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COMMENTARY

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Key Points:

- This is a commentary on a recent China/UK collaborative workshop held 23–24 August 2016
- The workshop was held for the purpose of facilitating historic instrumental observations for the China/China Seas region
- The workshop has resulted in better knowledge sharing and agreements for future data recovery work (DARE) to facilitate climate reanalyses

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The Atmospheric Circulation Reconstructions over the Earth (ACRE) initiative ACRE China workshop: Recovery, digitization, and analysis of pre-mid-twentieth century climate observational data in East Asia workshop on 23–24 August, Beijing, China

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Abstract This commentary discusses a recent workshop designed to explore the extant historic instrumental record of weather observations for China, East Asia, and the China Seas region; to uncover new sources of observations; and to work on joint initiatives for their recovery and inclusion in open access data sets. The workshop was funded by the UK Newton Fund's Climate Science for Service Partnership China. It was organized by the Atmospheric Circulation Reconstructions over the Earth China, the China Meteorological Administration (CMA), the Beijing Climate Centre, and the China University of Geosciences (Wuhan) and held at CMA offices in Beijing.

The Atmospheric Circulation Reconstructions Over the Earth China Workshop

Atmospheric Circulation Reconstructions over the Earth (ACRE) China is a regional arm of the Atmospheric Circulation Reconstructions over the Earth (ACRE) initiative (<http://www.met-acre.net>) and is a component of the UK Newton Fund's Climate Science for Service Partnership China (CSSP China). ACRE operates from the UK Met Office Hadley Centre but encompasses the international weather and climate data rescue plus dynamical 4-D reanalysis and climate services and application communities. Its aims are to recover instrumental terrestrial and marine surface weather observations spanning the past 200 to 250 years. Data recovery is a threefold process of discovery, imaging, and digitization. The recovered observations underpin 4-D weather reanalyses (<http://reanalyses.org>) for weather and climate applications worldwide.

The goal of the ACRE China workshop was to explore the extant historic instrumental record of weather observations for China, East Asia, and the China Seas region, to uncover new sources of observations; and to work on joint initiatives for their recovery and inclusion in open access data sets. This is a core part of ACRE's stated goal of advancing instrumental data recovery. Continuous, homogeneous, and unbiased long-term observational records are essential for understanding change and variability in key climatic variables of the earth system. However, pre-1950s records of surface climate are sparse in some parts of the world, including in Asia. These data gaps have impeded the ability to build a reliable long-term data set for the generation of climate reconstructions, especially reanalyses (Figure 1).

ACRE China grew out of the necessity to recover observations for this region. The project was part of an initial Memorandum of Understanding between the Met Office and the Chinese Meteorological Administration (CMA)/Beijing Climate Centre (BCC) that evolved over 2011–2013. In 2015, ACRE China became integrated into WP1 within the CSSP China, a UK-based scientific research program supporting strategic partnerships for climate and weather resistant economic development (<http://www.metoffice.gov.uk/research/collaboration/cssp-china>). ACRE China also links closely with ACRE Southeast Asia; ACRE Pacific; the World Meteorological Organization/ACRE/Global Framework for Climate Services INdian Ocean DAta REscue initiative; the Koninklijk Nederlands Meteorologisch Instituut-Badan Meteorologi, Klimatologi, dan Geofisika Southeast Asian Climate Assessment & Dataset and Digitisasi Data Historis project; and the Japan Climate Data Program (JCDP).

On 23–24 August 2016, the ACRE China, the China Meteorological Administration (CMA), the Beijing Climate Centre (BCC), and the China University of Geosciences (CUG, Wuhan) held a workshop at CMA offices in Beijing. Its objective was to draw together experts from multidisciplinary backgrounds to discuss progress



Figure 1. Discussion among workshop participants.

in the recovery, digitization, and analysis of pre-1950s instrumental observational data for mainland China and East Asia. The multidisciplinary nature of this focus is critical to ACRE's data recovery efforts. Although historic weather and climate observations are often held by national meteorological services, more often than not, they are also to be found scattered among libraries and archives and, in a variety of different source documents, not only meteorological registers. Likewise, due to the complicated political histories of many countries during the nineteenth and twentieth centuries—especially with regime changes or war—observations are not necessarily always held in their country of origin. Thus, participants at the ACRE China workshop represented universities, climate services, and archives, from China, the UK, Japan, Germany, the USA, Singapore, and Mongolia. The workshop was therefore an excellent opportunity for the consortium to come together, to foster further collaboration between parties undertaking data rescue activities in this region, and to highlight new and potential sources of data for current and future projects.

