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.

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**


• Thorne, P. W. et al., 2013, "The International Surface Temperature Initiative" AIP Conference Proceedings, 1552, 10.1063/1.4821418


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:** Ongoing

**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

**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:** Superceded

**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 gosic.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 incompleted actions


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.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Details</th>
<th>Owner</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ongoing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular teleconferences</td>
<td>For steering committee and any groups formed under auspices of the initiative. Minutes posted online.</td>
<td>Steering committee</td>
<td>Quarterly or more frequently.</td>
</tr>
<tr>
<td>Formal annual written report on Initiative</td>
<td>By steering committee to sponsors and posted online</td>
<td>Steering committee</td>
<td>Every January</td>
</tr>
<tr>
<td>Formal written reports on working group progress</td>
<td>From working groups to Steering Committee and posted online</td>
<td>Working groups</td>
<td>Every October</td>
</tr>
<tr>
<td>Maintenance of website and blog</td>
<td>Materials updated and highlighted on a regular basis.</td>
<td>Steering Committee</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Promotion of initiative through relevant meetings</td>
<td>Talks or posters</td>
<td>Steering Committee, working groups</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Engendering new dataset efforts</td>
<td>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</td>
<td>Steering committee</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Area</td>
<td>Duration</td>
<td>Details</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Up to date reference list of work on inhomogeneities in surface temperatures on the website (<a href="http://www.surfacetemperatures.org/benchmarking-and-assessment-working-group">www.surfacetemperatures.org/benchmarking-and-assessment-working-group</a>)</td>
<td>Ongoing</td>
<td>Benchmarking and Assessment working group led by Kate Willett</td>
<td></td>
</tr>
<tr>
<td>Advocacy of the benchmarks and support for users</td>
<td>Ongoing</td>
<td>Benchmarking and Assessment working group led by Kate Willett</td>
<td></td>
</tr>
<tr>
<td>Advocacy of the databank, efforts to augment holdings</td>
<td>Ongoing</td>
<td>Steering committee, Databank working group</td>
<td></td>
</tr>
</tbody>
</table>

**Timebound**

<table>
<thead>
<tr>
<th>Task</th>
<th>Duration</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST-type meeting program viability</td>
<td>Initial decision point on viability of funding request such as COST</td>
<td>January 2014</td>
</tr>
<tr>
<td>Talk at Imperial College, London</td>
<td>Invited talk</td>
<td>Kate Willett</td>
</tr>
<tr>
<td>Advancing exchange of daily climate summaries on a routine basis</td>
<td>Completion of development and testing of new CLIMAT template containing daily observations</td>
<td>January 2014</td>
</tr>
<tr>
<td>Completion of software enhancements to databank software associated with code review</td>
<td>Improve long-term maintainability of stage 1 through 3 software</td>
<td>February 2014</td>
</tr>
<tr>
<td>Analog-clean-worlds open worlds</td>
<td>Create software to produce analog-cleanworlds on a global scale, produce enough</td>
<td>January 2014</td>
</tr>
<tr>
<td>Task</td>
<td>Description</td>
<td>Team/Lead</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Create the open error worlds and submit methods paper</td>
<td></td>
<td>Lund and Kate Willett</td>
</tr>
<tr>
<td>Analog-error-worlds concepts finalised</td>
<td>Using the defined set of blind and open worlds define the distribution and statistical probability framework</td>
<td>Team Corruption – lead by Claude Williams/Victor Venema</td>
</tr>
<tr>
<td>Validation concepts finalised</td>
<td>Decide upon number and type of tests with which to perform validation</td>
<td>Team Validation – lead by Ian Jolliffe</td>
</tr>
<tr>
<td>Talk at AMS, Atlanta</td>
<td>Overview talk</td>
<td>Peter Thorne</td>
</tr>
<tr>
<td>Completion of operational readiness requirements for version 1 databank release</td>
<td>Meeting documentation and review requirements internal to NCDC</td>
<td>Lawrimore</td>
</tr>
<tr>
<td>Version 1 release of Stage-3 data</td>
<td>Release version 1 of the Stage-3 dataset with variants. Web and media announcements.</td>
<td>Databank Working Group</td>
</tr>
<tr>
<td>Talks at EGU</td>
<td>Invited talk and PICO presentations</td>
<td>Kate Willett</td>
</tr>
<tr>
<td>Analog-clean-worlds global scale production</td>
<td>Produce analog-cleanworlds for all blind error worlds</td>
<td>Team Creation – code run and data hosted by Kate Willett</td>
</tr>
<tr>
<td>Analog-error-worlds open worlds</td>
<td>Create software to produce analog-error worlds for at least the open worlds and submit methods paper (if desired?)</td>
<td>Team Corruption – lead by Claude Williams/Victor Venema and coding by Kate Willett</td>
</tr>
<tr>
<td>Talk at homogenization workshop, Budapest</td>
<td>Benchmarking talk</td>
<td>Victor Venema</td>
</tr>
<tr>
<td>Analog-error-worlds blind worlds (official benchmarks)</td>
<td>Produce analog-error worlds from the analog-clean-worlds ready for distribution as official</td>
<td>Team Corruption – lead by</td>
</tr>
</tbody>
</table>

