Global Data Rescue Initiatives relevant for extremes

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Important Issue

- Data rescue has to be for the whole data distribution, not just for extremes
- Trying to select out extremes risks efforts being made in some regions of the world

- Pre-instrumental written historical data were probably selected for extremes (as that was what was important), but different recorders in the past had different views of what was important!

Further Issues

- National Met Services (NMSs) have much more data, but we can't always access it
- Also NMSs don't realize that longer series exist for their country. Many think that the records began when the Met Service was created or the country became independent
- All data rescue initiatives should stipulate that the digitized data should be made available. Putting them in ISTI and ISPD (and we really need an archive for daily precipitation data)
- Even scanning of old data, with a view to digitization, should also stipulate that the data are made available when digitized. This doesn't even happen in Britain. Money found for scanning of UK Daily Weather Reports, but not their digitizing and if it was then the digitized data would not be made freely available

Possible Data Sources

- SYNOP
- CLIMAT
- NMSs
- Gridded Daily Products like E-OBS
- Long European series/Pressure Triangles
- Gridded monthly datasets (useful for drought)

SYNOP

- Sub-daily data issued for weather forecasting
- Has potential usage, but when it comes to Tx and Tn it has to be remembered that these relate to the two halves of the day (for Europe, 18-06 for Tn and 06-18 for Tx). These are not the station Tx and Tn extremes for much of Europe in the winter (see van den Besselaar et al., 2012)
- Daily precipitation totals are not for the same daily definition used in long historic series

- van den Besselaar, E.J.M. Klein Tank, A.M.G, van der Schrier, G. and Jones, P.D., 2012: Synoptic messages to extend climate data records. *Journal of Geophysical Research*, **117**, D07101, doi:10.1029/2011JD1688

CLIMAT

- These are monthly summaries/totals for countries calculated (generally) in accordance with the NMSs historic way of calculating monthly averages
- What is needed for daily extremes is a Daily CLIMAT message sent at the end of the month with all the days together
- GCOS/AOPC is working on this, but it will take ages
- This is exactly what is needed, as it will provide near real-time data to update historic sequences that you have. You need to endorse this! It might then happen one day!

NMSs

- Few make their daily data freely available
- Need to continue to harass NMs' that don't – this includes many Met Services in Europe such as the UK and Spain.
- If we want to get others to release their data, we have to release ours

Gridded Products (like E-OBS)

- Issues here is that gridded products (not just E-OBS, but others like HadISD, HadEX) that can be used are affected by issues of variable amounts of data through time
- This has the greatest effect on extreme values
- In an ideal world if you calculated extremes from grids they would be the same as gridding extremes. They aren't
- Gridding extremes is a possible answer, but comparisons between approaches needs to be undertaken in data dense regions
- Gridding daily precipitation totals could work better by transforming the data using a gamma distribution. This is being assessed for Europe in UERRA
- Gridding that accounts for changing number of Observations through time. Probably impossible, but is used at the monthly timescale (see later slide)

Long European series/Pressure Triangles

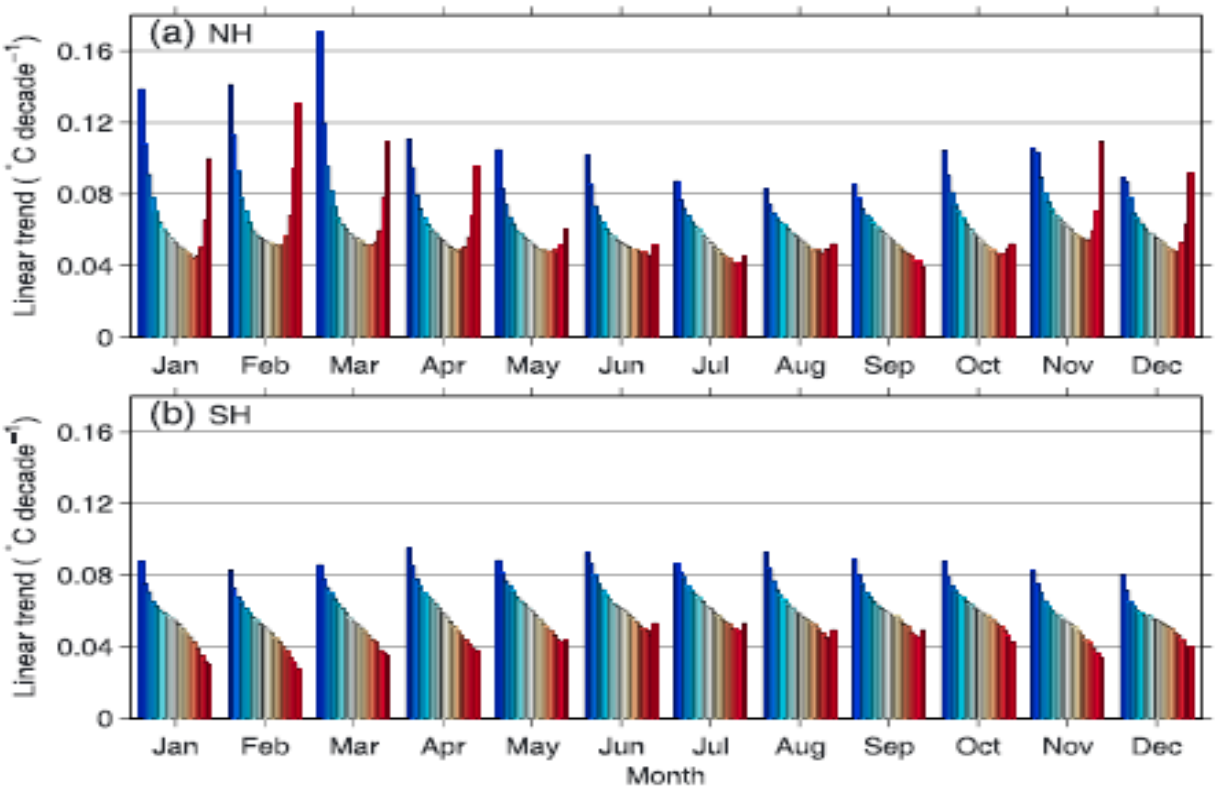
- Pressure Triangles have proved popular for estimating extreme wind speeds
- Seem to work much better than anemometer data as latter affected by instrument changes and exposure issues
- Issues when pressure triangle extremes compared with Reanalyses (like 20CR), but this might be that 20CR is affected more in extremes by changes in data availability through time
- Currently working on this for the triangle of London/Paris/De Bilt, where the potential exists back to the 1740s. Recent completion of De Bilt has made this possible
- This has to use daily average MSLP, not obs at fixed times

