International Surface Temperature Initiative progress report
June 2016

Authors: Peter Thorne, Jay Lawrimore, Kate Willett, Victor Venema

On behalf of the steering committee

6/6/16

This constitutes the fifth in an envisaged annual set of progress reports by the International Surface Temperature Initiative. The primary purpose of these reports is to update the endorsing bodies of the initiative (WMO, TIES, BIPM) regarding progress against stated goals. Feedback from endorsing bodies is welcomed. This report will also be made available on the Initiative blog, and feedback there is also welcome from other interested parties and stakeholders.

The databank and benchmarking and assessment working group reports can be found at http://www.surfacetemperatures.org/progress_reports . The current Implementation Plan can be found at **http://tinyurl.com/isti-IP2017**.

SUMMARY

Overall progress

In 2015 additional progress was made to further the overall Initiative aims. Two major events are of particular import: the release of a new version of the databank holdings and the roll-out of the Parallel Observations Science Team (POST).

Based upon initial feedback and further investiagtion a new Version 1.1 release of the databank was made in late 2015. The changes made in the release are outlined and justified in a NOAA technical note available at ftp://ftp.ncdc.noaa.gov/pub/data/globaldatabank/monthly/stage3/ISTI_Databnk_Technical_Report_v1.1.0.pdf .

The Parallel Observations Science Team made substantial progress in collecting and analysing an initial set of parallel measurements data holdings. An in person meeting of many of this group was held on the side of the EUMETNET Data Management Workshop (DMW) held in St Gallen.

Several papers, web-based reports, and conference / workshop talks and posters have been given over the past year. The ISTI databank version 1 release was used in the high profile Karl et al. Science paper. Talks were given at: AGU fall meeting (invited), EGU, EMS, the WCRP Grand Challenge meeting on extremes, CSIRO, the Australian BoM, Met Eireann, at the DMW, Climate ES and the UK MetOffice. Posters were given at The Copernicus Climate Change Service Data Store meeting, and EGU.

The benchmarking has been more challenging than previously foreseen. Victor Venema visited the Met Office in August and this resulted in further progress. Clean worlds are now created but the papers describing them are not yet accepted.

The ISTI Chair has been chosen to sit on EUSTACE's science advisory panel. A first meeting of this project occurred in 2015 along with phone briefings. The project will help inform future ISTI-related efforts towards daily data homogenisation.

A failed bid for funding to support ISTI activities was submitted to Science Foundation Ireland. Efforts will continue to be encouraged to seek funding to support ISTI activities.

Significant issues

Significant issues are unchanged from those outlined in previous years. They are repeated here for completeness.

1. At time of writing, the envisaged working group charged with creating a data portal and user support remains elusive. Although not currently critical as there are still no products developed under ISTI auspices this will become so and suggestions as to how to pursue this would be welcomed.
2. Concerns remain over the ability to get multiple independent groups engaged in the dataset creation (homogenization of the data to create climate products) problem.
3. Despite numerous efforts to create a crowdsourcing digitization portal with the citizen science alliance, it remains the case that no funding has been accrued. It would require on the order of 0.5 million US$ to create a portal and pull through to the databank for three years. Suggestions as to potential avenues to pursue would be welcome.

4. Implicit in much of the above the Initiative continues to function in a largely volunteer-based capacity with in-kind support from some of the participants' institutions. A more dedicated funding solution would help place the Initiative as a whole on a firmer basis. In particular progress should be weighed against dedicated resources. It is not, in that context, a great surprise that several timelines have slipped substantively again.

