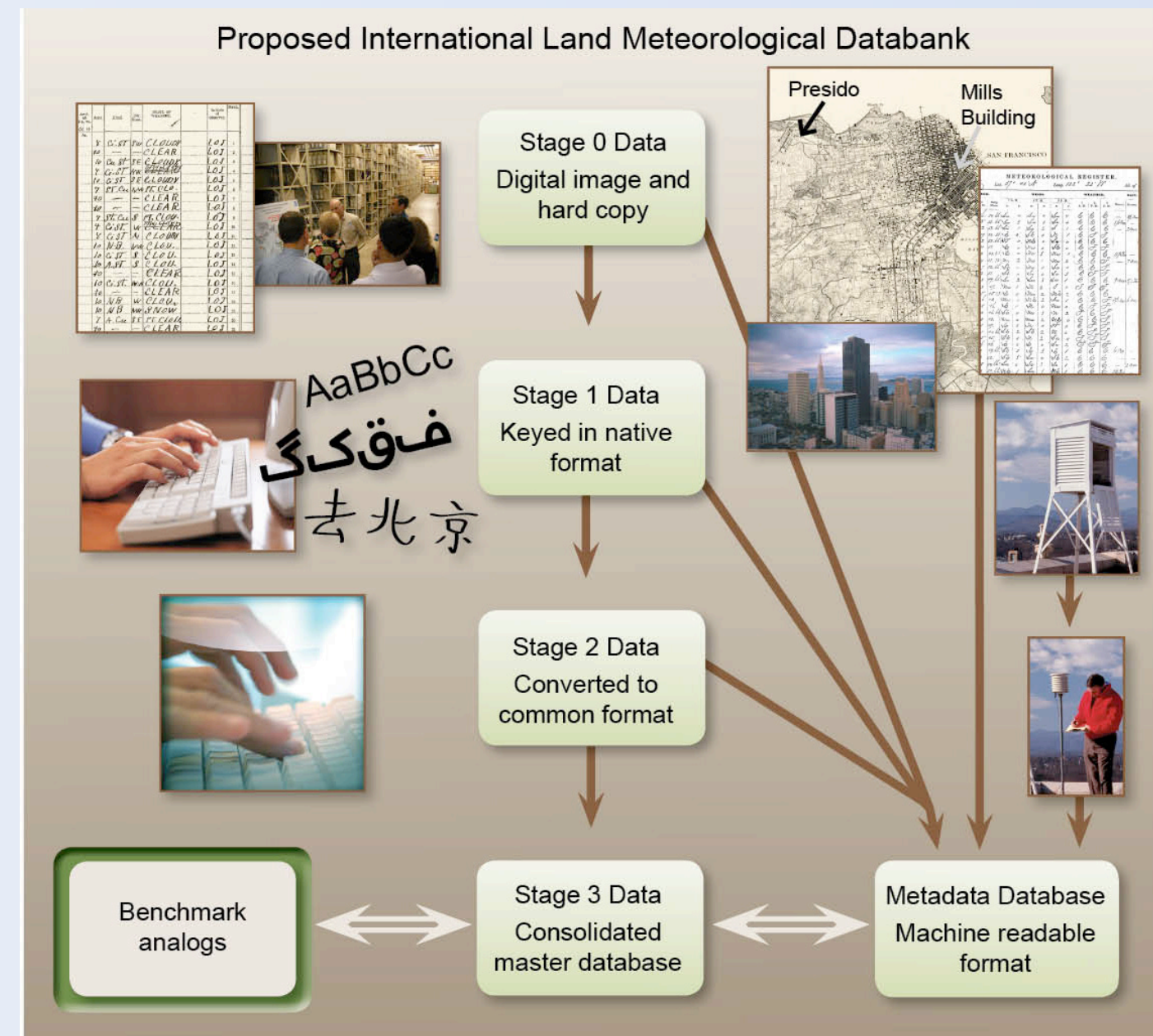# The International Surface Temperature Initiative

