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THE HINDU

Fri, 21 Dec 2018

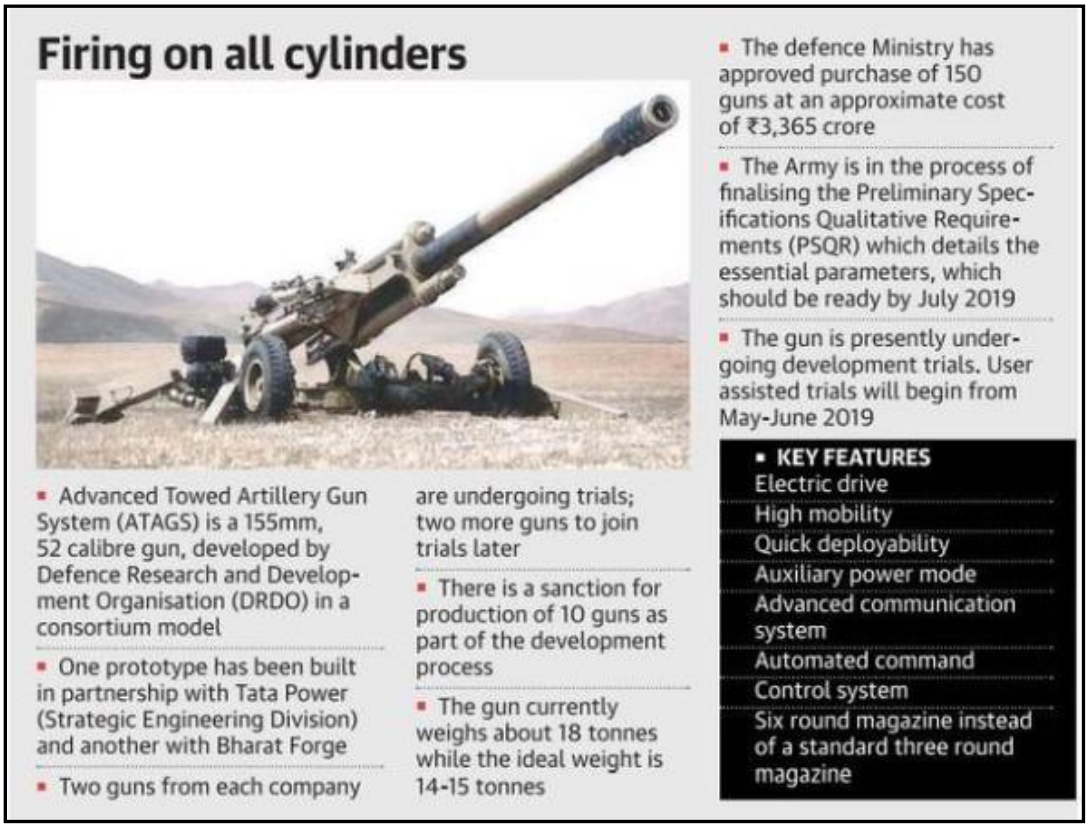
Indigenous gun trials of the Army to enter next stage by June

By Dinakar Peri

The development of the indigenously-designed heavy artillery gun, the Advanced Towed Artillery Gun System (ATAGS), has advanced to a stage where user-assisted trials of the gun are likely to start by June and the Army has begun finalising the Preliminary Specifications Qualitative Requirements (PSQR), a defence official said.

"Two guns are currently undergoing trials and another two guns will join the trials in a month," the official, who spoke on the condition of anonymity, said. "User-assisted trials will begin from May-June while the PSQR should be ready by July," the official added.

The ATAGS is a 155mm, 52 calibre gun being developed by the Defence Research and Development Organisation on two parallel tracks: one prototype is being built in partnership with Tata Power (Strategic Engineering Division), and the other is in collaboration with Bharat Forge. There is a sanction for production of 10 guns as part of the development process.



