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

Robert Dunn

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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 high quality data required to properly assess many high-frequency extremes remains unavailable in 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 (≤ daily)
     - High quality
       - Using common system
     - Accessible
       - Common format
     - data and metadata standards

Actions:
Effort should be made to ensure that, as much as possible, data adhere to common data quality assurance and metadata standards, and be internally re-documented using a common format, thereby improving the exchangeability of existing data and promoting 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
High Frequency

6103 stations
High Quality – QC Suite

Campbell River, Canada

718936-99999

Dunn, Willett, Thorne, et al, 2012 Climate of the Past (8, 1649-1679)
High Quality – homogeneity

Dunn, Willett, Morice & Parker, 2014, Climate of the Past (10, 1501-1522)
Accessible

- User dialogue using Twitter [@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
HadISD Applications
Climatological Events

Exeter

Moscow
Inter-disciplinary uses

Number of days with THI > 70 in 2003

Dunn, Mead, Willett & Parker, 2014, ERL, 9, 064006
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

- 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
Questions and answers