

Origins of a ‘diagnostics climate center’

Robert W. Reeves and Daphne Gemmill

Full operation of the Climate Analysis Center was achieved in August 1979, but when was the concept for a diagnostic climate center first articulated? What were the circumstances and who were the key individuals? To what extent did the concern about long-term climate change play a role in the Climate Prediction Center’s birth? Our search for the origins took us back to the early 1970s.

A number of short-term climate events, later linked to the 1972-1973 El Niño, had national and international economic consequences. These dramatic events reinforced the calls for action to improve understanding of the climate system and our ability to issue climate outlooks. Several climate events were cited in numerous reports and Congressional testimony. Among those cited in *A United States Climate Program (1974)* were:

A killing winter freeze followed by a severe summer heat wave in the United States.

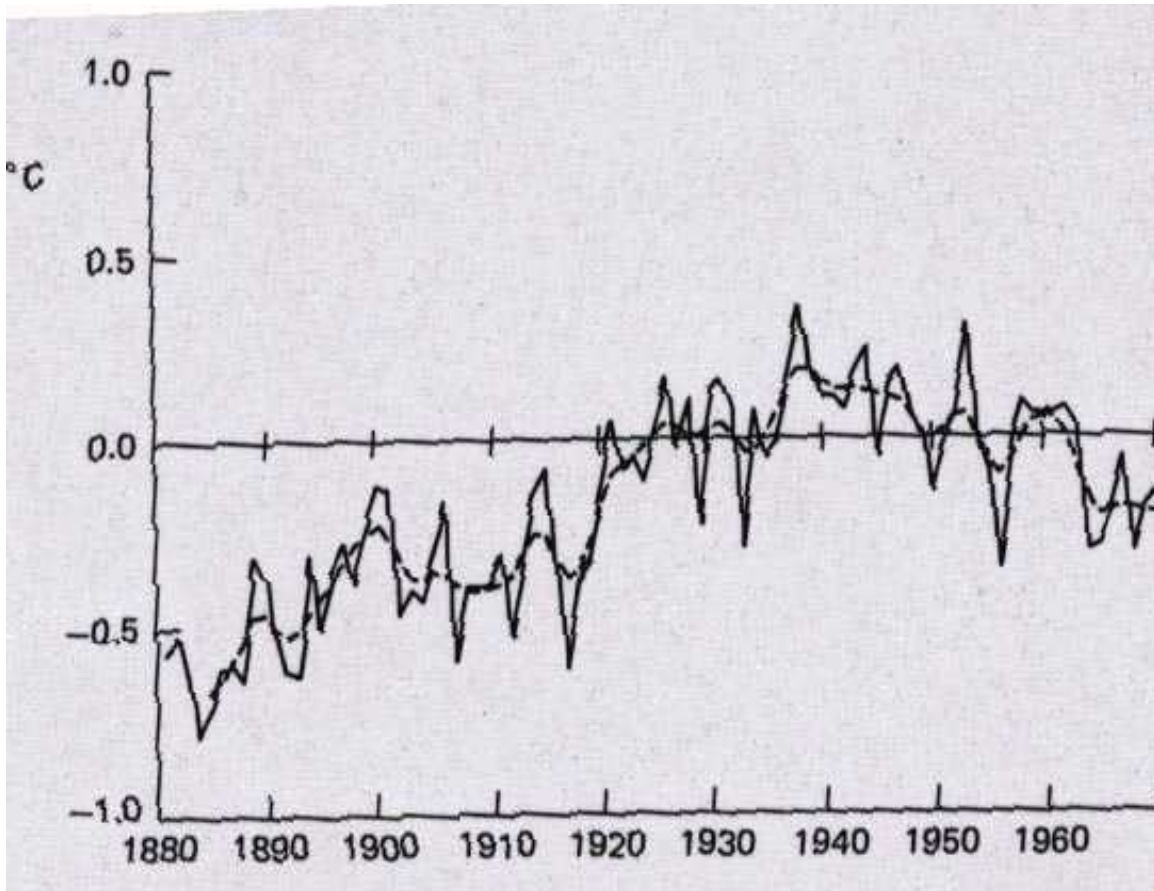
Drought in the Soviet Union producing a 12 percent shortfall in their grain production in 1972, forcing the country to purchase grain abroad which in turn reduced world grain reserves and helped drive up food prices.

