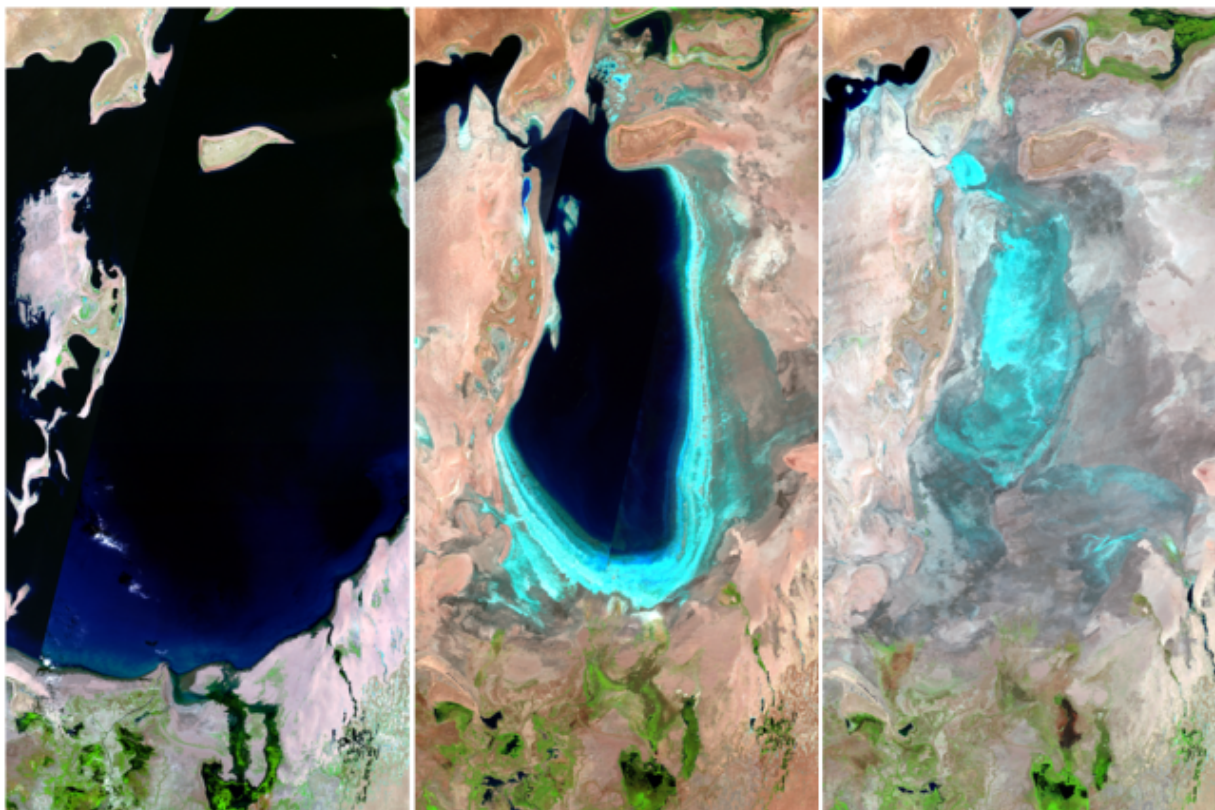


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The MEDEA Legacy: Darkened Data Shed Light on a Changing Planet and Environmental Security

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In 2018, California experienced its most destructive wildfires in history. Satellite imagery shared by NASA scientists helped firefighters track fires and map damage by comparing satellite images documenting changes to the Earth's surface. These types of images existed for decades but were classified for military purposes until the government program MEDEA identified their potential benefit and advocated for public access in the 1990s. According to former National Oceanic and Atmospheric Association (NOAA) Chief Scientist and MEDEA member Richard Spinrad, "the systems that might be used for early detection of a missile launch may work equally well for detection of wildfires."

MEDEA was a joint program between the United States intelligence and scientific communities in which the nation's top Earth scientists reviewed classified reconnaissance satellite imagery from the Cold War to determine environmental applications and facilitated declassification of vast amounts of Earth monitoring data for scientific purposes. Through personal interviews, former MEDEA members provided their perspectives on the program's history, emphasis on collaboration, and impact on environmental security.

A Brief History

Around 1992, the Environmental Task Force, MEDEA's immediate predecessor, was created to review Cold War spy satellite imagery to determine whether "that classified information could help on particular scientific questions," said D. James Baker, former Administrator of NOAA and MEDEA co-founder. Around 1994, the Environmental Task Force evolved into MEDEA.

"Satellite assets were applied to look at the environmental issues, [which had] never been done before," said Linda Zall, Central Intelligence Agency (retired) and former Director of the MEDEA Program. Initially, the imagery and data were highly classified and viewed by MEDEA scientists in spy-proof bunkers, according to William Schlesinger, President Emeritus of the Cary Institute of Ecosystem Studies. MEDEA "initiated the argument that some of the older classified data could be declassified and released," said Jeff Dozier, Distinguished Professor Emeritus at the University of California at Santa Barbara and MEDEA co-founder.

MEDEA began helping to identify data for declassification and recommended lower-resolution imagery in open-source databases for research purposes. Thomas McCord, Director and Senior Scientist at the Bear Fight Institute and a former NASA scientist, published the first scientific paper using classified military satellite data and emphasized the importance of communicating MEDEA's "findings to the general science community." As time went on, the focus of MEDEA shifted toward using the data to understand national security implications of environmental change.

