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OPEN RIVERS : RETHINKING THE MISSISSIPPI

# WATER, ART & ECOLOGY



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from multiple perspectives within and beyond the academy.

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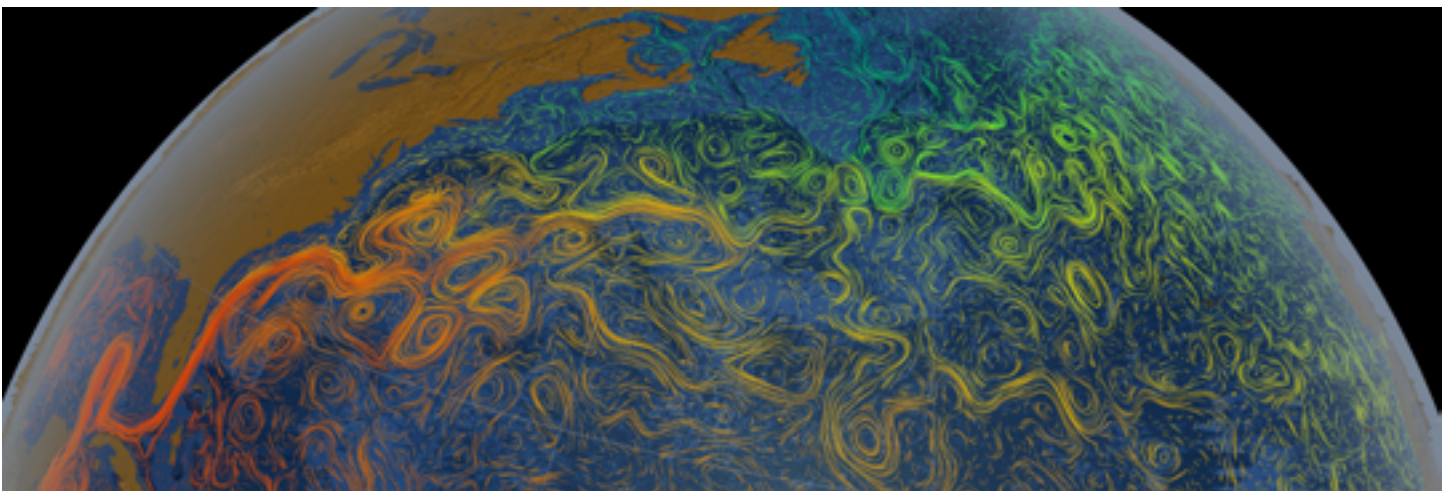
## MAPPING OCEAN CURRENTS

By Emily Clare Casey

How can a map visualize a water current—something that is powerful and physically palpable, but that lies beneath the surface and is largely invisible to the eye? In a recent map, scientists at the National Aeronautics and Space Administration (NASA) represented the course of the Gulf Stream in the Atlantic Ocean through swirls of vibrant color denoting its thermal temperature (Fig. 1). The Gulf Stream is a warm ocean current that flows north from the Gulf of Mexico, along the east coast of the United States, to an area off the southeast coast of Newfoundland, where it joins the North Atlantic Current. Its central location has facilitated or hindered transatlantic passage for centuries, making knowledge of the Gulf Stream indispensable to navigators. Even before advanced technologies of thermal mapping and computer-generated imagery were available, mapmakers and scientists grappled with the problem of how to represent phenomena like currents with the tools they had. In the eighteenth century, American polymath

Benjamin Franklin turned his attention to this problem and created one of the earliest known maps of the Gulf Stream.