Plans for the coming year

- Release of first version of benchmarks
- Presentation of progress at various relevant international meetings
- Papers describing the benchmarks
- Release of GHCNv4 which builds from the v1.1 databank release
- Several papers envisaged to be published arising from the SAMSI sponsored workshop

Publications in 2015-2016 reporting period

- Karl, T. R. et al., 2015, Possible artifacts of data biases in the recent global surface warming hiatus. Science, Vol. 348 no. 6242 pp. 1469-1472 DOI: 10.1126/science.aaa5632

PROGRESS ON TASKS DETAILED IN THE IMPLEMENTATION PLAN THROUGH 2015

1. Ongoing or periodic activities

Task: Regular Teleconferences
Main Contact: Peter Thorne **Due Date:** Ongoing **Status:** Ongoing
Milestone: Regular discussions amongst members of the steering committee
Progress: Regular calls have occurred and been minuted on the web. In general agreed actions have been completed satisfactorily.
Issues: None.

Task: Formal annual written report on Initiative
Main Contact: Peter Thorne **Due Date:** Jan **Status:** Delivered late
Milestone: Written by steering committee to sponsors and posted online.
Progress: This document.
Issues: Owing to commitments of senior initiative members this was delivered. 4 months late.

Task: Formal written reports on working group progress
Main Contact: Jay Lawrimore / Kate Willett **Due Date:** Oct **Status:** Done
Milestone: Written reports from working groups submitted to steering committee for approval and posted online.
Progress: Done.
Issues: None.

Task: Maintenance of website and blog
Main Contact: Peter Thorne **Due Date:** Ongoing **Status:** Ongoing
Milestone: Materials updated and highlighted on a regular basis.
Progress: All relevant materials have been posted and are up to date.
Issues: None although reappraisal and refresh of materials is required in 2016 and will be undertaken as time permits.

Task: Promotion of Initiative through relevant meetings
Main Contact: Steering committee **Due Date:** Ongoing **Status:** Ongoing
Milestone: Presentation to the science community through talks and posters.
Progress: The Initiative has been presented at multiple meetings this past year through talks and / or posters as highlighted in the summary above.
Issues: None.

Task: Engendering new dataset efforts
Main Contact: Steering committee **Due Date:** Ongoing
Status: Cause for concern
Milestone: Exploit opportunities to promote awareness of the need for improvements to and diversity of algorithms, for example by organizing conference sessions and journal special issues and by lobbying funding bodies to support research in this area.
Progress: Several funding bids were submitted but ultimately not successful. EUSTACE is showing substantial progress. A new PhD student has started at Maynooth University looking at novel techniques using the 20th Century reanalysis. The Met Office continues to pursue a PhD studentship to pursue new and novel analyses.

Issues: Lack of relevant calls continues to inhibit setting up substantive research programs in this area.

Task: Up to date reference list of work on inhomogeneities in surface temperatures on website
Main Contact: Kate Willett **Due Date:** Ongoing **Status:** Ongoing
Milestone: To form a scientific basis for defining error model (analog) spread.
Progress: New relevant literature has been added as it has been published or discovered.
Issues: None.

Task: Advocacy of the benchmarks and support for users
Main Contact: Kate willett **Due Date:** Ongoing **Status:** Ongoing
Milestone: All working group members should be encouraging use of the benchmarks and providing support where necessary**.**
Progress: Limited as benchmarks have yet to be finalized.
Issues: None.

Task: Advocacy of the databank, efforts to augment holdings
Main Contact: Jay Lawrimore **Due Date:** Ongoing **Status:** Ongoing
Milestone: Efforts to augment data holdings.
Progress: New sources were accrued in 2015.
Issues: None.

Task: Data rescue
Main Contact: Peter Thorne **Due Date:** Ongoing **Status:** Ongoing
Milestone: Efforts to augment data holdings through data rescue
Progress: New sources were accrued in 2015.
Issues: None.

Task: Parallel measurements database data collection
Main Contact: Victor Venema **Due Date:** Ongoing **Status:** Ongoing
Milestone: Additional parallel measurements collected
Progress: New sources were accrued in 2015.
Issues: None.

2. Latent Activities due for completion in the previous reporting period

Note that does not include actions that were superceded by new or revised items in the 2015 work plan. These instead are now caught up in the next sub-section based upon the revised dates.

