

Pacific Climate Change Science

The International Surface Temperatures Initiative (ISTI)

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Australian Government

Outline

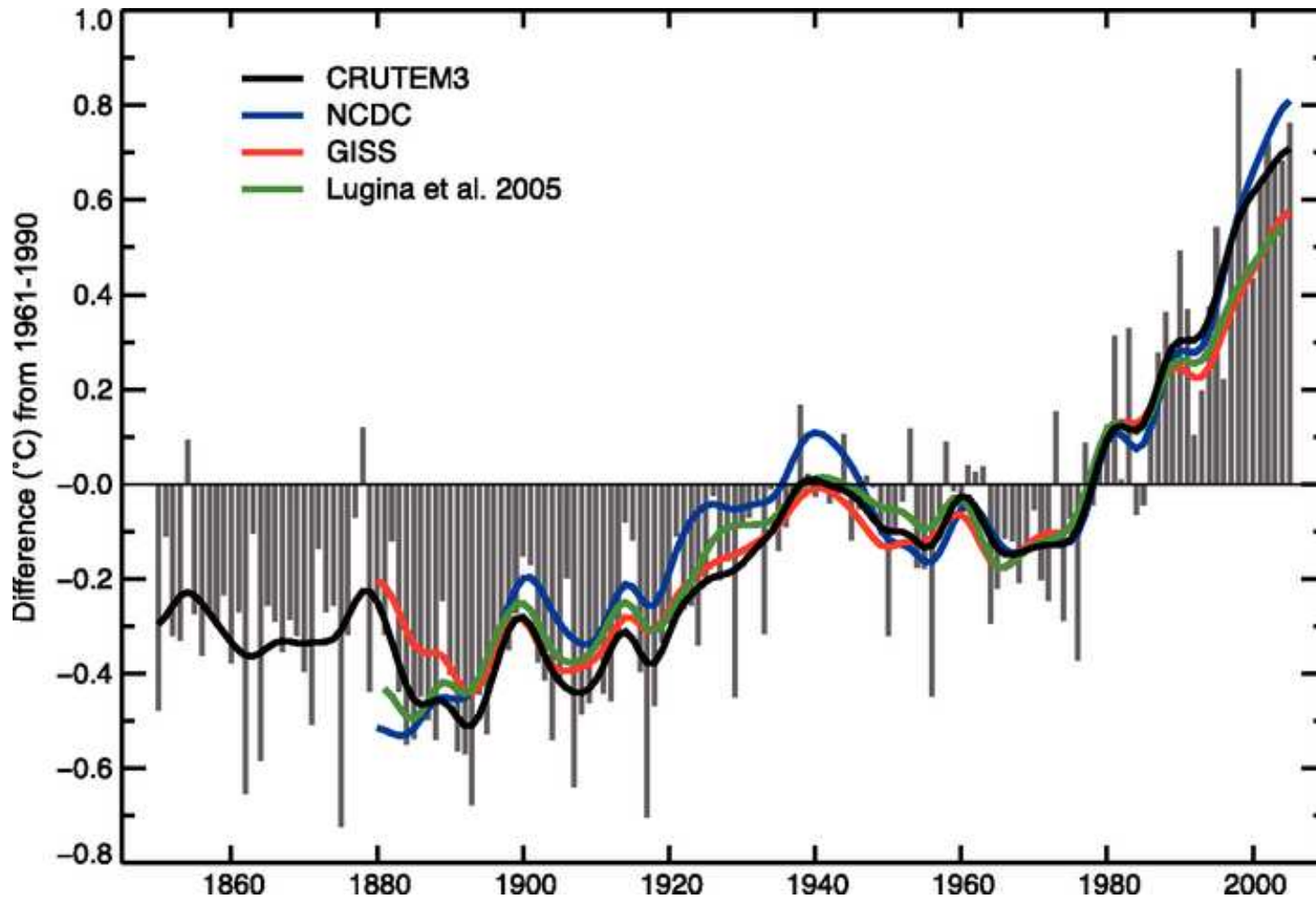
- Background
- Data rescue and databank
- Multiplicity of data products
- Common assessment through consistent performance benchmarking
- Data and product portal development
- What are the potential benefits for regional countries of getting involved?