Peter Thorne, Kate Willett, Jay Lawrimore, Rob Allan, Richard Chandler, Albert Mhanda, Thomas Peterson, Michael de Podesta, Antonio Possolo, Jayashree Revadekar, Matilde Rusticucci, Peter Stott, Gregory Strouse, Blair Trewin, Xiaolan Wang, Akiyo Yatagai
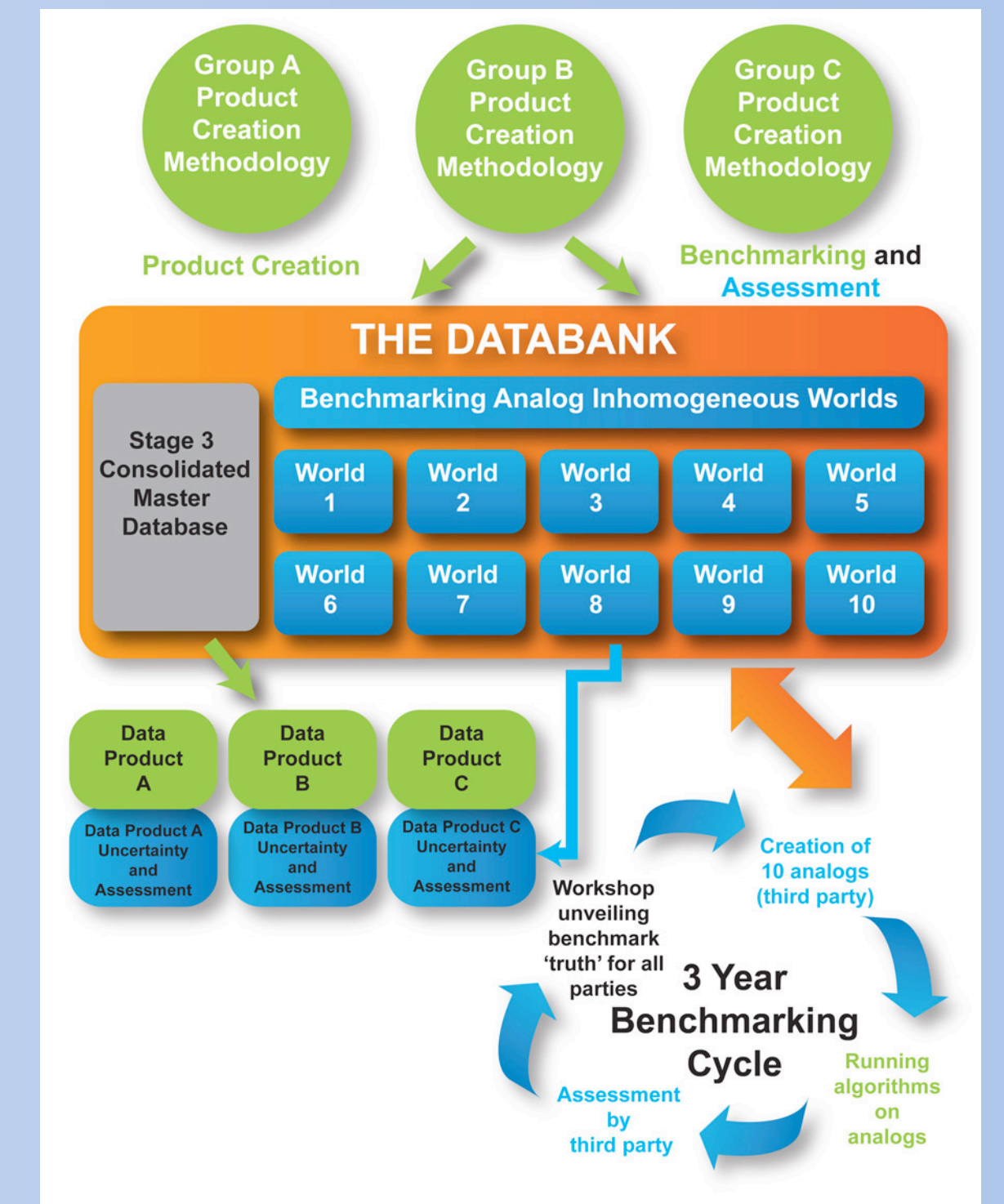
OVERVIEW

The International Surface Temperature Initiative was instigated in 2010 and aims to oversee an end-to-end process leading to the creation of a suite of open, transparent and verified surface temperature products to meet 21st Century requirements. This poster summarizes the major identified work areas.

Proposed International Land Meteorological Databank

1. International surface databank

A first version release is nearly complete, and a substantial delta forwards.

