

International Surface Temperature Initiative progress report January 2014

Authors: Peter Thorne, Jay Lawrimore, Kate Willett

On behalf of the steering committee

1/22/14

This constitutes the third 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.surface temperatures.org/progress_reports . The revised Implementation Plan can be found at [http://www.surface temperatures.org/steering-committee/Surface Temperatures Initiative Implementation Plan 2013 2015 final.pdf?attredirects=0&d=1](http://www.surface temperatures.org/steering-committee/Surface_Temperatures_Initiative_Implementation_Plan_2013_2015_final.pdf?attredirects=0&d=1) .

SUMMARY

Overall progress

Over 2013 significant progress has been made to further the Initiative aims. The steering committee and working groups have met regularly by teleconference and made significant progress. In addition a small workshop, facilitated by NOAA's National Climatic Data Center, was held in the summer to further benchmarking activities.

Following the meeting of the Global Climate Observing System's Atmospheric Observations Panel for Climate at which progress was summarized a letter was drafted and sent under signature of the WMO Secretary General. This letter was sent to all national Permanent Representatives requesting their help with furthering the databank's development and verification. It is understood that multiple National Met Services are in the process of consideration of and / or responding to these letters at this time.

A subset of the ISTI participants were involved in putting together a proposal to the SAMSI (Statistical and Applied Mathematical Sciences Institute) initiative in the USA for a summer activity in 2014. This activity was accepted from those submitted. The workshop will occur in July 2014, in Boulder, Colorado, at the NCAR facilities. Further details will be forthcoming in coming weeks.

The implementation Plan was revised and updated to cover the period 2013 through 2015. Further, terms of reference and membership for all ISTI groups have been revisited and revised to ensure that they remain relevant.

Several papers, web-based reports, and conference / workshop talks and posters have been given over the past year. The Initiative was included in a talk given at an event at the Royal Society in October 2013. Further talks were given at a SAMSI workshop in North Carolina, at a stats and climate workshop in Oslo, Norway, at the 12th International Meeting on Statistical Climatology in Jeju, South Korea, and at Reading University. The databank paper was accepted for publication in the Geosciences Data Journal, lead authored by Jared Rennie. Several ISTI relevant papers were published in the ITS9 conference proceedings.

The Databank Working Group and scientists at NOAA's National Climatic Data Center completed preparation of the databank for an official version 1 release. This included two additional beta releases which accounted for additional user feedback, a blacklisting facility, and development of a CF compliant netcdf version of the merged holdings. The first release was written up in a journal article and accepted by Geosciences Data Journal. Following this management at NCDC determined the need for an operational readiness review. This review has served to stay formal release at this time, The review should ensure best standards of management going forwards.

The benchmarking and assessment working group have undertaken significant progress facilitated in part by the workshop held in Asheville in the summer of 2013. The group have met frequently to further all aspects of the design of the benchmarks. Several new members have joined the group following the IMSC meeting and the Asheville workshop. By necessity the majority of their practical work is pending the release of the first version of the databank holdings which the benchmark analogs will 'mirror'. Further, it is non-trivial to create realistic benchmarks requiring more effort than was initially envisaged but substantial progress has been and continues to be made.

Efforts have continued to coordinate with relevant other activities as known to the initiative participants. Several posts have been made to the blog on behalf of the UK Natural Environmental Research Council EarthTemp initiative (<http://www.earthtemp.net/>) and ACRE.

Significant issues

Significant issues remain largely unchanged from those outlined the previous two years.

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 exist over the ability to get multiple independent groups engaged in the dataset creation (homogenization of the data to create climate products) problem..The SAMSI program workshop in summer 2014 will significantly help to address this issue but further work is required.
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 of the order 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 resource. It is not, in that context, a great surprise that several timelines have slipped substantively as they did last year.

Plans for the coming year

- Release of v1 databank holdings upon completion of Operational Readiness Review
- Presentation of progress at AMS annual meeting in Atlanta (Feb 2014), at Imperial College (Jan 2014), Edinburgh University (TBD), GCOS AOPC (April 2014), EGU (April 2014), and at a homogenisation workshop in Budapest (May 2014)
- Release of benchmarks (May 2014)
- SAMSI workshop on homogenization of surface temperatures (Jul 2014)
- Input as requested by CCI to their congress (Jul 2014)
- Papers describing the benchmarks (various)
- Paper summarizing SAMSI workshop outcomes (Dec 2014)