Collapse of the Peruvian anchovy harvest in late 1972 and early 1973, related to fluctuations in the Pacific Ocean currents and atmospheric circulation, impacted world supplies of fertilizer, the soybean market, and prices of other protein feed stocks.

The anomalously low precipitation in the U.S. Pacific Northwest during the winter of 1972-73 depleted water reservoir storage by an amount equivalent to an amount of water required to generate more than 7 percent of the electric energy for the region.

Interest in decadal to centennial timescales also contributed to the calls for action. The views on long-term climate change, however, were split. Some scientists projected a warming trend and others focused on the gradual cooling as suggested by the global surface temperature record from the 1940s through the 1960s. The cooling theory attracted the interests of many scientists, including glaciologists. In January 1972, geologists George Kukla of the Czechoslovakian Academy of Sciences and Robert Matthews of Brown University convened a working conference of top European and American investigators in Providence, Rhode Island, to discuss “The Present Interglacial, How and When will it End?”

They summarized their results in *Science* (October 1972). Kukla had by this time accepted a visiting scientist position at the Lamont-Doherty Geological Observatory. In a



Northern hemisphere mean annual surface temperature variations in °C: deviations from the 1946-1960 mean adapted from Jones and Wigley (1980).

rather bold move, they followed up their *Science* article with a letter to President Nixon calling for federal action based on the main conclusion of the conference:

“ . . . a global deterioration of climate, by order of magnitude larger than any hitherto experienced by civilized mankind, is a very real possibility and indeed may be due very soon. The cooling has natural cause and falls within the rank of processes which produced the last ice age. This is a surprising result based largely on recent studies of deep sea sediments.”

Kukla and Matthews concluded their letter with the following concern:

“It might also be useful for Administration to take into account that the Soviet Union, with large scientific teams monitoring the climate change in Arctic and Siberia, may already be considering these aspects in its international moves.”



Dear Mr. President:

Aware of your deep concern with the future of the world, we feel obliged to inform you on the results of the scientific conference held here recently. The conference dealt with the past and future changes of climate and was attended by 42 top American

P. President - 2 - December 3, 1972

With the efficient help of the world leaders, the research could be effectively organized and could possibly find the answers to the menace. We hope that your Administration will take decisive steps in this direction as it did with other serious international problems in the past. Meantime however it seems reasonable to prepare the agriculture and industry for possible alternatives and to form research

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Existing data still do not allow forecast of the timing of the predicted development, nor the assessment of interference with the natural trends. It could not be as severe that the cooling now under way in the Northern Hemisphere is the start of the expected shift. The present rate of the cooling seems fast enough to bring glacial temperatures in about a century, if continuing at the present pace.

George J. Kukla
Lamont-Doherty Geological Observatory

The practical consequences which might be brought by such developments to existing social institutions are among others:

R. K. Matthews, Chairman
Department of Geological Sciences

- 1) Substantially lowered food production due to the shorter growing seasons and changed rain distribution in the main grain producing belts of the world, with Eastern Europe and Central Asia to be first affected.
- 2) Increased frequency and amplitude of extreme weather anomalies such as those bringing floods, snowstorms, killing frosts etc.

GJM/RRM:mc
Enclosure

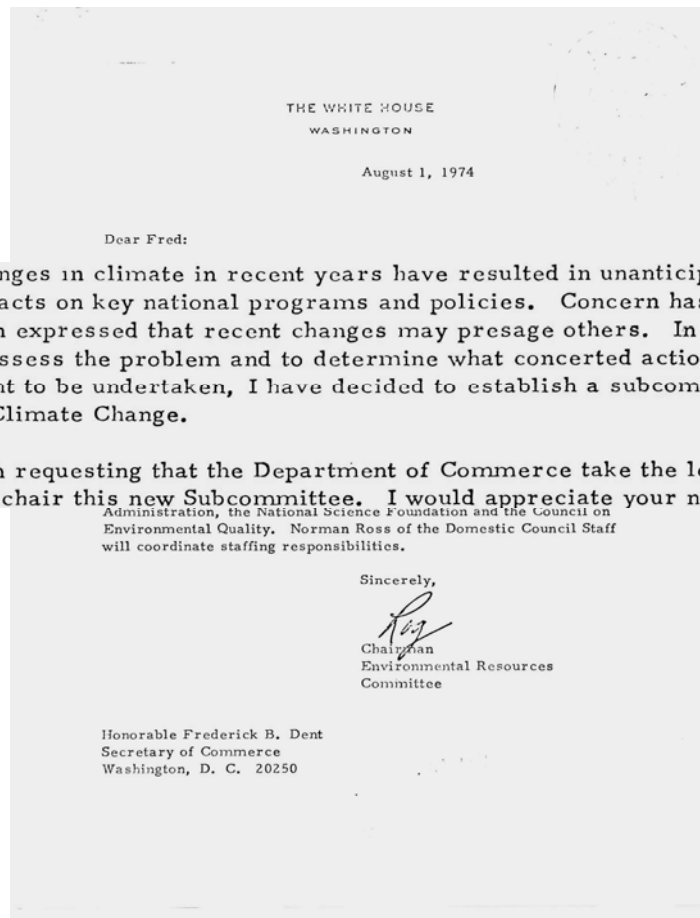
Kukla-Matthews letter to President Nixon.