- Provenance is key – retain all information as to source and make the full processing chain available.
- Version control will be maintained
- Metadata will be incorporated as far as possible
- Development version of the databank is available at http://www.gosic.org/GLOBAL_SURFACE_DATABANK/GBD.html
- Investigating novel techniques such as crowdsourcing (see www.oldweather.org)
- Data rescue requires strong partnering with existing efforts

Databank Stage3
Number of Station Records: 40643
Number of Years

Advanced development version of first release of the databank holdings. Colors denote period of record in (merged) station versions.

We need to undertake data rescue before it is too late and convert to a digital record to be usable

Databank Stage3
No of Stations
Years

Timeseries of station counts in the merged product. For comparison the GHCNv3 product peaks at around 5000 stations in the late 1970's/early 1980s.

Above: Example of an imaged meteorological log
Left: example of holdings, courtesy of IEDRO (www.iedro.org).
Neither are usable in science studies requiring digitized records.

2. Creating multiple independent datasets

- Raw data undoubtedly contain artifacts from instrumental and operational changes
- There is no definitive right way to go about adjusting for such effects
- Only through undertaking multiple methodologically distinct and independent efforts can we gain a realistic estimate of this uncertainty
- Redundancy of effort is scientifically important – cannot leave the task to just one group no matter how expert they are.
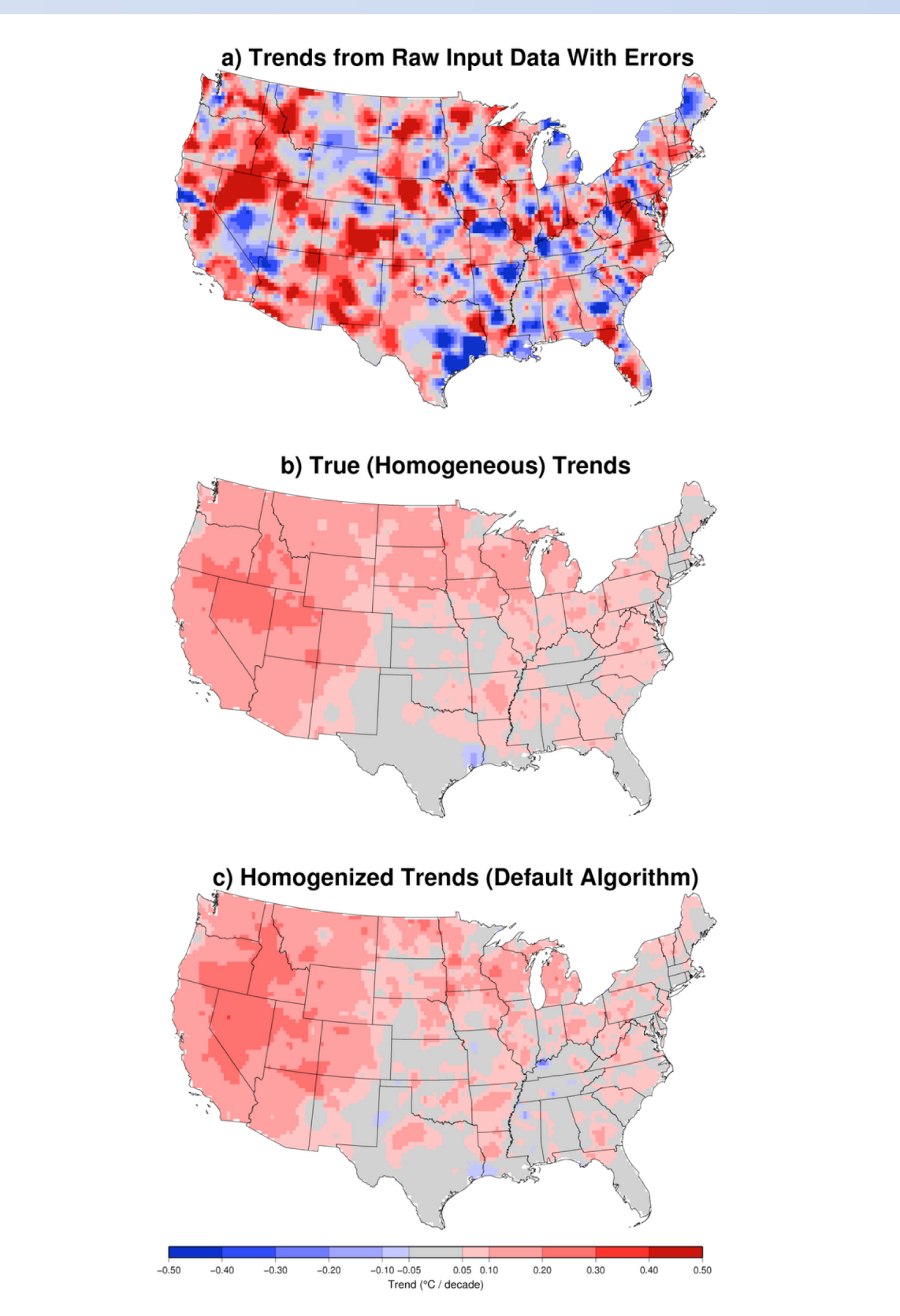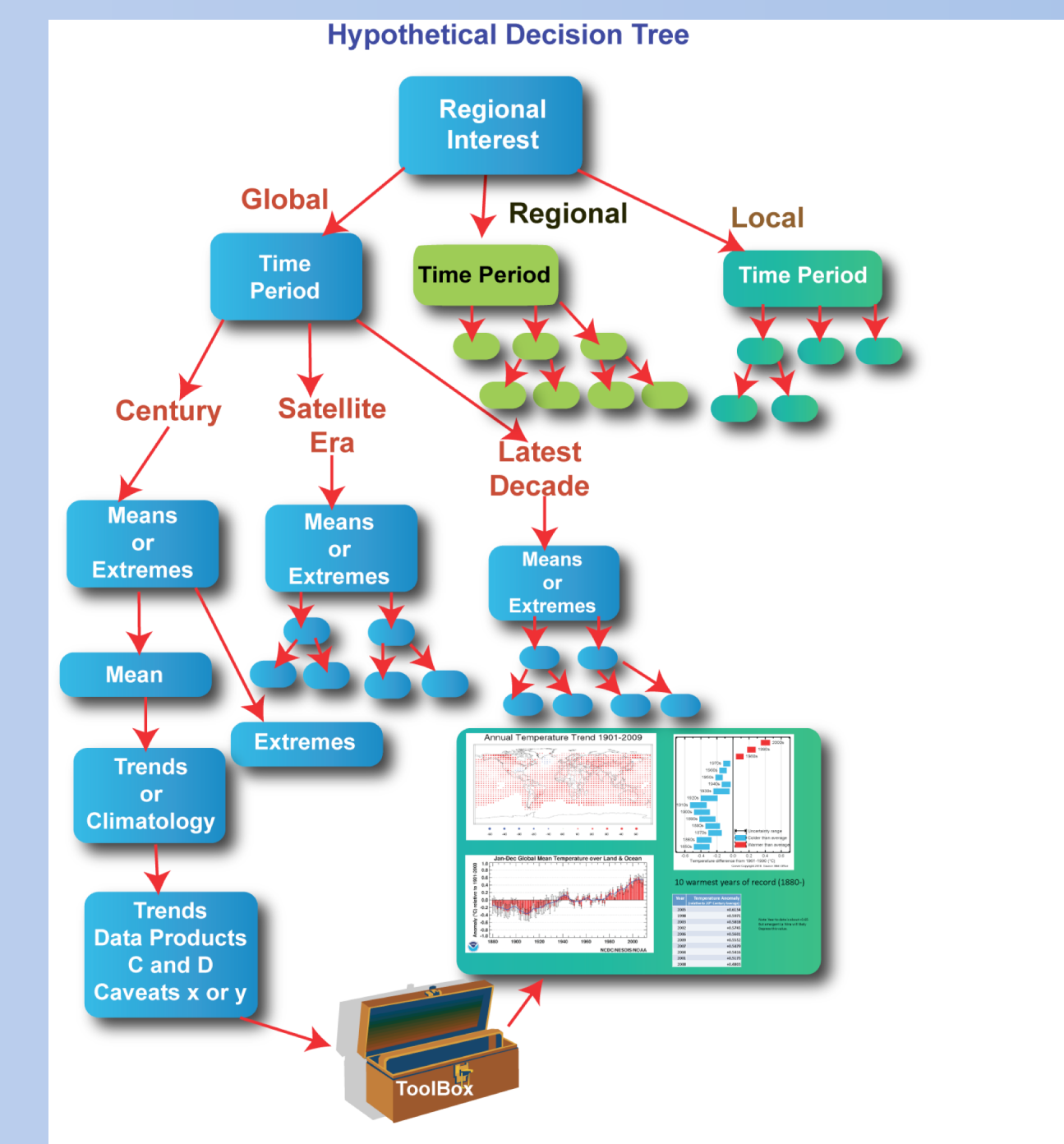

a) Trends from Raw Input Data With Errors
b) True (Homogeneous) Trends
c) Homogenized Trends (Default Algorithm)
Trend (°C / decade)

