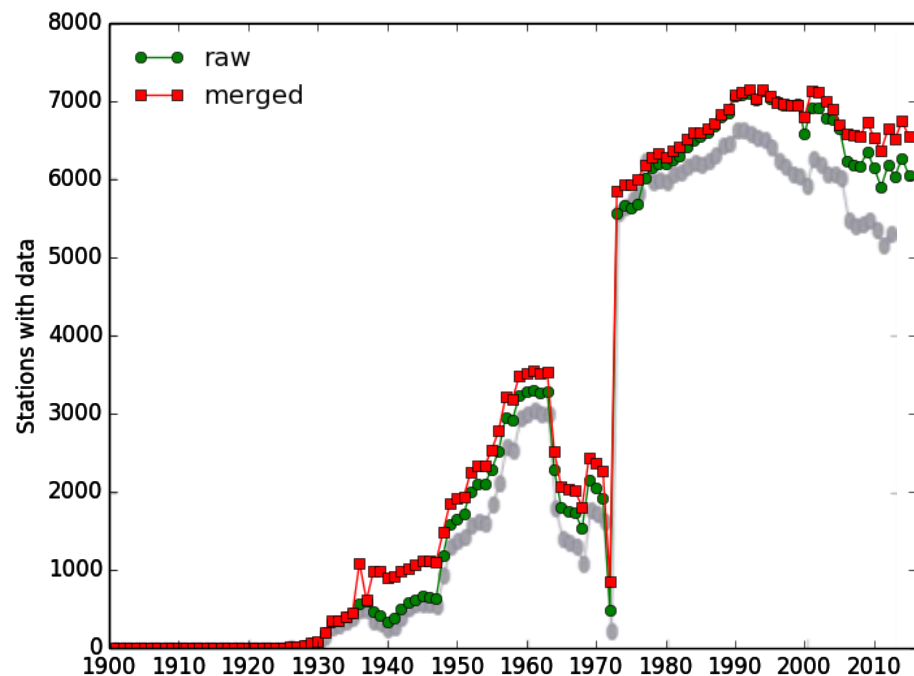
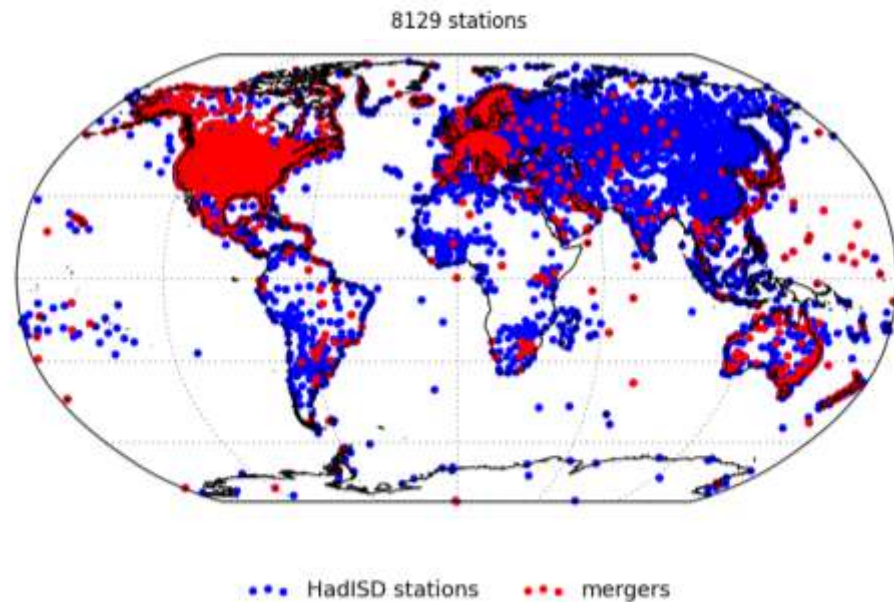
Can we do better?

- Time coverage of HadISD.1.0.x is limited (1973-present)
- Station selection is static
- Merging candidates are static (since v1.0.0)
- More rapid update cycle (annual → monthly)?