(open worlds at least)
<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Leader(s)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validation proof-of-concept</td>
<td>Create software and score system/intercomparison tables to run the validation on a proof-of-concept scale and submit methods paper (if desired?)</td>
<td>Team Validation – lead by Ian Jolliffe</td>
<td>May 2014</td>
</tr>
<tr>
<td>ISTI presentation at EarthTemp Network</td>
<td>Meeting focused on Africa as a data-sparse area, Germany, June 2014</td>
<td>Peter Thorne, Chris Merchant</td>
<td>June 2014</td>
</tr>
<tr>
<td>Validation global scale production</td>
<td>Produce software and framework ready for running on the global scale – automated or manual</td>
<td>Team Validation – lead by Ian Jolliffe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Have ability to accept returned benchmark data and statistics by Summer 2014 but full scale assessment could be delayed until Summer 2015 if necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input to CCI</td>
<td>As directed by Tom Peterson</td>
<td>Steering committee</td>
<td>July 2014</td>
</tr>
<tr>
<td>SAMSI summer workshop</td>
<td>Completion of summer SAMSI workshop to be held in Boulder, CO</td>
<td>Peter Thorne and organizers</td>
<td>July 2014</td>
</tr>
<tr>
<td>Metadata collection strategy</td>
<td>Documentation of Working Group’s strategy to pursue metadata holdings for existing data holdings</td>
<td>Databank Working Group</td>
<td>July 2014</td>
</tr>
<tr>
<td>Work with ACRE / ICOADS etc. to investigate potential extension of IMMA format to land meteorological data</td>
<td>Improve long-term archive of land surface data</td>
<td>Lawrimore, Woodruff (Guest expert)</td>
<td>August 2014</td>
</tr>
<tr>
<td>Meeting under</td>
<td>Meeting to be held</td>
<td>Peter</td>
<td>September</td>
</tr>
<tr>
<td>Task</td>
<td>Description</td>
<td>Responsible Parties</td>
<td>Date</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Meeting under Meteomet leadership with items on ISTI</td>
<td>Meeting to be held in Slovenia in September 2014</td>
<td>Peter Thorne, Andrea Merlone</td>
<td>September 2014</td>
</tr>
<tr>
<td>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</td>
<td>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.</td>
<td>Peter Thorne, Andrea Merlone</td>
<td>September 2014</td>
</tr>
<tr>
<td>Implement NRT and period of record updates to the databank and document how these are done</td>
<td>Provide continuing updates to Databank</td>
<td>Jared Rennie</td>
<td>September 2014</td>
</tr>
<tr>
<td>Begin collection of parallel measurements</td>
<td>Develop formatting structure for storing parallel measurements and begin collection (At least 3 sets of parallel measurements collected.)</td>
<td>Databank Working Group, lead by Jared Rennie and Victor Venema</td>
<td>September 2014</td>
</tr>
<tr>
<td>Add to collections in data sparse areas</td>
<td>Enhance data collections in data sparse areas, principally Africa and S. America. Work with ACRE and EarthTemp Network.</td>
<td>All</td>
<td>September 2014</td>
</tr>
<tr>
<td>Advancing daily databank activities</td>
<td>Completion and publication on website of plan for developing and operating daily databank</td>
<td>Databank working group</td>
<td>October 2014</td>
</tr>
<tr>
<td>Benchmarking Platform Design</td>
<td>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</td>
<td>Benchmarking Working Group</td>
<td>December 2014 (ideally earlier but more important to get benchmarks created first)</td>
</tr>
<tr>
<td>Instigate access and visualization</td>
<td></td>
<td>Steering committee</td>
<td>December 2014</td>
</tr>
</tbody>
</table>