Franklin’s “Map of the Gulf Stream” was developed over nearly two decades of Anglo-American conflict, first published in 1768 in England, then in France in 1785, with a final version created in 1786 in Philadelphia at the close of the American Revolution (Fig. 2). Franklin printed the 1786 version of the map in the proceedings of the American Philosophical Society. Accompanying it was his essay, “Maritime Observations,” written in the form of a letter to a French scientist colleague Alphonse Le Roy. In the text, he established his authority in addressing maritime matters through the self-deprecating declaration that, “the garrulity of the old man has got hold of me, and as I may never have another occasion of writing on this subject, I think I may as well now, once for all, empty my nautical budget, and give you all the thoughts that have in my various long



*Figure 1, “Ocean flows colored with sea surface temperature data,” NASA/Goddard Space Flight Center Scientific Visualization Studio.  
<https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=3913>.*

voyages occurred to me relating to navigation” (Franklin 1786). While earlier renderings of the map superimposed the Gulf Stream onto large, pre-existing maps of the entire Atlantic, this version shows a close view of North America and the branch of the Gulf Stream that runs along its coast, to Greenland. Based on Franklin’s own

observations of sea conditions during his many voyages between North America and Europe as a diplomat, and drawing on the knowledge of New England sea captains among his acquaintances, the map artfully blends Franklin’s scientific and political interests.

# Mapping Currents

Franklin responded to the problem of representing a current by combining an abstracted representation of flowing water with common symbols from hydrographic charts. At the center of the map, the Gulf Stream cuts across a simplified representation of the North American Atlantic coast like a sinewy arm. Curving from

the lower left edge of the page to the bottom right corner, a collection of densely engraved lines suggests the ocean’s flow. Arrows and notations of “minutes”—a method for measuring distance in nautical miles—indicate the current’s direction. Ships dotted along the stream and just outside it



Figure 2, “A chart of the Gulf Stream,” Benjamin Franklin, James Poupard, engraver. Appears in “Maritime Observations” in the *Transactions of the American Philosophical Society*, 1786. Library of Congress Geography and Map Division, Washington, D.C.

illustrate the methods of navigating the current discussed in the text.

In “Maritime Observations,” Franklin describes how, as post-master general in the 1750s, he had been intrigued by discrepancies in arrival times between ships sailing from England to the American colonies. This prompted him to make inquiries of a Nantucket sea captain—his cousin Timothy Folger—who brought to his attention a band of water along the northeast coast of

America with a strong directional flow and a distinct change in temperature. Folger explained to Franklin that those ships traveling from England who attempted to “stem” the Stream—that is sail within it, against its current—met with delays while those who simply “crossed” it reached American shores much sooner. Although this phenomenon was familiar to New England whaling crews, it was relatively unknown among sailors navigating British merchant and navy ships.

## Mapping Politics

Writing that “it was a pity no notice was taken of this current on the charts,” Franklin intended his own map of the Gulf Stream’s contours to be a transatlantic offering for the benefit of all nations. The methods for describing the course and nature of the Gulf Stream in the map and accompanying text ultimately extends beyond scientific observation to project ideas about the place of the United States in the Atlantic World. Through its focus on environmental phenomena, Franklin’s map naturalizes transatlantic circulation as a human as well as ecological imperative. The text makes an explicit link between the course of the Gulf Stream and the commercial networks between Europe, Africa, and North and South America. Significantly, in a period when European and British imperial powers used naval force and commercial blockades to limit American access around the Atlantic, and in the Caribbean in particular, an image of the continuous and free circulation of ocean currents had a political and cultural subtext. It implies the inevitable continuation of an interconnected Atlantic world after United States independence by envisioning it as an ecological as well as a political network. The fact that the Gulf Stream runs north along the North American coast and then east to Europe underscores the importance of the United States within this network as it imagines the current moving out from the new nation. Acting as a

doorway to the United States, through which European traders were required to cross in their voyages across the Atlantic, the current insists on the significance of U.S. ports along the trading routes of the Atlantic world.

