These political stakes energized meteorology, and not merely as a CIA trick. When John F. Kennedy became president early in 1961, he saw the weather as a potential realm of cooperation with the Soviet Union, both for practical and symbolic reasons. In a story recounted by Michael O'Brien in his biography of Kennedy, one rainy afternoon the president was quizzing his science advisor, Jerome Wiesner, about the technical details of nuclear tests, trying to understand their environmental consequences and looking for a way to stop the cycle of test-for-test in which the Americans and Soviets were engaged. How, Kennedy asked, did fallout in the atmosphere return to the earth?

"It comes down in rain," Wiesner said.

"You mean there might be radioactive contamination in that rain out there right now?" Kennedy asked, staring out the window of the Oval Office. This frank and profound realization—we all live beneath the same sky—soon appeared in Kennedy's rhetoric and policy. Global meteorology held a natural appeal for him. It was a realm in which "the superpowers could collabo-

rate, and everybody would benefit while they eyed each other off politically at other levels," as John Zillman, a former head of the Australian Weather Bureau, put it to me. It satisfied Kennedy's scientific ambitions, while complementing the civilian space and military missile efforts. And it was well poised between the new globalism of the burgeoning jet age, and the technological and geopolitical ambitions of the superpowers.

That April, the Soviet Union succeeded in sending into orbit cosmonaut Yuri Gagarin, who became the first man in space. Six weeks later, Kennedy responded. "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth," he pronounced to a joint session of Congress, in some of the most famous words of his presidency. But putting a man on the moon was only the first point in a speech on "Urgent National Needs." Point number two was the development of a nuclear-powered rocket, for exploration "perhaps beyond the moon." Point three was $50 million for communications satellites. And point four—now forgotten—was $75 million to "help us give at the earliest possible time a satellite system for worldwide weather observation." The phrase "worldwide" was crucial. It was partly a nod to America's imperial ambitions of global hegemony, but it also showed that meteorologists' dreams of a "perfect system of methodical and simultaneous observations," as John Ruskin had put it, would soon be government policy.

Wiesner commissioned the Norwegian meteorologist Sverre Petterssen—the Bjerknes assistant—to write a report on the potential of the "atmospheric sciences" for the coming decade. Among Petterssen's recommendations was the creation of a Na-

tional Center for Atmospheric Research, which would be built in Boulder, Colorado. But Petterssen also made it clear that in addition to cooperation at the national level among major universities, there would have to be cooperation at the international level among weather services. In a speech to the United Nations General Assembly in September 1961, Kennedy again used the aspiration of global weather observation to redirect Cold War tensions away from a destructive missile race and toward more productive scientific endeavors. "Today, every inhabitant of this planet must contemplate the day when this planet may no longer be habitable," he said. "Every man, woman and child lives under a nuclear sword of Damocles, hanging by the slenderest of threads, capable of being cut at any moment by accident or miscalculation or by madness. The weapons of war must be abolished before they abolish us." The list of steps Kennedy proposed to counter this threat of annihilation included the signing of a nuclear test-ban treaty and the establishment of a UN peacekeeping force, both lasting ideas. And then, once again, weather got the last bullet point. In a sentence that could have been removed without anyone noticing, he added: "We shall propose further cooperative efforts between all nations in weather prediction and eventually in weather control."

This footnote in political history became a transformative moment in meteorology. In the years after World War II, the International Meteorological Organization had been reconstituted as the World Meteorological Organization, before becoming a specialized agency of the United Nations, along with its sister agencies the World Health Organization and the International Telecommunications Union. As with the UN more broadly, the

WMO would benefit from the American moment. In 1962, Harry Wexler worked with his Soviet counterpart, Viktor Bugaev, on a report proposing a "World Weather Watch." It would be not only "a coordinated plan for the making of observations" but a calculated effort to communicate those observations automatically and systematically, to process them into "analyses and prognoses," and then to distribute them back to "services which desire them." There would be three systems in this system: A Global Observing System, a Global Data Processing System, and a Global Telecommunications System.

The WMO held its congress every four years in Geneva, and at the next one, eighteen months later in April 1963, the idea took hold. "The concept of the World Weather Watch (WWW) was generally commended as an exciting development," the general summary of the congress recorded, in what counts as diplomatic enthusiasm. Meteorologists from all over the world got busy creating tall stacks of paper, hammering out the details. Over the next decade, dozens of World Weather Watch planning reports were published, including twenty-five in 1967 alone. Their titles point to the breadth of the effort to build a global observing system brick by brick. It was similar in spirit to the effort a century earlier in Vienna, at the first meeting of the International Meteorological Organization, but made newly complicated by all the technological tools now at their disposal. Beginning with Report 1—"Upper air observations in the Tropics"—they went on to address every aspect of observation, transmission and processing of data. There's Report 7, "Meteorological observations from mobile and fixed ships"; and Report 16, "Planning of the Global Telecommunication System."

What's astonishing in reading over them is how deliberately the system was designed. More than merely tying together existing national systems, there was a conscious effort by scientists—on both sides of the Iron Curtain, in all corners of the earth—to design an integrated and coordinated apparatus. It would be, as Paul Edwards described it, "a genuinely global infrastructure that produces genuinely global information." Its core idea was open and equal access to weather information, for operational and experimental use. In theory, at least, the only cost of entry for any nation, however small, was the purchase of a teletype machine. And using technology known as APT—for "automatic picture transmission"—anyone with a small and relatively inexpensive receiver could also have access to the latest satellite imagery as well. By 1975, one hundred weather bureaus around the world had the capability. Having an eye in space revolutionized meteorologists' ability to warn of storms, just as Harry Wexler had dreamed.

The only caveat written into the charter was that the World Weather Watch be used for peaceful purposes only. The UN proper might have been overwhelmed by the festering tensions of a world divided between East and West, but the weather diplomats were insistent on the borderlessness of the atmosphere. This was bold of them, given the technology on which they relied. Weather satellites were so expensive that they could be justified only on national security grounds. Mostly this limitation was technological: The innovation they required overlapped significantly with both intercontinental missiles and spy satellites. But it was also political: The jingoistic appeal of satellites was also a function of how they overflew the whole earth, without

regard for the borders below—overturning the historical understanding of sovereignty and territory.

Satellites were a global technology offering a global view, but they were owned and operated by individual nations pursuing national goals. Getting the most out of them required cooperation between nations. To be properly calibrated, a satellite needed corresponding surface observations over a wider geographic scope than ever before, and with more consistency in their distribution. "An accelerated effort to acquire additional conventional data is necessary in order to achieve maximum benefit from data from meteorological satellites," the WMO authors dryly noted. In a satisfying feedback loop, the arrival of weather satellites ironically drove the expansion and coordination of surface observation networks. The technological push that had begun during the war to collect weather observations from new realms, using new technologies, had turned back on itself, so that the new tools needed the old stations. It was just the push meteorologists needed to upgrade, rationalize and organize the existing surface networks. By the 1970s, the newly integrated Global Observing System was closer than ever before to the "perfect system of methodical and simultaneous observations" of which meteorologists had long dreamed.