Gridded Monthly Datasets

- Monthly timescale often overlooked, but gridded products can be constructed to take into account the issues of changes in the number of contributing stations through time
- This could be used with CRUTEM4, but not for NCDC/GISS/Berkeley as they extrapolate, so will produce series with different variance properties though time
- A recent example of this is Robeson et al. (2014)

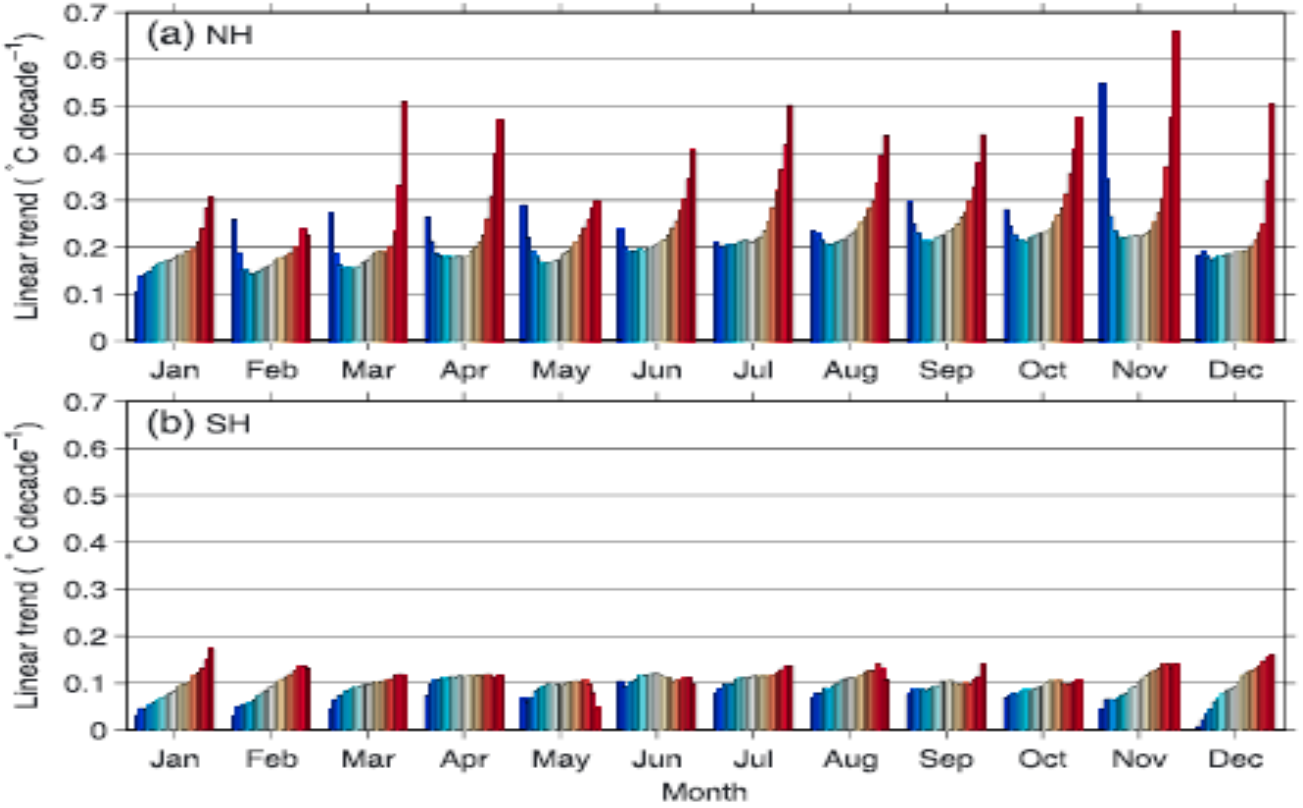
- Robeson, S.M., Willmott, C.J. and Jones, P.D., 2014: Trends in hemispheric warm and cold anomalies. *Geophysical Research Letters*, **41**, 9065-9071, doi:10.1002/2014GL062323.