Details in the map shape Franklin’s argument. While the main illustration of the Gulf Stream focuses on its course along the eastern coast of the United States, the inset map in the upper left pictures the complete flow of Atlantic currents circulating in the ocean. Here, ocean currents move continuously around the island of Great Britain, past the shores of Europe and Africa, and then up the coast of the United States. Close inspection reveals that the marks reproducing this circum-Atlantic current are in the form of small fish, vigorously swimming around the ocean, propelled by the directional flow of water. The map’s subject matter and mode of representation therefore combine to emphasize Atlantic circulation. Importantly, it visualizes this circulation of fish and ships as rotating centripetally around not a political power, but an environmental body: the sea. In this way, the form of the current imagines a global arena for transnational exchange that is not controlled by a single nation, but founded in an environmental system available to all. For the United States, keen to assert belonging in the

world of global trade, such an inclusive message was particularly important.

The map's cartouche, a small inset scene featuring the title inscribed on a rock face, further promotes the prominence of the United States within this maritime sphere. On either side of the inscribed monolith, we see the figure of Franklin—identifiable by his profile and eighteenth-century clothing—in conversation with a crowned merman with a trident, representing Neptune, an allegorical figure of the sea. Neptune

appears to be providing Franklin with a first-hand account of the Atlantic's mysteries, as if knowledge of the Gulf Stream allows the ocean to speak more clearly to its navigators. British prints traditionally represented Neptune with Britannia, the symbolic representation of the empire in female form. These pairings implied that Britain's celebrated naval and mercantile might was natural and approved by the sea itself. Adopting this trope for his own purposes, Franklin's replacement of Britannia with his own portrait makes a similar claim for the early United States.

## Mapping Culture

Franklin's choice of publication venue is central to his ambitions for the map beyond geographic utility. Franklin helped found the American Philosophical Society in the eighteenth century as an institution to promote American contributions to the intellectual culture of the Atlantic world. In the years after the Revolution, its members encouraged the economic and cultural development of the new United States through their scientific and technological innovations. They aspired to elevate the country as an equal participant in a transnational community of learned societies by sharing their discoveries in astronomy, anthropology, the natural sciences, and other fields. The political and scientific aims of Franklin's map correspond with the mission of the American Philosophical Society by asserting the importance of the United States in the Atlantic flow of goods, bodies, and knowledge propelled by the Gulf Stream. The second volume of *Transactions*, in which Franklin printed his "Maritime Observations," also traveled this route, broadcasting American intellectual pursuits to foreign ports and physically carrying Franklin's map along the current it represents.

In 1799, Jonathan Williams, Jr., Franklin's nephew, expanded upon his uncle's research in order to further explore the dynamic nature of

the Gulf Stream. His essay on "Thermometrical Navigation," also printed in the *Transactions of the American Philosophical Society*, incorporated water temperature data collected by Williams during Franklin's final transatlantic voyage. Williams theorized that sailors could navigate ocean currents by temperature alone, rather than by the stars or other visible markers (Williams 1799). While Williams' theory over-simplified the importance of temperature to understanding the sea, NASA's present-day thermal visualization of ocean currents exhibits the ongoing imperative to find new, creative means to document and visualize the Gulf Stream. Williams's early measurements suggest the relationship between Franklin's "Map of the Gulf Stream" and the oceanographic technologies of our own day. In so doing, they offer context for understanding how scientists and seafarers concerned with the benefits of maritime circulation might picture an ocean current's fluid dynamic. In their attempts to document and make visible an elusive, yet powerful, natural conduit, both maps demonstrate the importance of environmental forces in propelling or impeding economic trade, communicating information, and projecting political agendas in the Atlantic world.

A version of this paper was presented on a panel titled “Fluid Currents: Water, Art and Ecology” at the 2015 Southeastern College Art Conference in Pittsburgh.

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## About the Author

Emily Clare Casey is a doctoral candidate in the history of art at the University of Delaware. Her dissertation, “Waterscapes: Representing the Sea in the American Imagination, 1760-1815,” explores how eighteenth-century British Americans visualized their place in a global world through representations of the sea in art, literature, and material culture. She is the 2016-2017 Sylvan C. Coleman and Pam Coleman Memorial Fund Fellow at the Metropolitan Museum of Art.