The White House assigned the Kukla-Matthews letter to the Bureau of International Scientific and Technological Affairs of the State Department. They circulated the letter to the highest level Federal interagency body concerned with atmospheric sciences, the Interdepartmental Committee for Atmospheric Sciences (ICAS), for "review and appropriate action". The ICAS then established an ad hoc Panel on the Present Interglacial to respond to the letter.



- Members of the ad hoc Panel
- Dr. David M. Hirschfield*
(Chair)
Department of Agriculture
 - Mr. Joseph O. Fletcher*
National Science Foundation
 - Dr. J. Murray Mitchell, Jr.*
National Oceanic and
Atmospheric
Administration
 - Col. John S. Perry*
Department of Defense

The following year was a particularly busy time as the Panel sought advice on the issue from experts in the field. They also decided that the topic was of such paramount importance that they should go beyond simply reporting their findings and include recommendations as well. This they did with a companion document that was a call for a national climate program to begin to address climate issues. Joseph Fletcher was instrumental in the companion report's preparation and had envisioned the National Science Foundation (NSF) in the lead. In fact, NSF had demonstrated its commitment to climate by creating the Office of Climate Dynamics in May 1974 with Fletcher in the lead, assisted by Uwe Radok. NOAA had other ideas, objected to the Panel's overstepping its charge, and suggested NOAA was the appropriate agency to lead such an effort (Sprigg; 2004, personal communication). NOAA's ensuing efforts paid off.



Letter from Rogers C. B. Morton, Chairman of the White House Environmental Resources Committee to Secretary of Commerce Frederick Dent.

On August 1, 1974, the chairman of the White House Environmental Resources Committee wrote to Secretary of Commerce Frederick Dent:

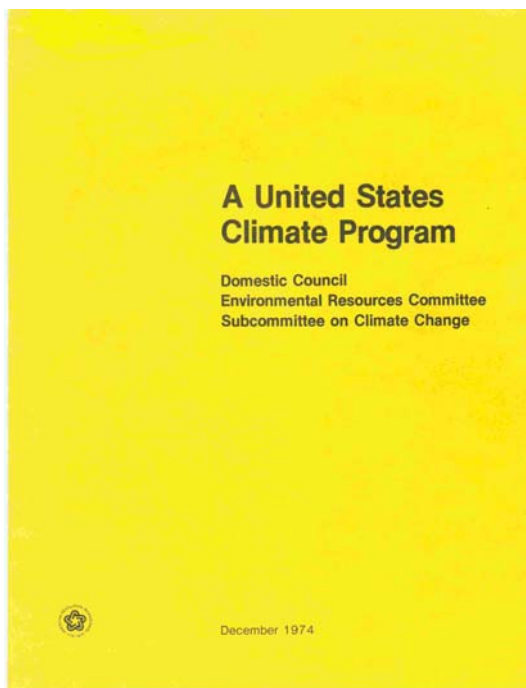
“Changes in climate in recent years have resulted in unanticipated impacts on key national programs and policies. Concern has been expressed that recent changes may presage others. In order to assess the problem and to determine what concerted action ought to be undertaken, I have decided to establish a subcommittee on Climate Change.”

