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The 20th Century Reanalysis Project: A Time Machine for Climate Scientists

New Dataset Provides Understanding of Earth's Past and Future Climate

From the hurricane that smashed into New York in 1938 to the impact of the Krakatoa eruption of 1883, the late 19th and 20th centuries are rich with examples of extreme weather. Now an international team of climatologists have created a comprehensive reanalysis of all global weather events from 1871 to the present day, and from the earth's surface to the jet stream level.

The 20th Century Reanalysis Project, outlined in the *Quarterly Journal of the Royal Meteorological Society*, not only allows researchers to understand the long-term impact of extreme weather, but provides key historical comparisons for our own changing climate.

"Producing this huge dataset required an international effort to collate historical observations and recordings from sources as diverse as 19th century sea captains, turn of the century explorers and medical doctors, all pieced together using some of the world's most powerful supercomputers at the US Department of Energy's National Energy Research Scientific Computing Center in California and the Oak Ridge Leadership Computing Facility in Tennessee," said lead author Dr Gil Compo.

"The resulting weather maps, called reanalyses, provide a much longer record of past weather variability than is currently available to compare present and projected weather variability in a warming climate. They also provide valuable insight into extreme weather and climate events that were historically important."

Dr. Compo leads the 20th Century Reanalysis Project (20CR) at the National Oceanic and Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL) and the Cooperative Institute for Research in Environmental Sciences (a joint project of NOAA and the University of Colorado) Climate Diagnostics Center with colleagues Dr. Jeffrey Whitaker of NOAA, Dr. Prashant Sardeshmukh of NOAA and the CIRES Climate Diagnostics Center, and Dr. Rob Allan of the United Kingdom Met Office Hadley Centre. The 20CR is produced in partnership with the Atmospheric Circulation Reconstructions over the Earth (ACRE) initiative, the Global Climate Observing System (GCOS), and 36 other international organisations.

By using historical climate data to understand current weather patterns the 20CR team, which includes 27 international scientists, are building on the work of their meteorological forebears such as the *U.S. Historical Weather Map Series* produced by the U.S. Weather Bureau to better

understand weather events preceding World War II. However, the 20CR is the first project of its kind to span a full century.

"A preliminary version of this project (20CRv1, Compo et al., 2008) spanned the period 1908 to 1958," said Compo. "In this second and complete version (20CRv2), the global atmospheric fields for 1871 to 2008 have been generated. We hope, as Wexler and Tepper of the US Weather Bureau said in 1947, that this project can 'breathe life into a mass of inert data' while providing an indispensable aid to future research."

The 20CR dataset provides the first long-term estimates of global tropospheric variability, weather maps from the Earth's surface to the level of the jet-stream, and of their time-varying quality, from 1871 to the present at 6- hourly temporal and 2° spatial resolutions.

"The new dataset will allow climate scientists to put current weather extremes in a historical perspective and determine how extremes are changing," said Compo. "Just how extreme is the recent European cold wave, for example, or the blizzard in the US Northeast?"

The 20CR dataset also gives a new insight into the weather events that may have misinformed early-century policy decisions, such as the wet period in central North America that led to overestimates of rainfall and over-allocation of water resources in the Colorado River basin in the years before the US Dust Bowl of the 1930's.

"This reanalysis data will enable climate scientists to rigorously evaluate past climate variations compared to climate model simulations, which is critical for building confidence in model projections of regional changes and high-impact, extreme events," concluded Compo. "We hope that this 138 year reanalysis data will enable climate researchers to better address issues such as the range of natural variability of extreme events, including floods, droughts, extratropical cyclones, and cold waves."

This paper is published in the *Quarterly Journal of the Royal Meteorological Society*. Media wishing to request a copy should contact Lifesciencenews@wiley.com or +44 (0) 1243 770 375

Meet the Author: Co-Author Dr Jeffrey Whitaker from NOAA will be available for interview at the American Meteorological Society Conference in Seattle on the 25th January. To contact Dr Whitaker email Jeffrey.S.Whitaker@noaa.gov or phone (303) 497-6313

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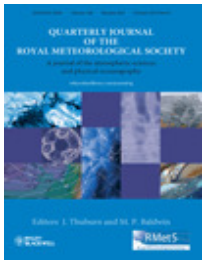

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