Example of results from a pre-existing benchmarking exercise for the USA (Williams et al., 2012)

Benchmarking cycle schematic diagram

3. Benchmarking performance

- With real world data we do not have the luxury of knowing the truth – we cannot measure performance of a specific method or closeness to real world truth of any one data-product.
- Consistent synthetic test cases, simulating real world noise, variability and spatial correlations potentially enable us to do this
- Create c.10 analog-error-worlds
  - Climate model basis (maintains plausible far field correlation structure) tweaked with real station climate characteristics
  - Add in random and systematic errors to approximate the real world error structures which may exist
  - Error structures should enable answering a range of questions / assumptions regarding the true error to avoid over-tuning
- Analogs to be made available based upon version 1 release of databank

4. Serving data products to end-users

- There are many and varied demands on the data for very many end users
- Need to provide easy use and user support based upon scientific findings
- Once precursor steps are sufficiently advanced we will start to serve products, tools and advice based upon Initiative outputs through a one-stop site
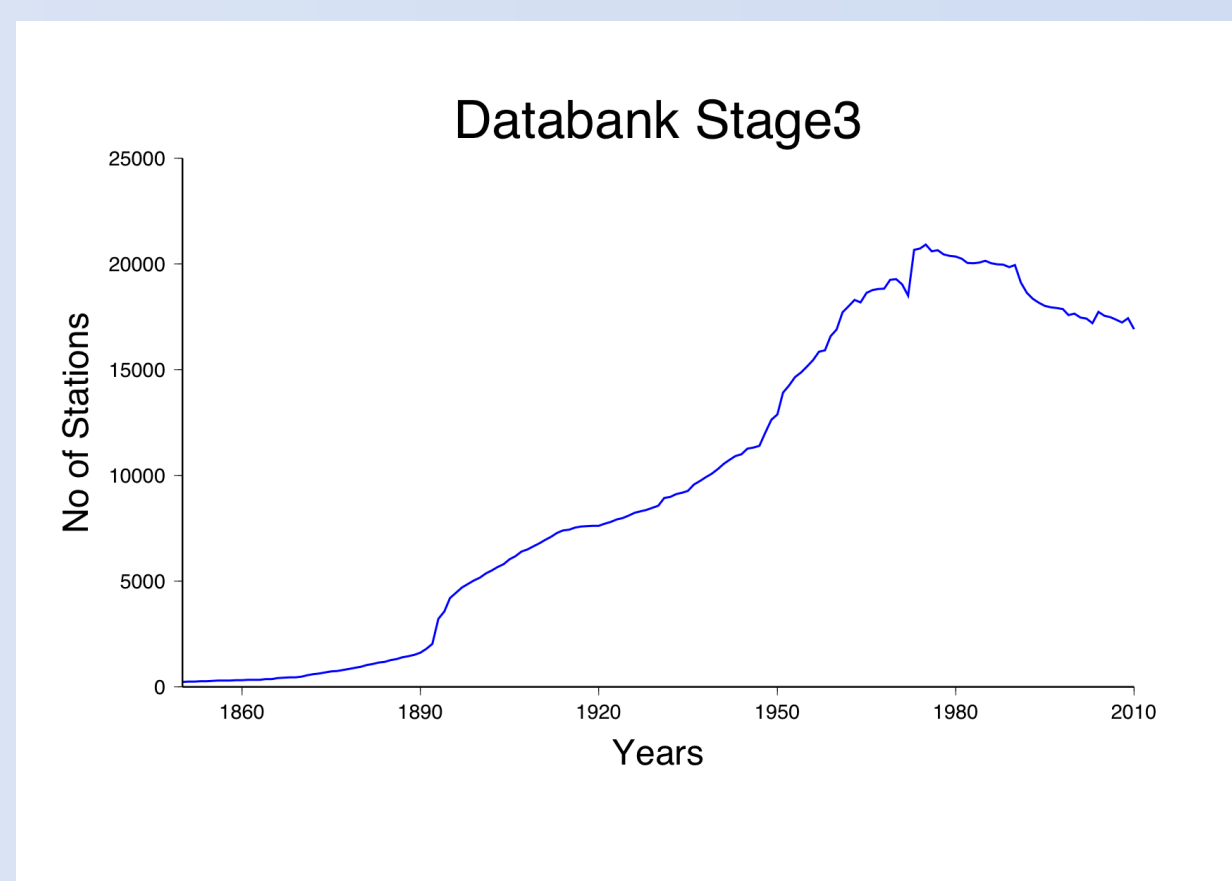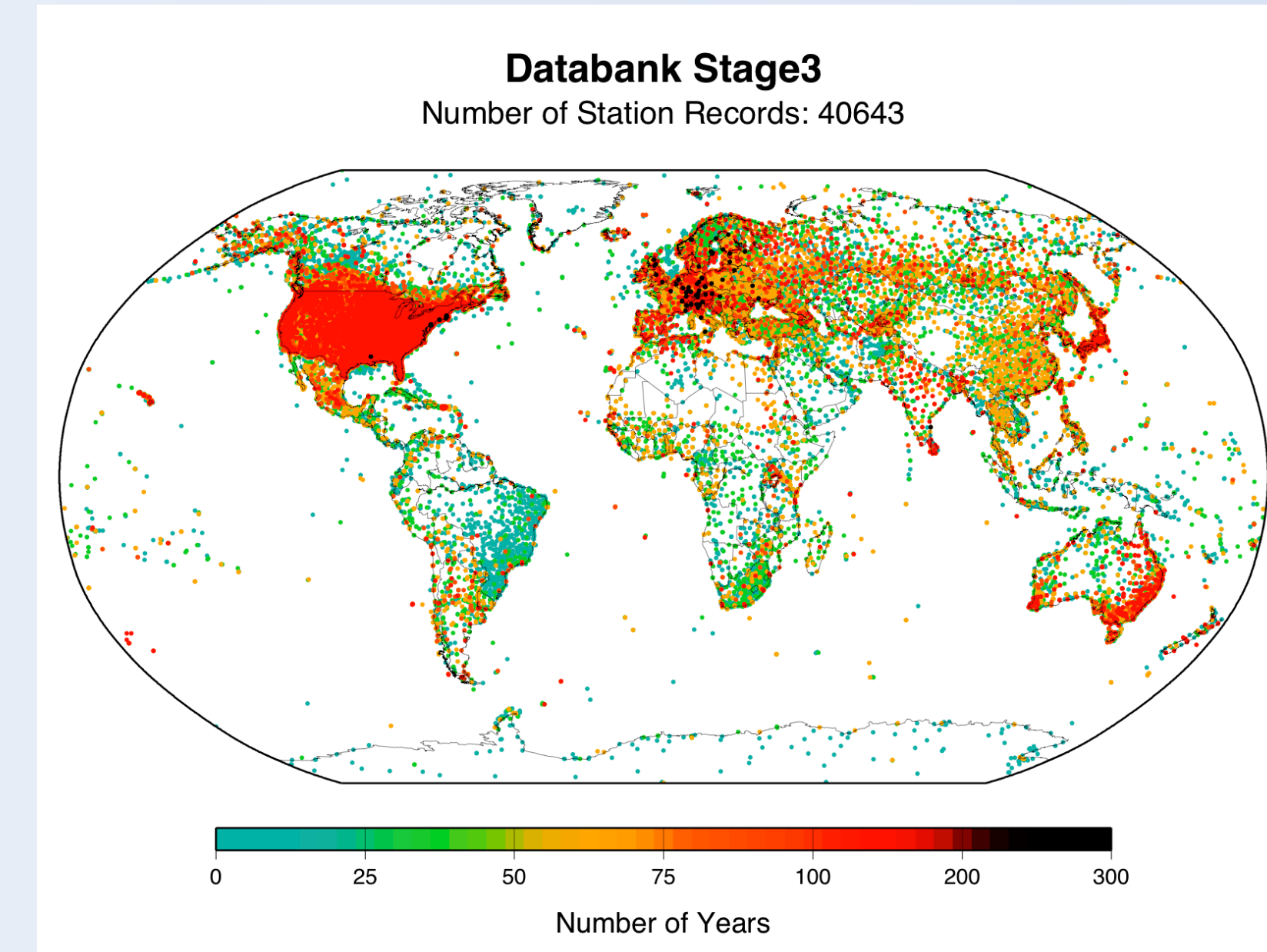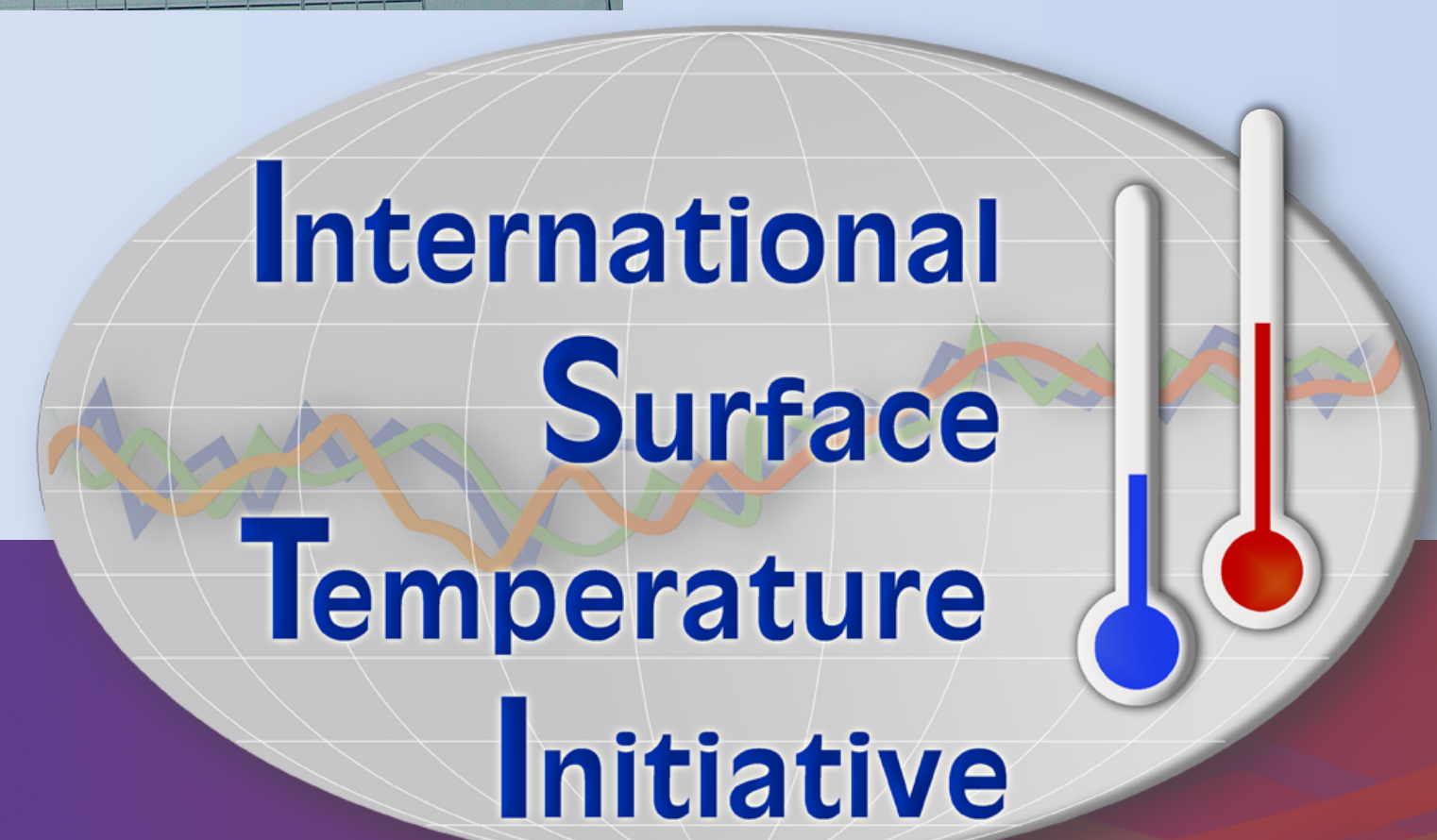