The memorandum further requested the Department of Commerce to chair the subcommittee. Secretary Dent responded on August 16 and named Robert M. White, Administrator of NOAA, as chair of the subcommittee. John Townshend, White's Deputy, asked William Sprigg, who was in the office of the NOAA Assistant Administrator for Environment and Prediction, to convene a series of interagency meetings to assemble the "United States Climate Program". Sprigg (2004, personal communication) recalled that during one of those meetings on climate data and indices, Barry Saltzman from Yale University proposed that a "focus or center" was needed where huge amounts of data could be assembled and analyzed. Sprigg stated that Saltzman's suggestion was included by the group as a recommendation to establish an analysis center -- one of the earliest suggestions for a center. According to Norman Canfield (2002, personal communication), who joined NOAA Headquarters in 1975 as Senior Climatologist, Sprigg was instrumental in the formation of the Climate Analysis Center because he organized the meetings that led to its formation.

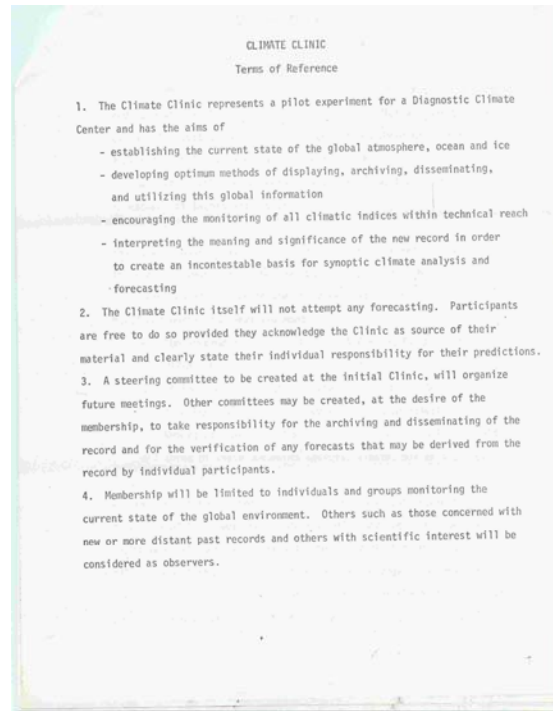
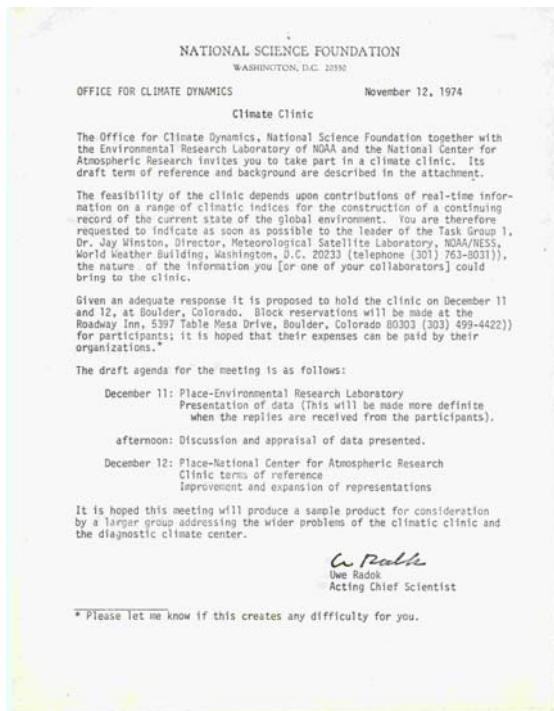
In a related effort, Sprigg began assembling some of NOAA's concepts for such an interagency organization, including estimated computer costs in an undated, unpublished (probably 1974) document entitled "A Climate Diagnostics Center". By late 1974 Don Gilman, at the request of Fred Shuman, had prepared a draft Diagnostic Center Budget and Personnel for 1976 and 1977. Gilman sketched out a plan that included 24 positions in 1976 with a budget of \$1, 400,000, increasing by 8 positions and \$700,000 in 1977. A subsequent draft (12/30/74) by Gilman outlined three Diagnostic Center Functions: Data Acquisition; Data Analysis and Synthesis; and Prediction.

In December 1974, the interagency subcommittee produced their report: *A United States Climate Program* in which they described the needs for a climate program. One of the *Actions and Milestones* in that report was ***Establish a Climate Diagnostics Center in 1976.***

In an article in "Inside CIRES" (September 1997), Uwe Radok reflected on the Brown University conference, mentioned the committee on the present interglacial and its "proposed national climate initiative which a new NSF Office of Climate Dynamics (OCD) started with a "Climate Clinic" that brought together representatives of the major climate research groups at NCAR in October 1974, and became the forerunner of annual Climate Diagnostic Workshops." Radok's invitation was actually issued in November for a December meeting in Boulder, CO.