Task: Advancing exchange of daily climate summaries on a routine basis
Main Contact: NCEI **Due Date**: 1/14 **Status**: Open
Milestone: Completion of development and testing of new CLIMAT template containing daily observations.
Progress: Daily CLIMAT BUFR Template completed and validated through the IPET-DRMM in Sept 2014.
Issues: Follow through to implementation.

Task: Metadata collection strategy
Main Contact: Databank WG **Due Date**: 7/14 **Status**: Closed
Milestone: Documentation of Working Group's strategy to pursue metadata holdings for existing data holdings.
Progress: A document on metadata principles was developed and published.
Issues: Prioritization of databank release and near real time updates.

Task: Implement near real time (NRT) and period of record updates to the databank and document how these are done
Main Contact: Jared Rennie **Due Date**: 9/14 **Status**: Closed
Milestone: Provide continuing updates to Databank.
Progress: Release of v1.1 completes this task by undertaking and documenting the first period of record update.
Issues: None.

Task: Add to collections in data sparse areas
Main Contact: Databank WG **Due Date**: 9/14 **Status**: Partially met
Milestone: Enhance data collections in data sparse areas, principally Africa and S. America. Work with ACRE and EarthTemp Network.
Progress: 10 new sources but most are in already well sampled regions. A workshop is planned for June 2016 to be held in Maynooth University, which may help identify new data sources. Shall transition to a standing objective as shall unlikely ever be complete by augmenting the existing databank related standing objective.
Issues: Resources, contacts.

Task: Instigate access and visualization working group
Main Contact: Steering Committee **Due Date**: 12/14 **Status**: Open
Milestone: WG active.
Progress: None.
Issues: Prioritization of benchmarks and databank improvements. Will be addressed only once benchmarks are released.

3. Progress against stated aims in the Implementation Plan for the present year

This is progress as assigned against the previous annual report's stated objectives. New activities and timelines are given in Section 4.

Task: Establish parallel observations science team
Main Contact: Victor Venema **Due Date**: 1/15 **Status**: Closed
Milestone: Group created and active.
Progress: Group created and making good progress
Issues: None

Task: Add at least 10 new sources to monthly databank and release v1.1
Main Contact: Jared rennie **Due Date**: 3/15 **Status**: Closed
Milestone: v1.1 release available
Progress: v1.1 release was made in late 2015 as detailed in the databank working group report and an NCEI tech note.
Issues: None

Task: Analog-clean-worlds open worlds
Main Contact: Kate Willett **Due Date**: 3/15 **Status**: Partially complete
Milestone: Create software to produce analog-clean worlds on a global scale, produce enough to create the open error worlds and submit methods paper.
Progress: A paper has been submitted and the code has been archived that produces globally complete analogs with a few stations missing due to data issues or extreme data sparseness.
Issues: Resources and complexity.

Task: Analog-clean-worlds global-scale production
Main Contact: Kate Willett **Due Date**: 4/15 **Status**: Partially complete
Milestone: Worlds available
Progress: Worlds have been created but not yet released pending completion of a paper and any ensuing methodological tweaks.
Issues: Resources and complexity.

Task: Analog-error-worlds concept finalised
Main Contact: Claude Williams / Victor Venema **Due Date**: 4/15 **Status**: Closed
Milestone: Concepts agreed and documented.
Progress: Concepts were finalised but are yet to be applied. Victor Venema visited Met Office in August to advance this.
Issues: None.

Task: Plan for advancing multi-element databank holdings
Main Contact: Jay Lawrimore **Due Date**: 6/15 **Status**: Partially met
Milestone: Plan clearly articulated.
Progress: Some discussion and progress has been made. A meeting at Maynooth University in June 2016 is foreseen with an aspiration of a community white paper as an outcome.
Issues: Resourcing and adoption shall be substantive challenges.