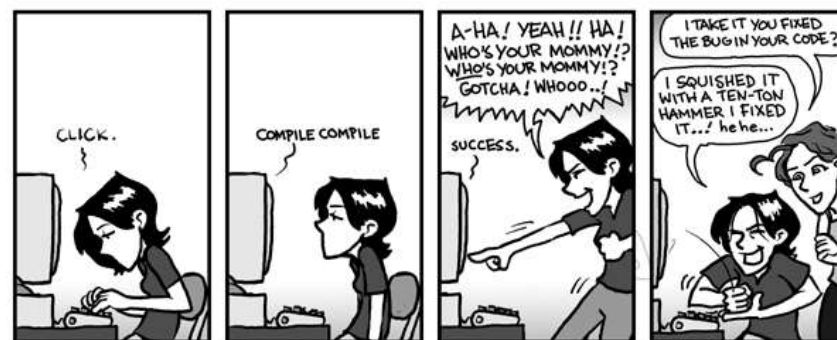


HadISD v2.0

- Updated station selection
 - 1931-present
 - 8129 unique station IDs
 - Run annually
- Updated merging process
 - Probability based
 - Jaccard index for names
 - 2050 mergers
 - Country-specific mergers

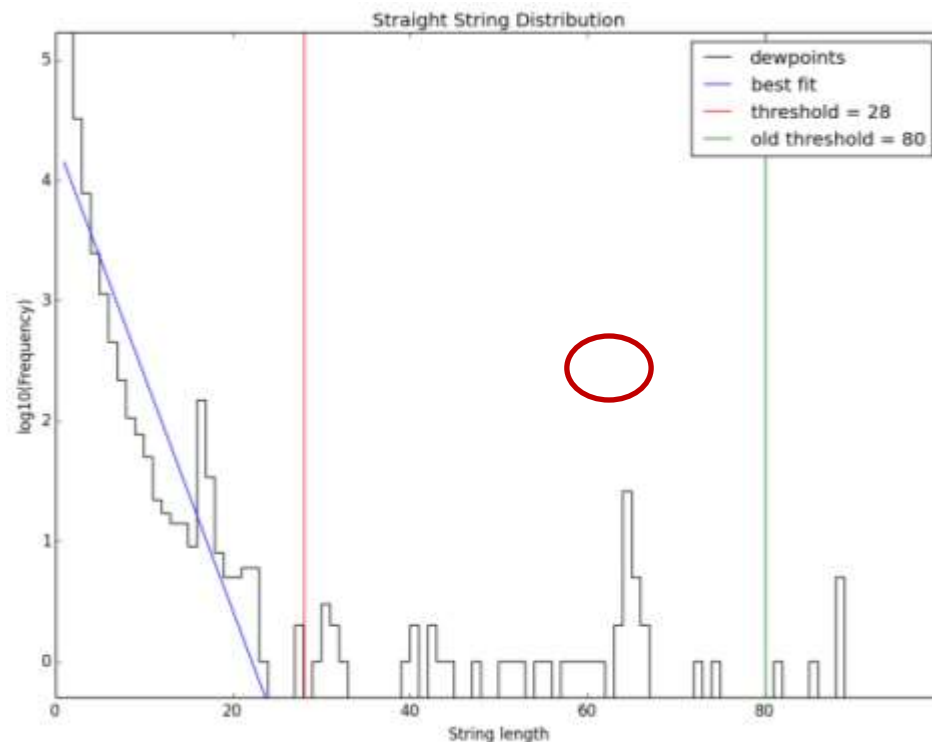


HadISD v2.0: updated tests



phd.stanford.edu/

- Updated QC tests:
 - Known bugs fixed on translation to Python
 - QC on wind speed & direction
 - Logical checks
 - Added to existing tests
 - Wind-rose check in devel.
 - Fewer fixed thresholds
 - Calculate dynamically from data – e.g streaks
 - Asymmetries removed
 - Spike check





Summary

- HadISD v1.0
 - Sub-daily, integrated dataset of quality controlled T, Td, SLP, ws & wd
 - 6103 stations, with better coverage in NH, 1973-2014
 - P, Tx, Tn, wg and weather codes also available
 - Annual update cycle (v1.0.3.2014p)
 - Code available (IDL)
- HadISD v2.0
 - Station selection updated each year
 - Updated merging routine
 - ~8000 stations, 1931-present
 - Code will be made available on publication (Python)
 - Available ~~early~~ mid 2015





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Questions and answers