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Scientists voice tsunami concern

By Jonathan Amos

BBC News science reporter, San Francisco

A US scientist studying the islands off southern Sumatra says it is very clear the region can expect more big quakes and tsunami in the coming decades.

Prof Kerry Sieh is using a GPS network to monitor land movements close to the great fault line that ruptured to produce last December's disaster.

His work indicates there is still huge strain bound up in the fault, and that this could let go in the near future.

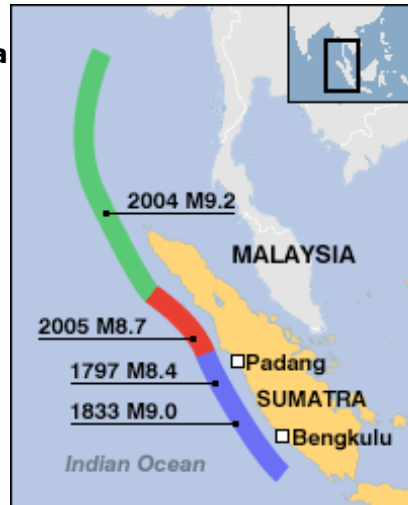
He believes the cities of Padang and Bengkulu may be at greatest risk.

"The time is now to start mitigating for such an event," said Kerry Sieh, who is attached to the California Institute of Technology's Tectonics Observatory.

"I don't know with certainty that it's going to happen but our team is telling people on the coast that they have to expect that this will happen in the lifetime of their children."

To the south

The 26 December quake of magnitude 9.2 stemmed from a rupture along the line where the Indian/Australian and Eurasian tectonic plates grind over each other.



The region of concern is moving southwards



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The associated tsunami wrought destruction throughout the Bay of Bengal, from Northern Sumatra to Thailand, Sri Lanka, and India.

It was followed by a magnitude 8.7 in March - with the rupture occurring further south along the plate boundary.



Coastal trees are being submerged as the strain accumulates

Prof Sieh, speaking here at the American Geophysical Union Fall Meeting, says the concern of scientists is now focused on events further south still, to a region known as the Mentawai islands patch.

This zone has experienced giant earthquakes about every two centuries, and is nearing the end of its earthquake cycle.

Coral rise

Prof Sieh says the strain building up in the region is evident from the behaviour of island coastlines - some are becoming submerged.

It is in the nature of tectonic plates that they do not glide smoothly past each other, as one dives under the other.

In fact, the plates move in "stick-slip" fashion, which means land at the leading edge of the overriding plate is pulled down briefly before suddenly slipping back up, generating a large earthquake.



After a quake, land that had been pulled down will pop back up

Surveys along northern Sumatra following the 26 December and 28 March events have revealed coral reefs that have come out of the water as land has thrust back up.

"When you look further to the south, the groves of trees and other coastal features are still sitting out in the water; they have not yet risen. So, we know the strain is still accumulating; our GPS network is telling us it is still accumulating," Prof Sieh explained.

"Our concern is that the next thing to happen will be ruptures."

Wave model

Prof Sieh says historical and coral records show the Mentawai islands patch experiences magnitude 8-plus quakes on a roughly 200-year cycle, and are accompanied by large tsunami.

"It appears that these giant earthquakes either occur singly

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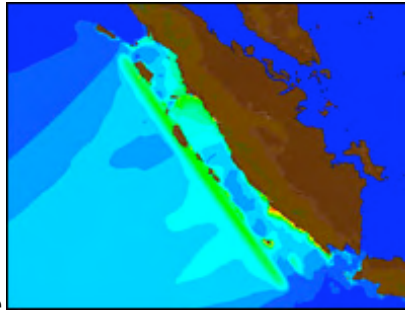
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or in couplets: singly in the 1300s and late 1500s, and as a couplet in the late 18th Century and early 19th Century; and the average time between those three sets is about 240 years."

Prof Stephan Grilli, from the University of Rhode Island, has modelled the tsunami that would result in the area from a magnitude 9.2 quake, the same as 26 December.



The modelling predicts up to 10m waves hitting the coast

"Our prediction for Padang and Bengkulu further south would be up to 10m waves hitting the cities," he told the AGU meeting.

Both Padang and Bengkulu are bigger cities than Banda Aceh which was destroyed in the 26 December tsunami. Like Banda Aceh, Padang is very low-lying.

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