The Army, which is in the process of drawing up the PSQR that details the essential and desired parameters for the gun, has already flagged a few concerns related to weight and accuracy. The gun currently weighs about 18 tonnes while the ideal weight for the army would be 14-15 tonnes. While the development team wanted the weight, accuracy and firing parameters to be relaxed in the PSQR, the Army has said that would be looked into after the user-assisted trials commence.

The gun has been undergoing development trials for some time now, with a few trials held in the Pokhran firing ranges as recently as last month.

Once the PSQRs are approved, the process for formulating the final Qualitative Requirements would begin. Guns from both Bharat Forge and Tata Power would be evaluated and based on the commercial bids, the order would be split between them with the lowest bidder getting a larger order. The Defence Ministry has already approved the in-principle purchase of 150 of these guns at an approximate cost of ₹3,365 crore.

The gun has several significant features including an all-electric drive, high mobility, quick deployability, auxiliary power mode, advanced communications system, automated command and control system. It also

sports a six-round magazine instead of the standard three-round magazine. This necessitates a larger chamber and is a major factor pushing up the overall weight of the system.

The Army, which has been seeking to accelerate the modernisation of its weaponry, recently inducted its first modern pieces of artillery in three decades: the M777 Ultra-Light Howitzer from the U.S. and the K9 Vajra-T tracked self-propelled artillery gun from South Korea.

https://www.thehindu.com/news/national/indigenous-gun-trials-of-the-army-to-enter-next-stage-by-june/article25791046.ece

EurekAlert! The Global Source for Science News

Fri, 21 Dec 2018

Sapphires and rubies in the sky

21 light years away from us in the constellation Cassiopeia, a planet orbits its star with a year that is just three days long. Its name is HD219134 b. With a mass almost five times that of Earth it is a so-called "super-Earth". Unlike the Earth however, it most likely does not have a massive core of iron, but is rich in calcium and aluminium. "Perhaps it shimmers red to blue like rubies and sapphires, because these gemstones are aluminium oxides which are com-mon on the exoplanet," says Caroline Dorn, astrophysicist at the Institute for Computational Science of the University of Zurich. HD219134 b is one of three candidates likely to belong to a new, exotic class of exoplanets, as Caroline Dorn and her colleagues at the Universities of Zurich and Cambridge now report in the British journal *MNRAS*.

The researchers study the formation of planets using theoretical models and compare their results with data from observations. It is known that during their formation, stars such as the Sun were surrounded by a disc of gas and dust in which planets were born. Rocky planets like the Earth were formed out of the solid bodies leftover when the proto-planetary gas disc dispersed. These building blocks condensed out of the nebula gas as the disc cooled. "Nor-mally, these building blocks are formed in regions where rock-forming elements such as iron, magnesium and silicon have condensed," explains Dorn who is associated to the NCCR Planet. The resulting planets have an Earth-like composition with an iron core. Most of the super-Earths known so far have been formed in such regions.

The composition of super-Earths is more diverse than expected

But there are also regions close to the star where it is much hotter. "There, many elements are still in the gas phase and the planetary building blocks have a completely different com-position," says the astrophysicist. With their models, the research team calculated what a planet being formed in such a hot region should look like. Their result: calcium and aluminium are the main constituents alongside magnesium and silicon, and there is hardly any iron. "This is why such planets cannot, for example, have a magnetic field like the Earth," says Dorn. And because the inner structure is so different, their cooling behavior and atmospheres will also differ from those of normal super-Earths. The team therefore speak of a new, exotic class of super-Earths formed from high-temperature condensates.

