

The International Surface Temperature Initiative – Building a Land Surface Temperature Data Program for the 21st Century

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For decades scientists have painstakingly obtained vast quantities of data from disparate archives and carefully removed random errors and accounted for systematic biases. The 21st Century demands on climate data go further. They require highly detailed (spatially and temporally), globally complete, long-term products, with quantified uncertainties, that are created from openly accessible, fully traceable data, available in near-real time. These data not only underpin climate monitoring and research: many decisions of substantial socio-economic importance rely on the accuracy of such products.

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Following the CCI XV endorsement of a UK proposal, the International Surface Temperature Initiative (www.surface temperatures.org) was launched at a meeting at the UK Met Office in September 2010. Its purpose is to facilitate creation of high quality and high resolution land surface air temperature data-products, with openness, transparency, verification, traceability and user tools. This effort is an ambitious program to oversee a complete end-to-end process:

1. Create a single go-to databank for monthly, daily and sub-daily land meteorological observations and their metadata with particular attention to data-provenance, version control and ease of use (e.g., for reanalyses developers). Multiple versions of a station in its raw, quality controlled and homogenised forms may be available. While all available variables will be included, initial efforts will concentrate on monthly and daily temperature records. Data submission guidance is available from the website and everyone is strongly encouraged to submit any known holdings to the databank.
2. Encourage the production of numerous independent land surface air temperature data-products at a wide range of spatial and temporal scales using different station selection criteria and methodological choices. This is key to assessing the structural uncertainty in estimates of land surface air temperature that arises from the use of different algorithms or development procedures.
3. Design a consistent methodological benchmarking process to provide objective assessments of the structural uncertainty of data-products derived from the databank and aid meaningful data-product intercomparison. This involves creating analog databanks with identical station structure to the land meteorological databank. Importantly, unlike in the real-world, systematic errors therein have been added artificially and are therefore known. Data-product creators are invited to test their methodologies on these benchmark analogs. The 'truth' is withheld from the users to avoid over tuning but the results are fed back in terms of ability to both detect specific types of systematic errors and correctly account for them. This enables some meaningful algorithm performance assessment. The process will be cyclical, with new analogs created every three years, to avoid the possibility of over-tuning algorithms to any one set of analogs.
4. Provide a data-portal to serve all data-products derived from the land meteorological databank and their metadata (e.g., station list, audit trails, key references, benchmarking assessments, uncertainty fields, development source code, etc.). Users will be able to download, visualise and intercompare products using a suite of online tools. The source data, key references and creation methods should be easily traceable from the data-product.

Crucially, this Initiative is international and interdisciplinary – bringing together climate scientists, statisticians, metrologists and software engineers from around the world. In this talk - progress to date is highlighted with the aim of engaging with the audience on how this program can best work alongside and provide useful input for reanalyses developers. Further

information can be found at www.surface temperatures.org and <http://surface temperatures.blogspot.com/>.

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