

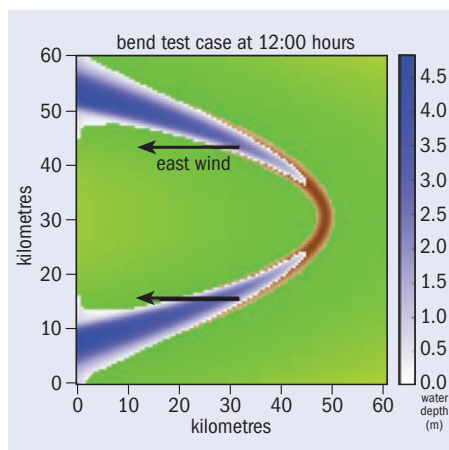
Compiled by John Swain, Northeastern University

Persistent strong winds could have parted Red Sea

Computer modelling has suggested a possible factual basis for the biblical story of the parting of the Red Sea. Carl Drews of the University of Colorado at Boulder and the National Center for Atmospheric Research (NCAR), and Weiqing Han, also of NCAR, have studied possible patterns of “wind setdown”, which is the drop in water level that can occur when strong winds act on a surface of water for an extended period of time. In particular, they investigated a site in the eastern Nile delta, where an ancient branch of the Nile flowed into a coastal lagoon along the Mediterranean, known as the Lake of Tanis.

Drews and Han found that a strong, easterly wind of 28 m/s (near hurricane force) blowing overnight could have pushed the water back at the U-shaped bend where the ancient river merged with the coastal lagoon. A land bridge some 3–4 km long and 5 km wide could have appeared for as long as four hours. People could then have crossed the exposed mudflats before the water rushed back to cover them again after the wind stopped.

The work is part of a broader study of how winds can affect water depths, including the effects of typhoons. However, this study could also help archaeologists to identify places to look for evidence that the biblical story corresponds to an event that actually took place. Similar events have been recorded, including in the eastern Nile delta in 1882.



In this idealized case for the bend of water at Lake Tanis, green represents land surface, white and blue represent water, and brown represents exposed lake bottom. The wind blows from the right at 28 m/s for 12 hours and wind stress is uniform over the entire domain. The channel is originally 2 m deep and the banks are 1 m high, comparable to lakes and rivers in the Nile delta during spring.

• For videos, see www2.ucar.edu/news/parting-waters-computer-modeling-applies-physics-red-sea-escape-route.

Further reading

C Drews and W Han 2010 *PLoS ONE* **5**(8) e12481, doi:10.1371/journal.pone.0012481.

Predicting tipping points

The patterns in fluctuations of a population can indicate if it is about to go extinct, according to work by John Drake of the University of Georgia in Athens and Blaine Griffen of the University of South Carolina. The researchers have based their study on the fact that statistical mechanical systems respond more and more slowly to perturbations as they reach a critical point – a well known phenomenon called “critical slowing down”. The basic idea is that fluctuations of a system can be used as perturbations, so that the

essential information is in the frequency spectrum and variance of those fluctuations.

Drake and Griffen have verified this theory in a laboratory study of extinction in plankton populations. In addition to its obvious value in ecology, the method suggests a general approach for indicating when a system is about to undergo a catastrophic transition.

Further reading

John M Drake and B D Griffen 2010 *Nature* **467** 456.

Touch eases pain

Grabbing an injured part of your body can reduce a sharp pain but it works best if you grab it yourself rather than have someone else do it for you. The reason for this has now been studied by Marjolein Kammers of the University of London and colleagues.

The team used the “thermal grill illusion” in which putting a subject’s middle finger in cool water and the fingers on either side into warm water creates a painful heat sensation in the middle one. They found that pushing the same three fingers of both hands together immediately afterwards reduced pain levels by 64% but the contact had to be complete and involve both hands.

Using a variety of different types of touch, the researchers discovered that the pain reduction appears to be linked to coherent information transfer across the whole body – it seems that we need to connect the affected part to a remote one. The work has obvious implications for the treatment of pain but it also shows why you do what you do when you hit your hand with a hammer.

Further reading

MPM Kammers et al. 2010 *Current Biology* **20** 10.1016/j.cub.2010.08.038.

Making light of opaque matter

Light passing through complex materials, such as biological tissues, can undergo such thorough multiple scattering that even though it gets through, any image is so degraded as to render the media effectively opaque. Now Sylvain Gigan and colleagues of the Institut Langevin in Paris and the Universities of Paris 6 and 7 have shown that measurements of the complex scattering matrix can invert the multiple scattering. This allows them to “see” an arbitrary object through such opaque media. The technique will work with any degree of complexity of scattering and could find applications in biology and medicine.

Further reading

S Popoff et al. 2010 *Nature Communications* **1** doi:10.1038/ncomms1078. arxiv.org/abs/1005.0532.