

EXPLAINER

India–Pakistan nuclear rift: where could it lead?

India says ‘no first use’ nuclear policy could change. Pakistan calls the move ‘explosive’.

BY PRIYANKA PULLA

Nuclear tensions are escalating between India and Pakistan following the Indian defence minister’s announcement last month that India might revoke its current commitment to use nuclear weapons only in retaliation for a nuclear attack, known as ‘no first use’.

Some experts watching the situation have told *Nature* that the risk of a conflict between the two countries has never been greater since they both tested nuclear weapons in 1998.

“It’s very explosive right now, and I am really concerned it could get worse,” says Atta-ur-Rahman, a chemist at the University of Karachi in Pakistan and a science adviser to Pakistan’s prime minister, Imran Khan. Khan has talked up the risks of nuclear war between the two countries on several occasions since being elected a year ago.

Vipin Narang, who studies nuclear proliferation at the Massachusetts Institute of Technology in Cambridge, says that the statement from defence minister Rajnath Singh creates ambiguity in India’s no-first-use policy, and “essentially renders it meaningless”.

Satinder Kumar Sikka, a condensed-matter physicist who was part of India’s 1998 nuclear-weapons-testing team, argues that India should be able to use nuclear weapons if there is an increased risk of Pakistan doing so first. “If we are threatened by Pakistan, we have every right to retaliate,” he says.

Others caution against reading too much into the present war of words, emphasizing that neither a conventional war nor a nuclear conflict will be triggered just because of strong language from both sides.

Nature examines the background for the latest escalation, what it means — and what could happen next.

What is no first use and who else has adopted it?

Of the world’s eight declared nuclear-weapons states, only China and India have an unambiguous no-first-use nuclear-weapons policy. This is a commitment to use such weapons only in response to a nuclear attack — and never in retaliation for an attack using conventional weapons. Such a policy also includes comprehensive protocols in which activating nuclear weapons would only ever be a last resort.

India tested its first nuclear weapon in



India and Pakistan both tested nuclear weapons in May 1998.

1974, and the government committed to no first use in 2003, five years after conducting a second set of nuclear-weapons tests on 11 and 13 May 1998. The intention in declaring no first use was partly to help defuse tensions with its neighbour, which had responded to India’s second test with its own nuclear tests on 28 May 1998.

Over the past two decades, Pakistan has amassed 150–160 nuclear missiles to India’s 130–140, according to the Stockholm International Peace Research Institute. Moreover, both countries have advanced research and development in nuclear weapons and in ballistics.

India and Pakistan have been at loggerheads before: why is the current situation such a big deal?

When India’s defence minister said on 16 August that the country’s long-held no-first-use nuclear-weapons doctrine could change, “depending on circumstances”, this was not the first time a leading politician had floated the idea.

But the minister’s statement came at a time when the two countries’ governments are barely on speaking terms. A week earlier, India announced that Kashmir — a disputed northern region claimed by both India and Pakistan and currently divided into two areas administered by each country, respectively — would

no longer need a separate constitution from the rest of India. Indian-administered Kashmir would, moreover, be partitioned into two territories. A curfew and communications blackout followed in Indian-administered Kashmir, and is slowly being lifted.

Pakistan’s government has been trying to persuade the international community, through the United Nations, to censure India’s government. India’s opposition parties also object to what is happening in Kashmir. But India’s government, led by Prime Minister Narendra Modi, says that its changes will help Kashmiri society and the development of the area’s economy, and that neither country needs outside help to resolve their differences.

Relations have been on a knife-edge since February, when a Pakistan-based militant group, Jaish-e-Mohammad, claimed responsibility for the deaths of 40 paramilitary police officers in Indian-administered Kashmir. India responded with air strikes that hit targets inside Pakistan. For a few days in February, it did seem as if war would break out. Pakistan and India have previously fought wars over the region.

What might happen next?