Hypothetical Decision Tree

Schematic of envisaged user support and data and product provision tools

5. The Initiative and you

The International Surface Temperature Initiative will only work effectively if there is buy in from the science community. Not just climate scientists but in keeping with the instigation meeting also statisticians, metrologists, software engineers, and citizen scientists etc.. You can help in any of data rescue, databank management, creating new data products, benchmarking the efforts, or data product provision.
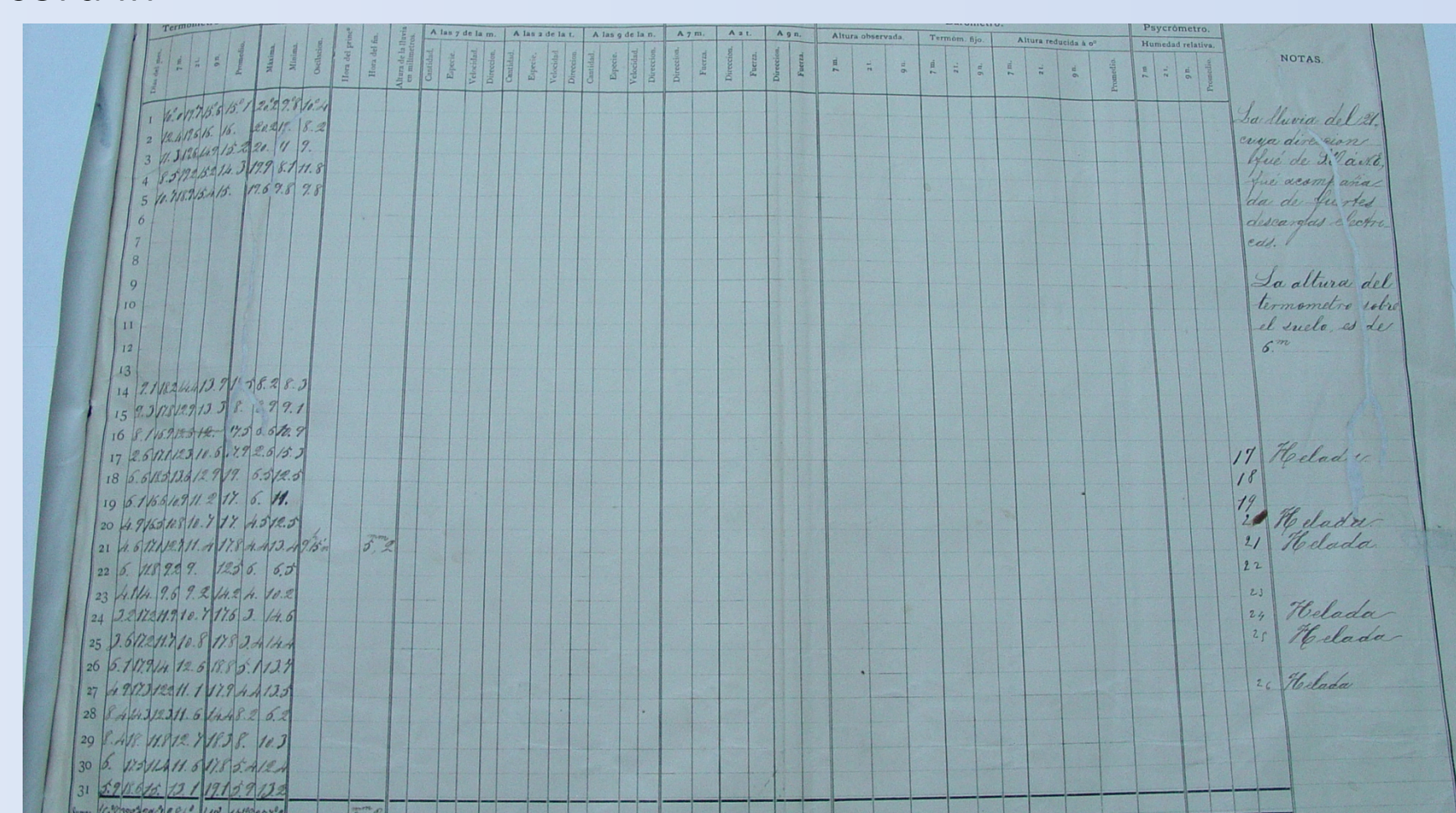
References
Thorne, P. W. et al., "Guiding the Creation of a Comprehensive Surface Temperature Resource for 21st Century Climate Science" Bulletin of the American Meteorological Society, doi:10.1175/2011BAMS3124.1
Williams, C. W. et al., Benchmarking the performance of pairwise homogenization of surface temperatures in the United States, JGR. doi:10.1029/2011JD016761

International Surface Temperature Initiative

www.surfacetemperatures.org
general.enquiries@surfacetemperatures.org
data.submission@surfacetemperatures.org