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New tsunami warning

60 million people in the Bay of Bengal may be at risk.

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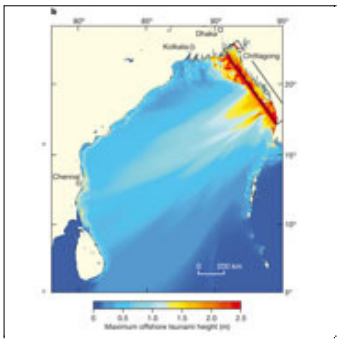

The modelled height of a tsunami that likely hit in 1762(red = 2.5m).

The densely-populated Bay of Bengal looks to be at risk from very large tsunami-producing earthquakes, according to a new analysis of modern and historical observations.

Phil Cummins, a seismologist at the national Geoscience Australia agency in Canberra, who publishes the analysis today in *Nature*[1], is quick to say that his ideas need confirmation before "policymakers start doing anything". But with the 2004 Indian Ocean tsunami fresh in everyone's mind, his conclusions are likely to raise the hairs on the back of a few necks.

The northern Bay of Bengal was formerly thought to be an unlikely place for the large earthquakes that result when tectonic plates that are pushing against one another suddenly wrench, with one plate slipping below the other. These 'megathrust' earthquakes can cause tsunamis, as water is suddenly displaced up and down by the thrusting rock. The plate boundary further south, off the coast of Sumatra, causes such quakes — one of which created the devastating 2004 wave.

Previous research has hinted that, further north, the plate boundary comes ashore in Myanmar rather than continuing up into the northern end of the Bay of Bengal, that the Indian Ocean plate is not subducting there, and that the land beneath Burma is instead moving north with the Indian continental plate. But the seismological and geological evidence for this is complex and open to interpretation.

Further west

Cummins favours the interpretation that that the plate boundary is actually some 100-200 kilometres further west. This puts it underwater, where it has the potential to create waves during a quake. He also argues that there is convincing evidence that the subduction zone is still active here.

If so, there is a 900-kilometre long earthquake-producing line running underwater from the northern tip of the Bay of Bengal towards the Andaman islands. Cummins modelled a quake on the northern part of this zone and found that 60 million people live within 10 metres of sea level in area that would be affected. In a conservative estimate, he concludes that more than a million lives are at risk — although a wave may not strike for hundreds of years.

Kerry Sieh, a seismologist at the California Institute of Technology in Pasadena, who works on the same area, calls the work "a very good advertisement for a problem that is unappreciated in the general community". While reiterating that the analysis is "open to question", he thinks Cummins is "probably right".

Captain's log

There is scant written evidence of previous tsunamis in the area, but Cummins' hypothesis is supported by the writings of British Captain Edward Halsted, who visited Cheduba Island, off the coast of what is now Myanmar, in 1841.

In between recording the islanders' habit of keeping their cigars handy in their ear piercings and an account of an interview with an 106-year old inhabitant (of whom he wrote that "not a tooth in his head was gone or apparently inclined to depart"), Halsted recorded the memory of and geological evidence for a very large earthquake with accompanying tsunami in 1762 that "washed to and fro several times with great fury and then retired from the grounds, leaving an immense quantity of fish, the feasting on which is a favourite story throughout the island."

"These British guys, it is amazing what they were interested in," says Cummins.

Both Cummins and Sieh suggest that more seismic data should be gathered with fine-resolution global positioning system instruments, and that more physical evidence of previous large earthquakes should be sought to confirm where the plate boundary is, and how it behaves.

Be prepared

Sieh worries that for Bangladesh, the country where perhaps the largest number of people could be affected, even confirmation of Cummins' ideas is unlikely to spur proper preparations. He has found the government there dispassionate

about earthquake or tsunami preparedness, he says. "No matter what we learn, given the current social and political situation, it will have no effect. And if an event occurs there will be half a million or a million people dead."

Gerard Fryer, a geophysicist at the Pacific Tsunami Warning Center in Ewa Beach, Hawaii, says the Bay of Bengal area is decidedly not prepared for a tsunami. "Everyone is really concentrating on central and southern Sumatra. That's where the new instruments are going in; that's where everyone expects the next big earthquake to occur," he says. "I don't think the Indian or the Bangladeshi governments are prepared."

"My initial reaction to the paper was disbelief," Fryer adds. "But then I saw it was by Phil Cummins, and Phil Cummins essentially predicted the 2004 Sumatran tsunami. So when he talks now, people listen."

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References

1. Cummins, P. *Nature* **449**, 75-78 (2007). | Article |

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