Analysts say that a nuclear conflict — although closer — is still remote. But they also agree that rhetoric from both sides, combined with the possibility of even a small change to

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India's no-first-use principle, is not safe.

For example, if India firms up the change to its no-first-use policy, Pakistan might take this as a signal that India could pre-emptively strike at Pakistani nuclear installations, says Narang. And that might, in turn, prompt Pakistan to use all its nuclear weapons first. "And so, you get this destabilizing dynamic where as soon as the crisis becomes nuclearized, there is an incentive for both sides to go first," Narang says.

How likely are these scenarios?

Ramamurti Rajaraman, a physicist and emeritus professor at the Jawaharlal Nehru University in Delhi, calls the escalating rhetoric a

"war of words" that will not on its own lead to military action.

However, the increasing tensions, combined with references to nuclear conflict from both sides, mean that the two countries are now likely to have changed the status of their nuclear-weapons readiness from "peacetime" to "crisis", says Feroz Hassan Khan, who teaches security studies at the Naval Postgraduate School in Monterey, California.

In practice, this means moving the three main physical components of a weapon — the warhead, missile-delivery system and fissile-material core — either to be assembled or to get them closer to where they need to be, ready for launch. In peacetime, each component is kept

at a different location, for safety and security.

According to Feroz Hassan Khan, who worked on Pakistan's nuclear-weapons planning team in the early 2000s, such a state of readiness for a strike heightens the risk of a nuclear accident, but is not in itself a sign that war will happen.

But if there is another attack in India similar to that seen in February, India's armed forces might again respond with force. That would precipitate a reaction from Pakistan's military, prompting a retaliation from India. Unless one side voluntarily holds back, the prospect of such military escalation concerns analysts because it could eventually lead to strikes against nuclear targets. ■

GEOLOGY

Ocean drillers chart an ambitious new course

Geologists begin laying out a vision for the next phase of sea-floor studies.

BY ALEXANDRA WITZE

This month, off the coast of Ecuador, scientists are hunting for hot, teeming masses of microbes living in two long, skinny holes drilled into the bottom of the sea.

This cruise, aboard the legendary research ship *JOIDES Resolution*, is the latest in the five-decade history of scientific ocean drilling. The practice of boring holes in the sea floor has revolutionized Earth science, helping researchers to confirm the theory of plate tectonics, discover microbes deep in the ocean crust and probe the hidden risks of earthquakes and tsunamis. But to keep the field alive for years to come, scientists must now convince international funding agencies that there are discoveries waiting to be made.

The international agreement that governs scientific ocean drilling expires in 2023. Researchers from the 26 nations that participate in that framework, known as the International Ocean Discovery Program (IODP), will gather in Osaka, Japan, on 11 September to discuss how they might replace it. The scientists will hammer out a new list of scientific goals for the next phase of ocean drilling, from 2023 to 2050 — if they can convince funding agencies to pay for it.

IODP member nations collectively spend around US\$150 million a year to send researchers on drilling expeditions. "The stakes are really high if we want to continue scientific ocean drilling beyond 2023," says Anthony Koppers, a marine geologist at

Oregon State University in Corvallis.

At the Osaka meeting, scientists will debate whether to accept an ambitious draft research plan that draws on discussions at regional meetings held in IODP nations over the past year. "We have to dream, to really go for it," says Dick Kroon, a geoscientist at the University of Edinburgh, UK, who will chair the Osaka conference.

The plan calls for ships to drill regularly spaced holes across the world's oceans in an unprecedented effort to reconstruct the past

climate — and improve researchers' understanding of how Earth might operate during future climate change. Other goals include probing how life might have arisen and evolved in ocean crust.

The idea excites Anais Pages, a marine scientist at the Commonwealth Scientific and Industrial Research Organisation in Bentley, Australia. She says that setting ambitious interdisciplinary goals "will be crucial to achieve major scientific discoveries".

What's not clear is which of the IODP's ►



The *JOIDES Resolution* is the workhorse of the world's fleet of ocean-drilling research vessels.

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