Background

- Several independent global estimates of Land Surface Air Temperatures
 - Independently produced
 - Gross agreement on all timescales
 - Process metadata in some cases missing
 - Much of the work was undertaken in late 1980's/ early 1990's - technology and expectations have changed since then
 - Monthly large scale gridbox averages only (generally)



Examples of temperature reconstructions



IPCC Fourth Assessment Report (2007), Figure 3.1
Annual anomalies of global land-surface air temperature (°C), 1850 to 2005, relative to the 1961 to 1990 mean for CRUTEM3 updated from Brohan et al. (2006). The smooth curves show decadal variations ... The black curve from CRUTEM3 is compared with those from NCDC (Smith and Reynolds, 2005; blue), GISS (Hansen et al., 2001; red) and Lugina et al. (2005; green). See http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch3s3-2-2.html.

Why is a new initiative needed?

- Global surface temperature records are key line of evidence
- Backed by many other indicators (ice loss, humidity increases, sea level increases etc.)

BUT:

- Link from station data to global averages is indirect (statistical problem – reconstruction depends on methodology used)
- Data holdings are dispersed with poor provenance
- Few user tools: access difficult for non-specialists
- Concerns over: evolving station networks; changes in measurement technique / station location / recording practice (often undocumented); urban “heat island” effects; etc. etc.
- Increasing role of “blogosphere” & critiques outside peer-reviewed literature

The big question

- Can we create a process that leads to a suite of verified estimates of land surface temperatures that can be used to answer scientific and societal demands of the 21st Century?
 - Open and transparent
 - Better understanding of fundamental instrument performance and measurement properties
 - Consistent performance evaluation
 - User tools
 - Not just monthly at the largest scales. Daily, sub-daily, regional and local



How did ISTI get started?

- 2010 UK Met Office Submission to World Meteorological Organization Commission for Climatology
 - Call for creating new suite of products to meet 21st Century demands / expectations
- September 2010 instigation workshop, UK Met Office, Exeter UK
 - 80 international experts including climate scientists, metrologists, statisticians, software engineers
 - White papers posted online and public comments solicited
 - Agreed project outline and governance structure
 - Agreed outcomes published in Bull. Amer. Met. Soc. doi: 10.1175/2011BAMS3124.1



Data rescue and provision



Databank Progress

- Working Group instigated
 - Data rescue task team
 - Provenance and version control task team
- Beta version release and accompanying documentation / paper submitted early 2012
- First operational version (monthly only at this stage) released January 2013 (hosted by NCDC)

Stage 0 data in hardcopy / image format

- Millions of rescued images in the NOAA Foreign Data Library
- 2000+ boxes of data in the NCDC library
- Holdings in other libraries and repositories, particularly former colonial powers
- Holdings literally rotting away or seen as a nuisance in many countries
- Holdings of data not taken by NMSs



www.iedro.org

Multiplicity of data products

- Structural uncertainty is the key
 - Raw data is far from traceable to international measurement standards
 - Data artefacts are numerous and have myriad causes
 - Metadata is patchy at best
 - Data is discrete in both space and time
 - No “how to” ... rather very many cases of “it may work ...”
 - Multiple subjective decisions required even in automated procedures (thresholds, periods, test type etc.)
 - Different approaches may have different strengths and weaknesses
 - No single dataset can answer all user needs

