MARINE GEOLOGY

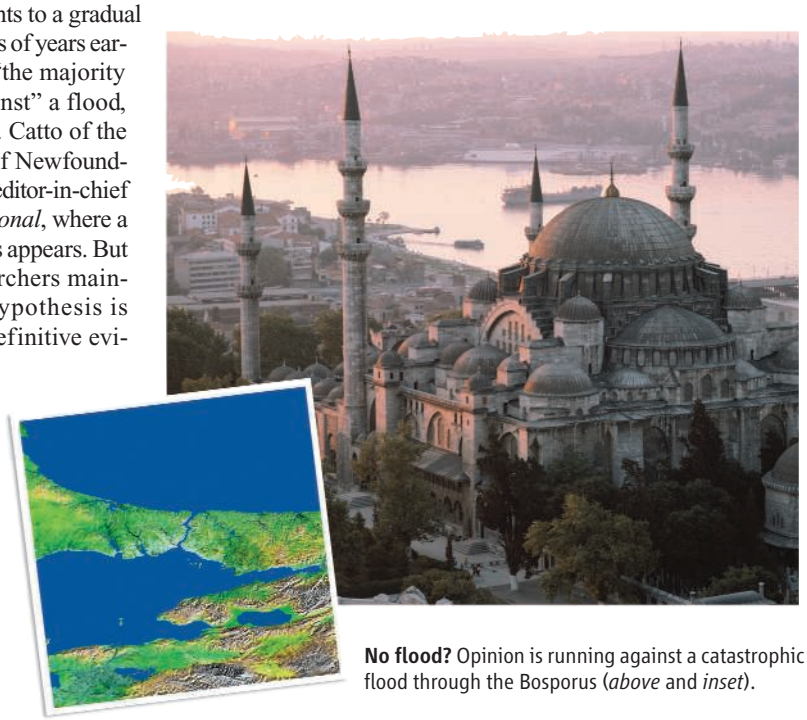
# Support Is Drying Up for Noah's Flood Filling the Black Sea

It was a hypothesis of biblical proportion: In 1997, two marine geologists proposed that a cataract with the power of 200 Niagaras filled the Black Sea 8400 years ago, driving Neolithic farmers into Western Europe and inspiring the story of Noah's flood (*Science*, 20 February 1998, p. 1132). Now, 10 years later, a torrent of research is still arriving, and almost all of it comes down hard on any Black Sea flood.

The proffered geologic evidence for a catastrophic event was misinterpreted, researchers write in more than 1000 pages of papers, and the raft of data collected around the Black Sea the past 50 years all points to a gradual filling starting thousands of years earlier. Putting it mildly, "the majority wisdom would be against" a flood, says geologist Norm R. Catto of the Memorial University of Newfoundland in St. John's. He is editor-in-chief of *Quaternary International*, where a new collection of papers appears. But a small cadre of researchers maintains that the flood hypothesis is sound and hints that definitive evidence is in the offing.

The latest surge of research comes in 15 papers in the June issue of *Quaternary International* and 35 papers in a 971-page book, *The Black Sea Flood Question*, published earlier this year by Springer. The new papers agree that the archaeological record shows no sign that people living around the Black Sea 8400 years ago fled from a rapidly advancing sea. "At this point, there just isn't any evidence for something big and catastrophic" in the archaeological record, says archaeologist Allan Gilbert of Fordham University in New York City, an editor of the new book. One apparent piece of supporting evidence—the discovery of the remains of a wood-and-mud house littered about with stone tools 91 meters beneath the Black Sea (*Science*, 22 September 2000, p. 2021)—has not panned out. "It looks peculiar," says Gilbert, but there's no sign it's anything more than a random bunch of rocks and sticks.

Then there's the geologic evidence used to gauge the depth and salinity of the Black Sea over the past 15,000 years. The tools include drowned beach dunes, seismic probing of bottom muds, oxygen isotopes, microscopic fossils, and pollen. Citing such data, the originators of the flood hypothesis—longtime marine geologists William Ryan and Walter Pitman of Lamont-Doherty Earth Observatory in Palisades, New York—have argued that 10,000 years ago, the Black Sea was a modest-sized lake lying perhaps 100 meters below its current level. It was cut off from the salty Mediterranean Sea, they say, because sea level was too low to spill through the Bosporus. When melting glacial ice raised sea level, the Black Sea basin filled up in a geologic instant about 8400 years ago.



**No flood?** Opinion is running against a catastrophic flood through the Bosporus (*above* and *inset*).

But most of the authors of the book consider that scenario "a myth," e-mails another editor of the book, Valentina Yanko-Hombach of the Avalon Institute of Applied Science in Winnipeg, Canada. The Black Sea, she says, was never that low, and it rose gradually over millennia.

Not so fast, says coastal geologist Liviu Giosan of Woods Hole Oceanographic Institution in Massachusetts. Giosan, a native Romanian who studied oceanography in that Black Sea coastal country, has reviewed the new book for *Quaternary Science Reviews* and found it wanting. In particular, he says, the "vast amounts of data" collected around the Black Sea by Soviet scientists and researchers from former communist countries around the Black Sea are suspect. He distrusts much of the carbon-14 dating of lake levels and is frustrated by the traditional lack of access to primary data. As a result, he writes, "many conclusions of studies presented in the book should be considered with a grain of salt" until researchers buttress them with more-direct measures of lake level.

Lately, geologists are in fact looking at more direct sea-level gauges, as well as geologic indicators of past flow through the Bosporus. Richard Hiscott and Ali Aksu of Memorial University of Newfoundland and colleagues have reported several signs that the Black Sea filled slowly and gently. In the *Quaternary International* issue, they describe a core from the shallow Black Sea shelf that contains sediment laid down beneath tens of meters of water when Ryan would have that spot high and dry. On the Black Sea floor just north of the Bosporus, they have mapped old beach ridges and lagoons formed as the lake level slowly rose. And south of the Bosporus, they found a delta built by outflowing waters 10,000 years ago, when Ryan's scenario would have the Black Sea totally cut off.

Ryan and a half-dozen colleagues disagree. "I've found myself following those who criticize the flood," says Ryan, "getting my own data from their sites, and in every case finding a very different story." Where Hiscott and Aksu find a delta built by Black Sea outflow, Ryan and colleagues find a delta formed by a nearby river, as they will soon report in *Marine Geology*. As for the putative beach ridges, Ryan says unpublished coring results show they are actually mud brought in by bottom waters still flowing through the Bosporus today. He also speaks of an as-yet-unpublished description of "an extraordinary debris fan" right where the flood would have dumped its gougings. Erosional features there bear a striking resemblance, he says, to those created by catastrophic outbursts from glacial lakes (*Science*, 20 July, p. 307).

Despite the continuing debate, Giosan, who has worked with Ryan, is guardedly optimistic. "There is momentum toward solving this," he says. "Maybe we'll solve it someday."

–RICHARD A. KERR

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