Publications in 2013-2014 reporting period

- Merchant, C. J., et al. "The surface temperatures of Earth: steps towards integrated understanding of variability and change", *Geosci. Instrum. Method. Data Syst.*, 2, 305-321, doi:10.5194/gi-2-305-2013
- Menne, M. J. et al. (2013), "Benchmarking the performance of pairwise homogenization of surface temperatures in the United States" AIP Conference Proceedings, 1552, 10.1063/1.4821423

- Lawrimore, J. H. et al., 2013, "The International Surface Temperature Initiative: Global Land surface Databank Development", AIP Conference Proceedings, 1552, 10.1063/1.4821420
- Thorne, P. W. et al., 2013, "The International Surface Temperature Initiative" AIP Conference Proceedings, 1552, 10.1063/1.4821418
- Pintar, A. L. et al., 2013, "Statistical methods for Change-Point Detection in Surface Temperature Records" AIP Conference Proceedings, 1552, 10.1063/1.4819688
- Pintar, A. L. et al., 2013, "Regional Homogenization of Surface Temperature Records Using Robust Statistical Methods" AIP Conference Proceedings, 1552, 10.1063/1.4819689

PROGRESS ON TASKS DETAILED IN THE IMPLEMENTATION PLAN THROUGH 2013

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:** Done

Milestone: Written by steering committee to sponsors and posted online

Progress: This document

Issues: None

Task: Formal written reports on working group progress

Main Contact: Jay Lawrimore / Kate Willett **Due Date:** Oct **Status:** Done (but delayed)

Milestone: Written reports from working groups submitted to steering committee for approval and posted online.

Progress: Done

Issues: Delayed (but less than in 2012) due to commitments of WG chairs.

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 likely due soon.

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:

- Royal Society event, London, Oct 2013 (as part of more general talk)
- GCOS AOPC, WMO, Geneva, Switzerland, April 2013
- SAMSI Uncertainty Quantification workshop, June 2013, RTP, NC
- Two talks at IMSC in Jeju, S. Korea, June 2013
- Stats and climate workshop, Oslo, Norway, November 2013
- Reading University, November 2013

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: The SAMSI workshop may help but further efforts are required to engender additional inputs.

Issues: Steering committee members have limited experience in this area and the funding environment is far from conducive.

Task: Up to date reference list of work on inhomogeneities in surface temperatures on website

Main Contact: Kate Willett **Due Date:** Ongoing **Status:**

Significant progress

Milestone: To form a scientific basis for defining error model (analog) spread.

Progress: Outline report drafted and some references collected and held on website and shared via blog announcements and googledocs following outreach to homogenisation listserv facility.

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 2013 and the letter sent out from WMO may mean further feedback in 2014. Several additional sources are being pursued for a subsequent update.

Issues: None.

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

Task: Position paper on version control and provenance available for public comment

Main Contact: Jay Lawrimore **Due Date:** 9/11 **Status:** Completed

Milestone: Posted and available for discussion on the blog

Progress: Included in databank paper that is now accepted.

Issues: None

Task: Metrologia article

Main Contact: Greg Strouse / Michael de Podesta **Due Date:** 12/11 **Status:** Superseded

Milestone: Initiative briefing paper to the metrology community submitted

Progress: Early drafts have been exchanged between authors but the demands of the day job have precluded more meaningful progress.

Issues: Resource crunch continues. ITS9 papers likely do the intended task so will now drop this task.

Task: Release of version 1 of the temperature databank (monthly and daily)

Main Contact: Jay Lawrimore **Due Date:** 4/12 **Status:** Pending

Milestone: First version of stage 3 (merged) monthly and daily holdings made available through gobic.org or another designated website
Progress: As stated above this is now solely pending an operational readiness review mandated by NCDC management to proceed.
Issues: None foreseen. This will be released in 2014.

Task: Benchmarking position (concepts) paper submitted for peer review

Main Contact: Kate Willett **Due Date:** 4/12 **Status:** In internal review

Milestone: Submission to Journal of Atmospheric and Oceanic Technology, Journal

of Geophysical Research-Atmospheres or Climate of the Past

Progress: Paper is in internal review and soon to be submitted to an appropriate EGU OA journal (the same journal as Merchant et al. was published in).

Issues: None envisaged at this time.

Task: Paper describing databank first version and underlying principles submitted to journal

Main Contact: Jay Lawrimore **Due Date:** 8/12 **Status:** Accepted

Milestone: submission to journal

Progress: Paper on method accepted and will be published commensurate with the dataset release.

Issues: Delayed, otherwise none.