The workshop agenda included discussion on improving climate reconstructions and reanalyses by historical data rescue, the ACRE-facilitated 20th Century Reanalysis project, recent JCDP efforts in historic data and typhoon tracking, marine data recovery, the International Surface Pressure Databank (ISPD), and perspectives from historians and geographers working in the field. Importantly, the agenda focused on recovery activities specific to Chinese projects and institutions. Presentations were heard on collections of records that dated back to as early as 1743 in eastern China and also for different cities or provinces, including Wuhan City, Shenyang City, Shanxi Province, and Beijing Municipality. Participants were made aware of records made by Jesuit missionaries in China during the mid-eighteenth century, 1920s data from 105 observation stations including agricultural schools in Shanxi Province, and valuable data from the Japanese occupation period in Northeast China. Digitization of these data is underway or will be undertaken in near future (Figure 2).

A great deal of early instrumental data for the China region derives from the China Coast Meteorological Register (CCMR) which, through cooperation with the Great Northern and Eastern Extension Telegraph companies, had been collated and distributed freely by the Hong Kong Observatory from around 1884. However, earlier data of this type back to 1873 were tabulated and published in various Chinese newspapers of the time. The CCMR, and earlier newspaper data, have recently been digitized by ACRE and the Japan Meteorological Agency/Japan Climate Data Program (JCDP), although gaps and duplicate records are still being filled and assessed, respectively. The CMA is currently involved in digitizing data from up to 19 terrestrial stations, dating back as early as 1868 (Beijing). Of those stations, data from six have already been delivered to ACRE and international data repositories, and the remainder are being quality-controlled and will be delivered later this year. Pressure data will be available publicly within the next few months via the ISPD (<https://reanalyses.org/observations/international-surface-pressure-databank>).

A notable outcome of the workshop was a more cogent understanding of the disparate projects already underway on data rescue across the globe, as well as in China, and an effort to coordinate this work in a more

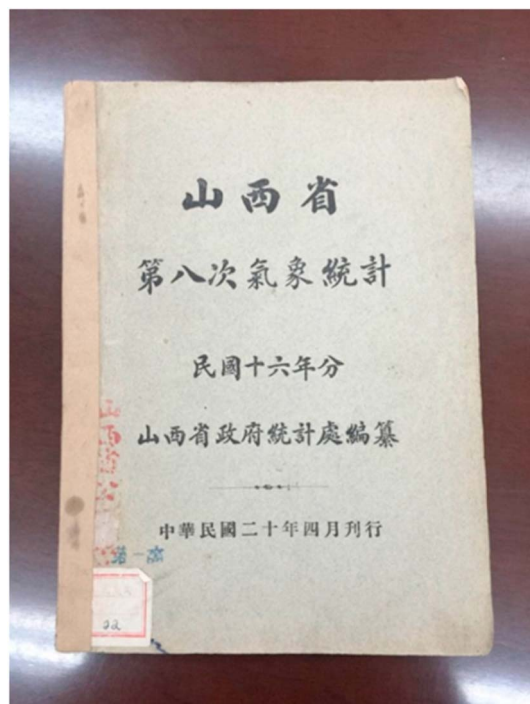


Figure 2. Example of a book containing meteorological data from Shanxi Province, 1927. Published by the Statistics Office, 1931.

centralized way for the China, East Asian, and the China Seas region under the umbrella of ACRE China and ACRE SE Asia. This will help to eliminate the duplication of data rescue efforts, as well as to make information more available on what data have been recovered and are available for user needs. This builds on a major paper outlining a blueprint for integrated, seamless international data rescue, which was compiled following the 9th ACRE Workshop and Historical Weather and Climate Data Forum (June 2016), and is about to be submitted for publication [Thorne *et al.*, 2016]. It includes recommendations for metadata standards for ACRE and the wider international climate and weather data rescue community, and this has been taken forward in the ACRE-DARE4C3S service project proposal to the European Union Copernicus program which, if successful, will incorporate,

build on, and meld together the Global Metadata Registry from the European Reanalysis of the Global Climate System 2 project and the International Data Rescue Portal (<https://www.idare-portal.org/>).

A specific commitment was also made to help to improve the data record for Mongolia, which currently dates only from 1936 at best. This effort will be undertaken by seeking far-ranging sources, including data collected by foreign powers during periods of occupation (particularly Russia and China), or that collated during early scientific expeditions. Importantly, a commitment was made to further enhancing collaborative data recovery via CMA/BCC projects, in particular the investigation of Chinese holdings for historical weather observations made at national through to regional level. Funding for such an enterprise is being sought internally by CMA/BCC.

As CMA/BCC data rescue is primarily for terrestrial weather and climate data, ACRE China took the opportunity to engage with the Chinese marine community following the Beijing workshop. The Chinese National Marine Data Information Service had invited ACRE China representatives to attend and present at the 1st Chinese Centre for Marine-Meteorological and Oceanographic Climate Data (CMOC China) Meeting, which was held in Tianjin from the 29–31 of August. A verbal agreement was made at the Tianjin meeting between CMOC China and ACRE China, to work together and to approach CMA/BCC in order to initiate a united focus on historical Chinese terrestrial and marine data rescue. CMOC China will also investigate the possibility of being part of CSSP China.

The workshop was supported by CSSP China, the CMA, BCC, and CUG.

Further Reading

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