Multiple approaches

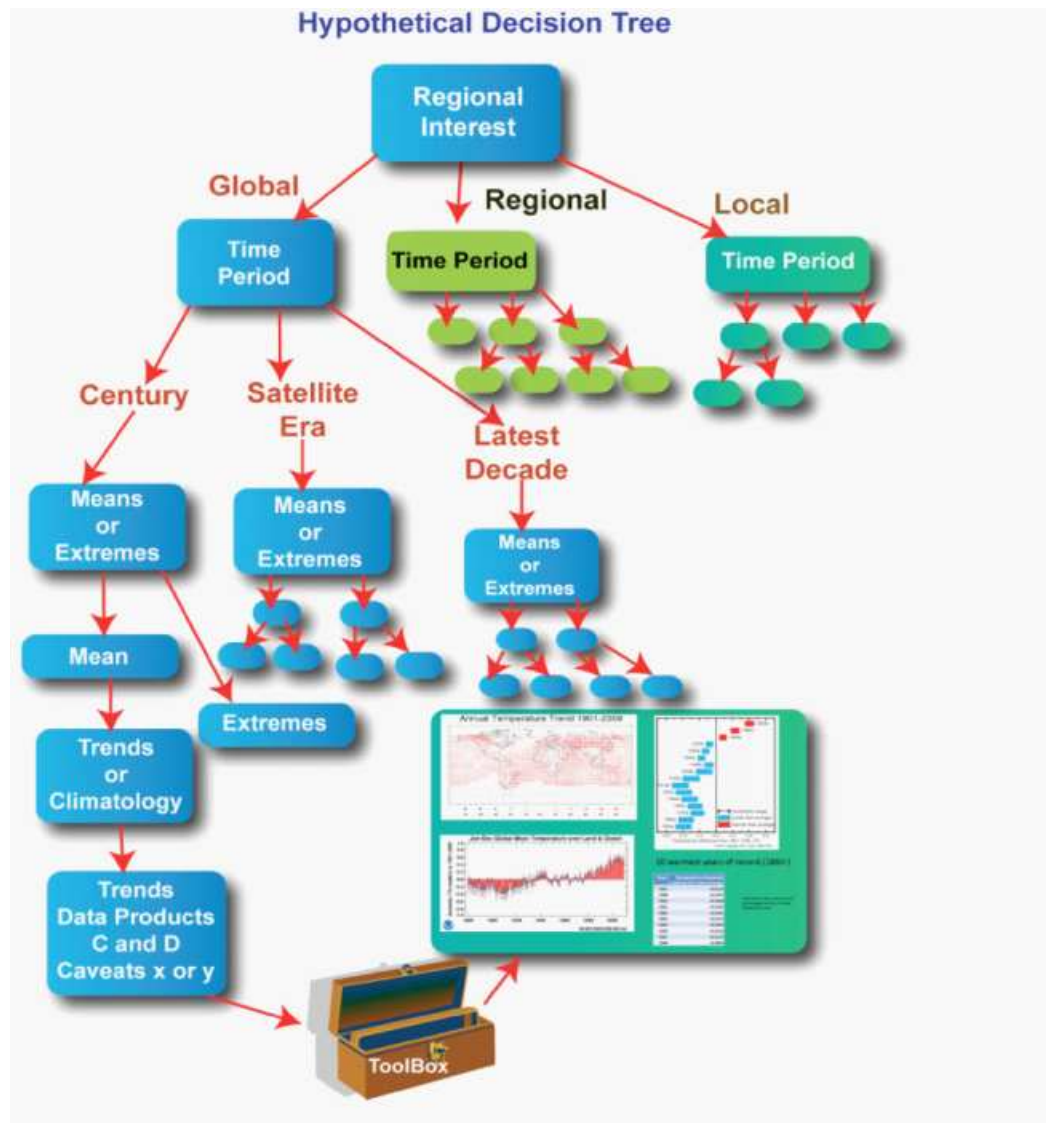
- Need multiple independent efforts with different choices
 - Station selection
 - Time and space resolution
 - Quality control choices
 - Homogenization decisions
 - Averaging procedures
- Should not just be climate scientists as need broad range of approaches
 - Statisticians, metrologists, software engineers, citizen scientists etc.
- Distinct approaches pinpoint key uncertainties so redundancy is of fundamental scientific value ...
- ... at least providing the underlying algorithm is understood (transparency)

Benchmarking and assessment

- 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.
- Instead focus on performance of underlying algorithms
- Consistent synthetic test cases, simulating real world noise, variability and spatial correlations potentially enable us to do this



Serving products and aiding users



Open issues in data product provision

- Data formats
- Degree of user interaction
- Ability to create graphical and tabular output on the fly
- Limited progress to date
 - Largely a reflection that this data provision is some way down the road?
 - Ideas and suggestions welcome ...

Progress to date

- **Steering committee set up**
 - Terms of reference
 - World Meteorological Office and The International Environmetrics Society sponsored (seeking International Bureau of weights and measures)
- **Working groups on databank and benchmarking active**
 - First version of databank made public and data sources coming in.
- **Implementation Plan published**
- **Progress documented on initiative website at www.surface temperatures.org**

What benefits are there for participating countries?

- Better-quality regional analyses, based on local data of known quality (not often-erratic GTS data)
- Potential support for data rescue (including crowd-sourced digitisation)
- Contribution to better global knowledge of climate variability and change

Thank you

For further information

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www.surface temperatures.org



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