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, with some redundancy with Section 2 above removed. It therefore does not catch up on changed timelines envisaged in the redrafted IP for some of these activities. New activities and timelines are given in Section 4.

Task: Analog-known-worlds proof-of-concept

Main Contact: Robert Lund / Kate Willett **Due Date:** 5/13 **Status:** In progress

Milestone: Create software to produce analog-known-worlds on a proof-of-concept scale and submit methods paper

Progress: Software is produced but has yet to be applied to the global data. Paper is in progress.

Issues: Resources and delay in v1 databank release.

Task: Analog-known-worlds global scale production

Main Contact: Kate Willett **Due Date:** 5/13 **Status:** Delayed

Milestone: Produce analog-known-worlds for as many ISTI databank stage 3 stations as possible

Progress: Stayed pending v1 databank release to work from

Issues: Delay in v1 databank release

Task: Analog-error-worlds concepts finalised

Main Contact: Kate Willett **Due Date:** 5/2013 **Status:** Completed

Milestone: Decide upon number and type of error-models to create (including how to ensure that these are blind tests for each cycle)

Progress: The set of benchmarks has now been defined but some effort is still required to finalize details at the time of the build.

Issues: Delay in v1 databank release

Task: Validation concepts finalised

Main Contact: Ian Jolliffe **Due Date:** 8/13 **Status:** In progress

Milestone: Decide upon number and type of tests with which to perform validation

Progress: The testing framework has been defined by details still need to be worked out.

Issues: Availability of benchmarks is required and also a higher immediate priority.

Task: New Implementation Plan drafted and published

Main Contact: Steering committee **Due Date:** 9/13 **Status:** Completed

Milestone: Implementation Plan update published

Progress: Plan available online

Issues: None

Task: Benchmarking group meet up

Main Contact: Kate Willett **Due Date:** 9/13 **Status:** Completed

Milestone: Attempt to get as many together as possible, possibly a networked code sprint

with a USA and Europe (Australia?) hub

Progress: Meeting held in Asheville, NC, July 2013

Issues: None

Task: Analog-error-worlds proof-of-concept

Main Contact: Claude Williams **Due Date:** 10/13 **Status:** Pending

Milestone: Create software to produce analog-error-worlds on a proof-of-concept scale and submit methods paper (if desired?)

Progress: None to date due to dependencies on databank and analog clean worlds

Issues: Resources, conditional on progress in other tasks

Task: Validation proof of concept

Main Contact: Ian Jolliffe **Due Date:** 10/13 **Status:** Pending

Milestone: Create software and score system/intercomparison tables to run the validation

on a proof of-concept scale and submit methods paper (if desired?)

Progress: Methods have been developed but application requires availability of benchmarks.

Issues: Conditional on progress in other tasks before able to proceed.

Task: Analog-error worlds global scale production

Main Contact: Claude Williams **Due Date:** 11/13 **Status:** Pending

Milestone: Produce analog-error worlds from the analog-known-worlds ready for distribution

Progress: None

Issues: Dependent upon earlier deliverables which have been delayed

Task: Benchmark Cycle Release of analog-error worlds
Main Contact: Kate Willett **Due Date:** 12/13 **Status:** Pending
Milestone: Release first official benchmarks – publicise widely
Progress: None
Issues: Release is dependent upon completing preceding benchmarking exercise steps

Task: Validation global scale production
Main Contact: Ian Jolliffe **Due Date:** 12/13 **Status:** Pending
Milestone: Produce software and framework ready for running on the global scale – automated or manual
Progress: None
Issues: Dependencies on earlier incompletd actions

4. Proposed schedule of tasks for 2014-2015 reporting period

These are the planned activities for 2014 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	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	Steering committee	Ongoing

	area.		
Up to date reference list of work on inhomogeneities in surface temperatures on the website (www.surface-temperatures.org/benchmarking-and-assessment-working-group)	Ongoing.	Benchmarking and Assessment working group led by Kate Willett	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
Advocacy of the databank, efforts to augment holdings	Every effort should be made to engender data submissions	Steering committee, Databank working group	Ongoing
Timebound			
COST-type meeting program viability	Initial decision point on viability of funding request such as COST	All, especially members with experience of COST actions or similar	January 2014
Talk at Imperial College, London	Invited talk	Kate Willett	January 2014
Advancing exchange of daily climate summaries on a routine basis	Completion of development and testing of new CLIMAT template containing daily observations	NCDC	January 2014
Completion of software enhancements to databank software associated with code review	Improve long-term maintainability of stage 1 through 3 software	Rennie, Gleason	February 2014
Analog-clean-worlds open worlds	Create software to produce analog-cleanworlds on a global scale, produce enough to	Team Creation – lead by Robert	January 2014