Task: Analog-error-worlds open worlds

Main Contact: Claude Williams / Victor Venema **Due Date**: 7/15 **Status**: Open

Milestone: Create software to produce analog-error worlds for at least the open worlds and submit methods paper.

Progress: Limited. Victor visited Met Office and this helped prepare the foundation, but the building itself is most work and still to be done.

Issues: Dependency upon availability of clean worlds.

Task: Finish basic data processing of the parallel database

Main Contact: Victor Venema **Due Date**: 7/15 **Status**: Partially complete

Milestone: Quality control developed and applied

Progress: As data is still coming in this remains work in progress.

Issues: Unlikely to be a case of do it once and never revisit so may be best as BAU rather than a specific task in future. Have decided to base work on a database.

Task: Analog-error-worlds blind worlds (official benchmarks)

Main Contact: Claude Williams/Victor Venema **Due Date**: 8/15 **Status**: Open

Milestone: Produce analog-error worlds from the analog-clean-worlds ready for distribution as official benchmark data.

Progress: See open worlds.

Issues: Dependency upon availability of clean worlds.

Task: Benchmarking platform design

Main Contact: Kate Willett **Due Date**: 8/15 **Status**: Open

Milestone: Create a webpage showing step-by-step ‘How to benchmark’ with appropriate links to data, validation and intercomparison tables with registration so that feedback can be provided and contact maintained.

Progress: None.

Issues: Dependency upon completion and distribution of the benchmarks.

Task: Benchmark cycle release of analog-error-worlds

Main Contact: Kate Willett **Due Date**: 9/15 **Status**: Open

Milestone: Benchmarks available and widely publicised.

Progress: None.

Issues: Dependency upon availability of benchmarks.

Task: Benchmark cycle release of analog-error-worlds

Main Contact: Kate Willett **Due Date**: 9/15 **Status**: Open

Milestone: Benchmarks available and widely publicised.

Progress: None.

Issues: Dependency upon availability of benchmarks.

Task: Addition of new sources to GHCN-Daily

Main Contact: Matt Menne **Due Date**: 9/15 **Status**:

Milestone: New data added

Progress: Plan to remerge in the various KNMI held daily sources in first Instance but not yet enacted

Issues: Time and resources

Task: Metadata collection
Main Contact: Jay Lawrimore **Due Date**: 9/15 **Status**: Open
Milestone: Add at least two new sources of metadata to databank**.**
Progress: None.
Issues: Resources.

Task: PhD on Daily Benchmarking completed
Main Contact: Rachel Warren **Due Date**: 9/15 **Status**: Closed
Milestone: PhD submitted and papers drafted.
Progress: PhD was submitted March 2016.
Issues: None.

Task: Validation concepts finalised
Main Contact: Ian Jolliffe **Due Date**: 10/15 **Status**: In progress
Milestone: Decide upon tests with which to perform validation.
Progress: Main concept in place, but detailing still needed, construction of benchmarks has been given priority.
Issues: None but resolution will follow benchmarks provision.

Task: Work with ACRE / ICOADS etc. to investigate potential extension of IMMA format to land meteorological data
Main Contact: Jay Lawrimore **Due Date**: 11/15 **Status**: In progress
Milestone: Improve long-term archive of land surface data.
Progress: A case study is being developed.
Issues: Resourcing.

4. Proposed schedule of tasks for 2015-2016 reporting period

These are the planned activities for 2015 that are commensurate with the revised IP. In some cases dates have been moved from those in the published IP to accommodate developments that have arisen in the interim.