1881-2013 Trends by Percentiles – more warming at cold end



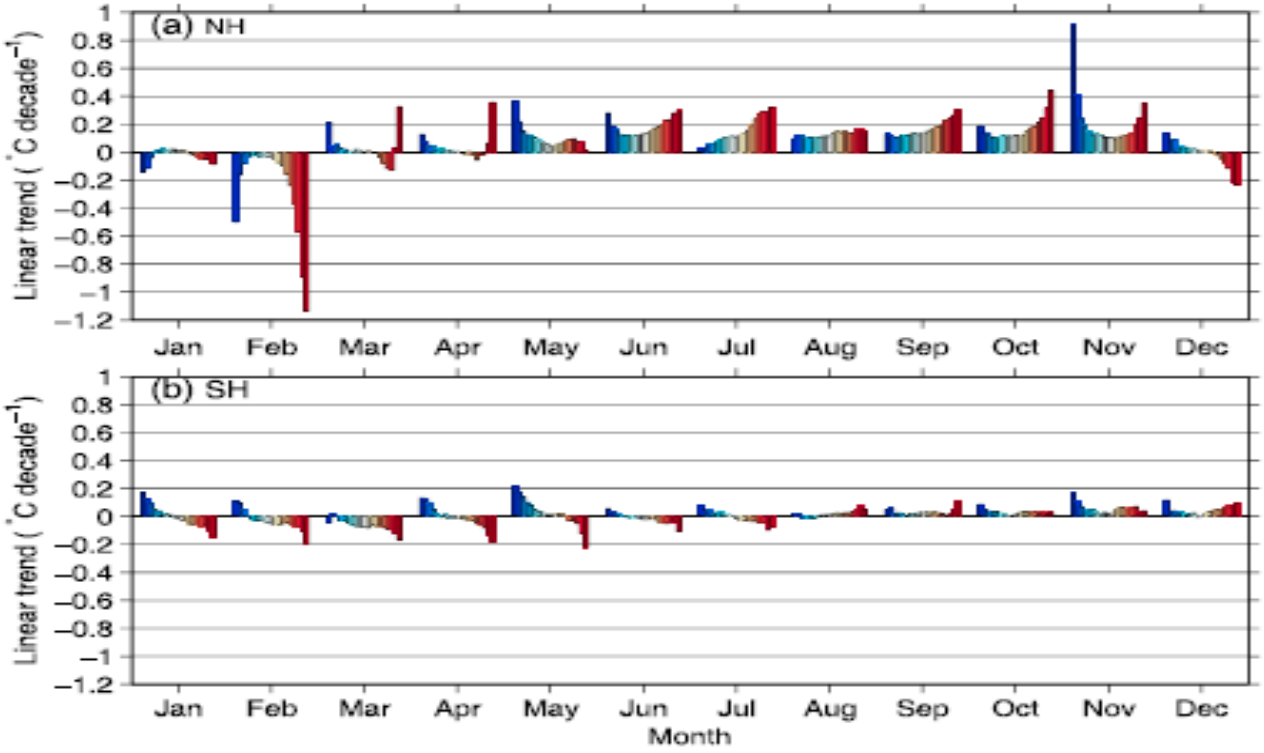
Linear trends (°C decade^{-1}) of the 5th to the 95th (by increments of 5 percentiles) spatial percentile of each month's temperature anomalies for 1881-2013: (a) Northern Hemisphere and (b) Southern Hemisphere. Nearly all months have trends in the 5th spatial percentile that exceed those in the 95th spatial percentile, indicating a decrease in spatial dispersion over this time period.

1984-2013 Greater warming for warmer temperatures. Little change for colder temperatures



Linear trends (°C decade^{-1}) of the 5th to the 95th (by increments of 5 percentiles) spatial percentile of each month's temperature anomalies for 1984-2013: (a) Northern Hemisphere and (b) Southern Hemisphere. In this most recent 30-year period, trends in the 95th spatial percentile exceed those in the 5th spatial percentile, indicating an increase in spatial dispersion. Note the different y-axis scale from the previous plot.

1998-2013 – Warming in most months, but not in February
Cooling of warm extreme temperatures then



Linear trends (°C decade^{-1}) of the 5th to the 95th (by increments of 5 percentiles) spatial percentile of each month's temperature anomalies for 1998-2013: (a) Northern Hemisphere and (b) Southern Hemisphere.

I know little happens in the Southern Hemisphere, but it has more ocean than the NH!