"What is exciting is that these objects are completely different from the majority of Earth-like planets," says Dorn - "if they actually exist." The probability is high, as the astrophysicists explain in their paper. "In our calculations we found that these planets have 10 to 20 percent lower densities than the Earth," explains the first author. Other exoplanets with similarly low-densities were also analyzed by the team. "We looked at different scenarios to explain the observed densities," says Dorn. For example, a thick atmosphere could lead to a lower overall density. But two of the exoplanets studied, 55 Cancrie and WASP-47 e, orbit their star so closely that their surface temperature is almost 3000 degrees and they would have lost this gas envelope long ago. "On HD219134 b it's less hot and the situation is more complicated," explains Dorn. At first glance, the lower density could also be explained by deep oceans. But a second planet orbiting the star a little further out makes this scenario unlikely. A comparison of the two objects showed that the inner planet cannot contain more water or gas than the outer one. It is still unclear whether magma oceans can contribute to the lower density.

"So, we have found three candidates that belong to a new class of super-Earths with this exotic composition" the astrophysicist summarizes. The researchers are also correcting an earlier image of super-Earth 55 Cancrie, which had made headlines in 2012 as the "diamond in the sky". Researchers had previously assumed that the planet consisted largely of carbon, but had to abandon this theory on the basis of subsequent observations. "We are turning the supposed diamond planet into a sapphire planet," laughs Dorn.
https://eurekalert.org/pub_releases/2018-12/uoz-sar121918.php

Science

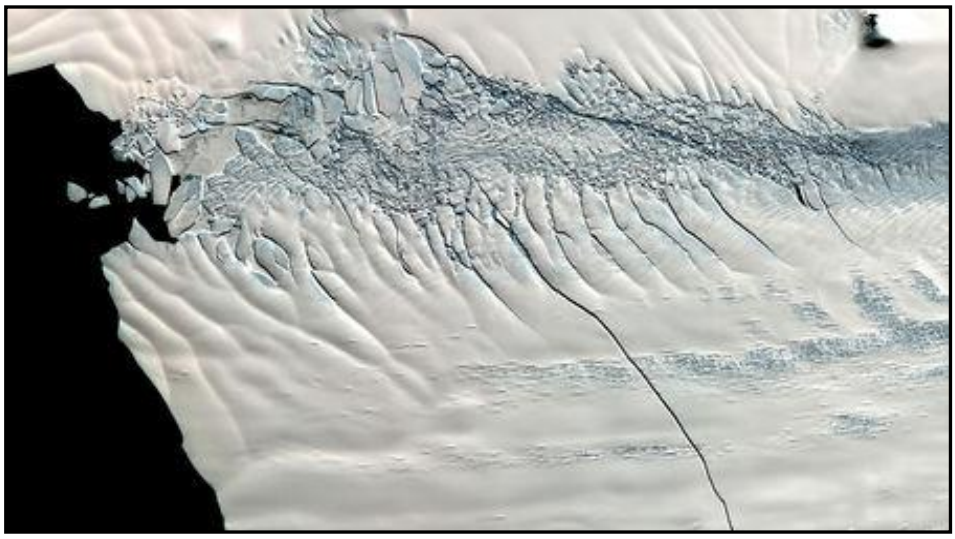
Fri, 21 Dec 2018

Discovery of recent Antarctic ice sheet collapse raises fears of a new global flood

A 30-kilometer crack angles across the Pine Island Glacier, a vulnerable part of the West Antarctic Ice Sheet

Some 125,000 years ago, during the last brief warm period between ice ages, Earth was awash. Temperatures during this time, called the Eemian, were barely higher than in today's greenhouse-warmed world. Yet proxy records show sea levels were 6 to 9 meters higher than they are today, drowning huge swaths of what is now dry land.

Scientists have now identified the source of all that water: a collapse of the West Antarctic Ice Sheet. Glaciologists worry about the present-day stability of this formidable ice mass. Its base lies below sea level, at risk of being undermined by warming ocean waters, and glaciers fringing it are retreating fast. The discovery, teased out of a sediment core and reported last week at a meeting of the American Geophysical Union in Washington, D.C., validates those concerns, providing evidence that the ice sheet disappeared in the recent geological past under climate conditions similar to today's. "We had an absence of evidence," says Anders Carlson, a glacial geologist at Oregon State University in Corvallis, who led the work. "I think we have evidence of absence now."