Activity	Details	Owner (lead investigator for timebound items)	Due date
Ongoing			
Regular teleconferences	For steering committee and any groups formed under auspices of the initiative. Minutes posted online.	Steering committee	Quarterly or more frequently.
Formal annual written report on Initiative	By steering committee to sponsors and posted online	Steering committee	Every January
Formal written reports on working group progress	From working groups to Steering Committee and posted online	Working groups	Every October
Maintenance of website and blog	Materials updated and highlighted on a regular basis.	Steering Committee	Ongoing
Promotion of initiative through relevant meetings	Talks or posters	Steering Committee, working groups	Ongoing
Engendering new dataset efforts	Exploit opportunities to promote awareness of the need for improvements to and diversity of algorithms, for example by organizing conference sessions and journal special issues and by lobbying funding bodies to support research in this area.	Steering committee	Ongoing
Advocacy of the benchmarks and support for users	All group members should be encouraging use of the benchmarks and providing support where necessary	Benchmarking and Assessment working group, Steering Committee	Ongoing
Up to date reference list of	Ongoing throughout but will have formed the basis	Benchmarking and	Ongoing

work on inhomogeneities in surface temperatures on the website (www.surfacetemperatures.org/benchmarking-and-assessment-working-group)	for defining error model spread.	Assessment working group led by Kate Willett	
Advocacy of the databank, efforts to augment holdings	Every effort should be made to engender data submissions with a special focus upon data sparse regions and periods.	Steering committee, Databank working group	Ongoing
Data rescue	Continued pursuit of funding proposal for support of crowdsourcing of already imaged forms (such as NOAA foreign data library)	Data rescue task team / databank WG	Ongoing until successful
Parallel measurements database data collection	Pursuit of parallel measurements data holdings and analysis of non-climatic changes	Parallel Observations Science Team, Databank WG	Ongoing
Timebound			
Analog-clean-worlds global scale production	Produce analog-clean-worlds for all blind and open error worlds and submit methods paper 2	Team Creation – code run and data hosted by Kate Willett	January 2016
Begin development of beta version of stage 3 merge using GHCN-D merge algorithm	Integrate characteristics of GHCN-Daily merge algorithm into databank Stage 3 merge process	Matt Menne, Jay Lawrimore	May 2016
Analog-error-worlds open worlds	Create software to produce analog-error-worlds for at least the open worlds	Team Corruption – lead by Claude Williams & Victor Venema and coding by Kate Willett	June 2016
Benchmarking Platform Design	Create a webpage showing step-by-step 'How to benchmark' with	All – lead by Kate Willett	July 2016

	appropriate links to data, validation and intercomparison tables with registration so that feedback can be provided and contact maintained		
Benchmark Cycle Release of analog-error-worlds	Release first official benchmarks – publicise widely	All – lead by Kate Willett	July 2016
Validation concepts finalised (including regional and incomplete submissions)	Decide upon number and type of tests with which to perform validation	Team Validation – lead by Ian Jolliffe	July 2016
Analog-error-worlds blind worlds (official benchmarks)	Produce analog-error-worlds from the analog-clean-worlds ready for distribution as official benchmark data	Kate Willett	September 2016
Plan for advancing multi-element databank holdings	With the ISTI Steering Committee establish plan for multi-element holdings	Menne, Thorne, Lawrimore, external partners	September 2016
Validation proof-of-concept	Create software and score system / intercomparison tables to run the validation proof-of-concept scale and submit methods paper (if desired?)	Team Validation – lead by Ian Jolliffe	September 2016
Finish basic data processing of the parallel database	Code needs to be more user friendly. Break detection and computation of indicies has to be coded. Published for code review	Victor Venema, Renate Auchmann	November 2016
Validation global scale production	Produce software and framework ready for running on the global scale – automated or manual	Team Validation – lead by Ian Jolliffe	December 2016
Submit paper on the parallel data concept and data processing	Some first examples of the transition from Stevenson screens to AWS	Victor Venema, Renate Auchmann, Enric Aguilar	January 2017
Submit paper on the transition to AWS for temperature	Analysis paper submitted	Enric Aguilar and POST	February 2017
Submit paper on	Analysis paper submitted	Petr	March

the transition to AWS for precipitation		Stepanek and POST	2017

372