Declassification

MEDEA's accomplishments included declassification of two major data sets: the Cold War reconnaissance satellite programs and the Global Fiducials Program, which acquires long-term imagery of environmentally sensitive sites worldwide. Both programs provided decades of comparative data, which can show "large-scale changes in the land surface, which is of interest to a wide variety of scientists who study the Earth's surface," said Stephen Pacala, Frederick D. Petrie Professor of Ecology and Evolutionary Biology at Princeton University. MEDEA supported open-source satellite imagery, but only where national security would not be jeopardized. The intelligence community instituted safeguards to prevent declassified data from leaking strategic military and technological details.

Relationship Between Intelligence and Scientific Communities

The relationship between the intelligence and scientific communities was a "two-way street" with both parties sharing knowledge, said John Orcutt, Distinguished Professor of Geophysics at the Scripps Institution of Oceanography at the University of California at San Diego. "We knew about the environment, and it was possible by having a good, open conversation...to transfer knowledge and data in both directions without compromise." The intelligence community helped MEDEA access data to reciprocally inform national security. "We became aware of the potential national security implications of climate change, and thus we needed the MEDEA

scientists to advise us on where and how fast we could expect to see the effects of climate change globally,” said Zall. “The more knowledge they gained from access to our data sets, the better they could advise us.”

MEDEA had access to wide arrays of reconnaissance data, collaborating with the intelligence and defense communities to analyze and report on global environmental changes and climate effects on populations, such as deforestation and arctic sea ice decline. For example, “submarines under the ice could determine their depth and then measure the distance to the underside of the ice; the satellites could measure the ice top profile; hence one could approximate ice thickness,” said Paul Gaffney, Vice Admiral (retired) and President Emeritus of Monmouth University.

There was an “astonishing trove of information,” according to Anthony Janetos, Director of the Frederick S. Pardee Center for the Study of the Longer-Range Future at Boston University. “MEDEA,” he said, “evolved into what seemed like an in-house think tank on environmental issues for the intelligence community.” The scientific and intelligence communities relate to data in different ways. “The intelligence community collects and analyzes information to address their problems which tend to be very short-term. As a result, their data are most useful to them immediately,” said NASA Emeritus Scientist Robert Bindschadler. “For science, it’s pretty much the exact opposite,” he explained, “that a lot of our data is more valuable over time.”

Working with the Russians

Following the fall of the Soviet Union, the U.S.-Russian Joint Commission on Economic and Technological Cooperation, known as the Gore-Chernomyrdin Commission, brought MEDEA scientists and top Russian Earth scientists together to collaborate and share declassified data. From 1995 through 2000, the Russians shared extensive data they collected in the Arctic Ocean, also a MEDEA research area. “We merged the data together,” noted Gaffney, and “in the end, both sides had a more complete view” of the Arctic climatology. Baker described working with the Russians to release 1950s satellite data of the slowly shrinking Aral Sea, so scientists could “watch the shrinking and then decide what really caused” the changes. Robert Corell, former Assistant Director of the National Science Foundation for Geoscience, acknowledged that the commission was a remarkable collaboration which “would be totally impossible today.”

National Security Applications

People in the intelligence community considered their participation as serving their nation, said Steve Wofsy, Abbott Lawrence Rotch Professor of Atmospheric and Environmental Science at Harvard University, adding that “climate change issues, and some pollution issues too, were potentially going to have impact in the geopolitical sphere.” The Soviet Union and other countries, including the United States, “got rid of a lot of World War II munitions by simply dumping them” in oceans, especially in the Arctic, said Orcutt, “so we looked at...damage from these munitions.” For countries pledging to reduce carbon emissions under the Kyoto Protocol, MEDEA studied how satellite assets could validate their greenhouse gas emissions reporting,

said Dozier.

“If there is a drought, if there is an extreme weather event,” said Zall, “and there is transnational migration as a result, that’s a national security issue.” Environmental monitoring of particular regions over time highlighted areas vulnerable to political destabilization and national security implications. “Both India and Pakistan have nuclear weapons and large populations. A significant reduction in available water coming out of the Himalayas could result in many people being displaced,” said Bruce Molnia, Senior Science Advisor for National Civil Applications at U.S. Geological Survey. “There was an emerging awareness in the intelligence community that changes in weather and climate were having an increasing impact on geopolitical factors that are their bread and butter,” said Bindschadler.

Although the program ended in 2015, the relationships MEDEA fostered between the scientific and intelligence communities created a legacy of collaboration and knowledge sharing. Continued longitudinal data collection and open-source access are equally important. As Bindschadler said, “You can never go back and measure the world as it was yesterday.” MEDEA’s efforts will continue to contribute to global understanding of accelerating climate change and its impacts on environmental security worldwide.

Photo: Global fiducial satellite photos show the shrinking Aral Sea between 1987 and 2014. From left to right: 1987, 2006, 2014. Source: U.S. Geological Survey and NASA.

Sources: American Geophysical Union, “Bombs, Bugs, Drugs, and Thugs” by Loch Johnson, Center for a New American Security, Center for Strategic and International Studies, Central Intelligence Agency, CNA Corporation, Defense Technical Information Center, Department of Defense, Eos, Harvard University Center for the Environment, House Permanent Select Committee on Intelligence, House Select Committee on Energy Independence and Global Warming, Institute for Defense Analyses, Institute of Geophysics and Planetary Physics, International Space University, Internet Archive Wayback Machine, Journal of Geophysical Research, MEDEA, National Academies of Science, National Aeronautics and Space Administration (NASA), NASA Earth Observatory, National Fire Fighter Corp., National Research Council, RAND, Ret. Vice Admiral Paul Gaffney II, SAGE, SANDIA, Scripps Institution of Oceanography, “Space Warfare” by Nordin Yusof, Thomas Fingar, United Nations Framework Convention on Climate Change, United States Geological Survey, US Global Change Research Program

Topics: climate change, data, development, environment, featured, military, NASA, security, U.S.