Cover of United States Climate Program Report to the Domestic Council



Uwe Radok's letter of invitation to the Climate Clinic its Terms of Reference

By that time, Joe Fletcher had left NSF to join NOAA at the Environmental Research Laboratories in Boulder. He convened the Clinic.

The Climate Clinic's proposed terms of reference stated, "The Climate Clinic represents a pilot experiment for a Diagnostic Climate Center." This was a clear indication that Joe Fletcher and Uwe Radok had also been developing the concept of a center.

Congressional action to create a national climate program was just beginning. In early 1975, Rep. Philip Hayes (D-IN) introduced H.R. 10013, the "National Climate Program Act of 1975" to establish a coordinated national program of climate research, monitoring, prediction, and contingency planning analysis. The bill gave the Department of Commerce the lead role. During the next four years numerous bills were introduced and committee hearings held.

Congress and most of the scientists and users of climate information who testified stated that the existing Federal efforts in climate research, monitoring and analysis were inadequate to meet existing and future needs of the nation. They also stated that the prospect for providing accurate monthly and seasonal forecasts was scientifically promising provided an accelerated program of basic and applied research was established and adequately funded. During an April 1977 House of Representatives hearing, a representative of the Agricultural Research Institute expressed dismay at the decline of the NOAA climate program and called for a separate division within the National Weather Service to address climate forecasting.

The official Administration position was that legislation was not needed. The Office of Science and Technology Policy and the Office of Management and Budget tried at the last minute with little success to rewrite the legislation in conference more in line

with the administration's views. President Carter signed the National Climate Program Act into law on September 17, 1978.

After it became clear that NOAA would host any center for climate diagnostics, various NOAA line components sought the management lead. Interviews with those involved and Congressional testimony indicated that National Weather Service (NWS) management was cool to the idea of leading the new center. Edward Epstein's memo in July 1977, however, assigned responsibility to the NWS. Epstein (personal communication) stated that the NWS was the logical choice.



Epstein's memo of July 1977 assigning responsibility for the new center to the National Weather Service.

A NOAA June 1978 memorandum administratively established the Climate Analysis Center. The following spring, NOAA added additional staff and functions. Full operations begin in August 1979 when NOAA completed the organizational structure.

NOAA formed CAC, a unit of the National Meteorological Center (NMC, and later National Centers for Environmental Prediction) in response to the growing awareness of El Niño's influence on climate and weather, a severe winter of 1976-77, failure of the wheat crop in the USSR leading to the wheat deal, and increased Congressional pressure for progress in climate prediction. CAC combined in-house operations, research and development and collaboration with outside entities through

grants. The objectives were near-real-time climate monitoring, climate diagnostics, and prediction in support of agriculture, water resources, and energy.

Acknowledgments: The authors are indebted to Jim Laver, Director of the Climate Prediction Center and Robert E. Livezey, Chief of the Climate Services Division for their support of this study. Don Gilman provided copies of Ed Epstein's July 1977 memorandum assigning responsibility for the Climate Analysis Center to the NWS, an early undated draft (but probably late 1974) by William Sprigg of "A Climate Diagnostics Center", and his own draft plans (December 1974) for an NWS Center. Uwe Radok provided copies of his memorandum of invitation for a Climate Clinic, its Terms of Reference, and the report of the Clinic. George Kukla kindly provided a copy of the letter to President Nixon and subsequent responses from the Department of State, Bureau of International Scientific and Technological Affairs.

[Note: The authors corresponded with individuals who were active during the 1970s, and had knowledge of events that led to the formation of the CAC. In some cases they conducted extensive interviews. Those interviewed include Don Gilman, Ed Epstein, Joseph Fletcher, John Perry, Eugene Bierly, Eugene Rasmusson, Jay Winston, Uwe Radok, William Sprigg, Norman Canfield, Robert White, and Phillip Arkin. The authors also read numerous Congressional hearing reports in researching the origins of CPC.]

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The National Climate Program Act became Public Law 95-367 (Library of Congress Law Library (Public Laws 95-355, fiche 7)(USC 2901) September 17, 1978.

On this date, President Carter signed H.R. 6669, the National climate Program Act. "Purpose of Congress in this Act is to establish a national climate program that will assist the Nation and the world to understand and respond to natural and man-induced climate processes and their implications."

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