If it holds up, the finding would confirm that "the West Antarctic Ice Sheet might not need a huge nudge to budge," says Jeremy Shakun, a paleoclimatologist at Boston College. That, in turn, suggests "the big uptick in mass loss observed there in the past decade or two is perhaps the start of that process rather than a short-term blip." If so, the world may need to prepare for sea level to rise farther and faster than expected: Once the ancient ice sheet collapse got going, some records suggest, ocean waters rose as fast as some 2.5 meters per century.

As an analogy for the present, the Eemian, from 129,000 to 116,000 years ago, is "probably the best there is, but it's not great," says Jacqueline Austermann, a geophysicist at Columbia University's Lamont-Doherty Earth Observatory. Global temperatures were some 2°C above preindustrial levels (compared with 1°C today). But the cause of the warming was not greenhouse gases, but slight changes in Earth's orbit and spin axis, and Antarctica was probably cooler than today. What drove the sea level rise, recorded by fossil corals now marooned well above high tide, has been a mystery.

Scientists once blamed the melting of Greenland's ice sheet. But in 2011, Carlson and colleagues exonerated Greenland after identifying isotopic fingerprints of its bedrock in sediment from an ocean core drilled off its southern tip. The isotopes showed ice continued to grind away at the bedrock through the Eemian. If the Greenland Ice Sheet didn't vanish and push up sea level, the vulnerable West Antarctic Ice Sheet was the obvious suspect. But the suspicion rested on little more than simple subtraction, Shakun says. "It's not exactly the most compelling or satisfying argument."

Carlson and his team set out to apply their isotope technique to Antarctica. First, they drew on archived marine sediment cores drilled from along the edge of the western ice sheet. Studying 29 cores, they identified geochemical signatures for three different bedrock source regions: the mountainous Antarctic Peninsula; the Amundsen province, close to the Ross Sea; and the area in between, around the particularly vulnerable Pine Island Glacier.

Armed with these fingerprints, Carlson's team then analyzed marine sediments from a single archived core, drilled farther offshore in the Bellingshausen Sea, west of the Antarctic Peninsula. A stable current runs along the West Antarctic continental shelf, picking up ice-eroded silt along the way. The current dumps much of this silt near the core's site, where it builds up fast and traps shelled microorganisms called foraminifera, which can be dated by comparing their oxygen isotope ratios to those in cores with known dates. Over a stretch of 10 meters, the core contained 140,000 years of built-up silt.

For most of that period, the silt contained geochemical signatures from all three of the West Antarctic bedrock regions, the team reported, suggesting continuous ice-driven erosion. But in a section dated to the early Eemian, the fingerprints winked out: first from the Pine Island Glacier, then from the Amundsen province. That left only silt from the mountainous peninsula, where glaciers may have persisted. "We don't see any sediments coming from the much larger West Antarctic Ice Sheet, which we'd interpret to mean that it was gone. It didn't have that erosive power anymore," Carlson says.

He concedes that the dating of the core is not precise, which means the pause in erosion may not have taken place during the Eemian. It is also possible that the pause itself is illusory—that ocean currents temporarily shifted, sweeping silt to another site.

More certainty is on the way. Next month, the International Ocean Discovery Program's JOIDES Resolution research ship will begin a 3-month voyage to drill at least five marine cores off West Antarctica. "That's going to be a great test," Carlson says. Meanwhile, he hopes to get his own study published in time to be included in the next United Nations climate report. In the 2001 and 2007 reports, West Antarctic collapse was not even considered in estimates of future sea level; only in 2013 did authors start to talk about an Antarctic surprise, he says. Research is due by December 2019. "We gotta beat that deadline."

https://www.sciencemag.org/news/2018/12/discovery-recent-antarctic-ice-sheet-collapse-raises-fears-new-global-flood