	create the open error worlds and submit methods paper	Lund and Kate Willett	
Analog-error-worlds concepts finalised	Using the defined set of blind and open worlds define the distribution and statistical probability framework	Team Corruption –lead by Claude Williams/Victor Venema	January 2014
Validation concepts finalised	Decide upon number and type of tests with which to perform validation	Team Validation – lead by Ian Jolliffe	January 2014
Talk at AMS, Atlanta	Overview talk	Peter Thorne	February 2014
Completion of operational readiness requirements for version 1 databank release	Meeting documentation and review requirements internal to NCDC	Lawrimore	March 2014
Version 1 release of Stage-3 data	Release version 1 of the Stage-3 dataset with variants. Web and media announcements.	Databank Working Group	April 2014
Talks at EGU	Invited talk and PICO presentations	Kate Willett	April 2014
Analog-clean-worlds global scale production	Produce analog-cleanworlds for all blind error worlds	Team Creation – code run and data hosted by Kate Willett	Spring 2014
Analog-error-worlds open worlds	Create software to produce analog-error worlds for at least the open worlds and submit methods paper (if desired?)	Team Corruption – lead by Claude Williams/Victor Venema and coding by Kate Willett	Spring 2014
Talk at homogenization workshop, Budapest	Benchmarking talk	Victor Venema	May 2014
Analog-error-worlds blind worlds (official benchmarks)	Produce analog-error worlds from the analog-clean-worlds ready for distribution as official	Team Corruption – lead by	May 2014 (open worlds at least),

	benchmark data	Claude Williams/Victor Venema	Summer 2014 (Blind)
Validation proof-of-concept	Create software and score system/intercomparison tables to run the validation on a proof-of-concept scale and submit methods paper (if desired?)	Team Validation – lead by Ian Jolliffe	May 2014
ISTI presentation at EarthTemp Network	Meeting focused on Africa as a data-sparse area, Germany, June 2014	Peter Thorne, Chris Merchant	June 2014
Validation global scale production	Produce software and framework ready for running on the global scale – automated or manual	Team Validation – lead by Ian Jolliffe	Have ability to accept returned benchmark data and statistics by Summer 2014 but full scale assessment could be delayed until Summer 2015 if necessary
Input to CCI	As directed by Tom Peterson	Steering committee	July 2014
SAMSI summer workshop	Completion of summer SAMSI workshop to be held in Boulder, CO	Peter Thorne and organizers	July 2014
Metadata collection strategy	Documentation of Working Group's strategy to pursue metadata holdings for existing data holdings	Databank Working Group	July 2014
Work with ACRE / ICOADS etc. to investigate potential extension of IMMA format to land meteorological data	Improve long-term archive of land surface data	Lawrimore, Woodruff (Guest expert)	August 2014
Benchmark Cycle Release of analog-error-worlds	Release first official benchmarks – publicise widely	Benchmarking Working Group	Summer 2014
Meeting under	Meeting to be held in	Peter	September

Meeting under Meteomet leadership with items on ISTI	Meeting to be held in Slovenia in September 2014	Peter Thorne, Andrea Merlone	September 2014
Evaluation of the software for the correction of the temperature records values, from the differences arising due to the changes of temperature scales over the years	The software developed by MeteoMet in their WP4 will be sent to ISTI for the evaluation of the utility, in terms of difficulties found and efficiency in the resulting outputs. A report will be made to eventually address improvements.	Peter Thorne, Andrea Merlone	September 2014
Implement NRT and period of record updates to the databank and document how these are done	Provide continuing updates to Databank	Jared Rennie	September 2014
Begin collection of parallel measurements	Develop formatting structure for storing parallel measurements and begin collection (At least 3 sets of parallel measurements collected.)	Databank Working Group, lead by Jared Rennie and Victor Venema	September 2014
Add to collections in data sparse areas	Enhance data collections in data sparse areas, principally Africa and S. America. Work with ACRE and EarthTemp Network.	All	September 2014
Advancing daily databank activities	Completion and publication on website of plan for developing and operating daily databank	Databank working group	October 2014
Benchmarking Platform Design	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	Benchmarking Working Group	December 2014 (ideally earlier but more important to get benchmarks created first)
Instigate access and visualization		Steering committee	December 2014