

Vikram may not spring back to life, say space experts

They believe that the moon lander may have crash-landed on the lunar surface and the impact shock may have damaged the module beyond repair

PRESS TRUST OF INDIA
BENGALURU

Experts said on Sunday that time was running out for the moon lander Vikram and the possibility of re-establishing communication with it looked "less and less probable".

A senior official associated with the mission said, "Progressively... as time goes by... it's difficult [to establish link]."

However, with the "right orientation", it can still generate power and recharge batteries with solar panels, he said.

"But it looks less and less probable, progressively," the official said on condition of anonymity.

Not on all fours

Another top ISRO official said the "hard-landing" of Vikram on the lunar surface had made the task of linking again with it that much difficult as it might not have the "right orientation" and would not have landed on its four legs.

"Impact shock may have damaged the lander," he said.

The lander was designed to execute a soft landing on the lunar surface and to function for one lunar day, which is equivalent to about 14 earth days.

The location of the Vikram module "proves beyond doubt" that the orbiter is functioning well, space expert Ajay Lele said. "The orbiter is the main element of the mission as it will work for more than a year," he said.

He said that with the orbiter working fine, 90-95% of the mission objectives had been achieved.

Former ISRO scientist S. Nambi Narayanan said the chances of re-establishing communication looked bleak as the lander may have crash-landed.

NASA salute

"Space is hard. We commend ISRO's attempt to land their Chandrayaan-2 mission on the Moon's South Pole," NASA said in a tweet. "You have inspired us with your journey and look forward to future opportunities to explore our solar system together," it said.



Moon-probing: This screen grab taken from a live webcast by the Indian Space Research Organisation (ISRO) on August 6, 2019, shows the Vikram lander before it was supposed to land on the Moon.

In transmission

Two of the four payloads developed by the Space Physics Laboratory are still active, on the Chandrayaan-2 orbiter

Out of

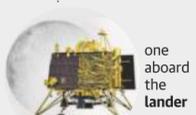
14 payloads aboard

4 were developed by the Space Physics Laboratory at the Vikram Sarabhai Space Centre, Thiruvananthapuram

RAMBHA, expected to provide valuable information on the lunar ionosphere, is made up of two components

ChaSTE (Chandra's Surface Thermophysical Experiment) on the lander

CHACE-2 # (Chandra's Altitudinal Composition Explorer), active on the orbiter



RAMBHA-LM (Radio Anatomy of Moon Bound Hypersensitive Ionosphere)



RAMBHA-DFRS* (RAMBHA- Dual Frequency Radio Science Experiment)



*RAMBHA-DFRS will study altitude variations of electron density in the moon's ionosphere. The hardware for this payload was developed by ISRO Telemetry, Tracking and Command Network, Bengaluru

CHACE-2 is an improvement on CHACE which flew aboard the Moon Impact Probe on the 2008 Chandrayaan-1 mission. CHACE-2 will make regular measurements, covering temporal variations in the lunar exosphere over a long period, including day and night changes and variations due to solar activity

A rapid dive to 15 minutes of terror

MADHUMATHI D.S.
BENGALURU

At 1.38 a.m. on September 7, Vikram, recently separated from the orbiting Chandrayaan-2 parent craft, began its much awaited descent to the moon as planned. It was to reach the lunar surface 30 km below in 15 minutes.

The velocity of 6,048 metres per second was being gradually reduced by its five throttleable engines.

There was applause in the ISTRAC control centre in

Bengaluru as everything went as planned.

First there was a "rough braking" period of 23 km lasting 10 minutes, when all engines were on. This phase was smooth until around 1.48 a.m. and the mission control engineers clapped. It was just 7 km more to the moon.

Then began the next stage of "fine braking", when only the central engine was on. The speed had fallen to 86 metres per second.

By 1.51 a.m., Vikram, glid-

ing in a parabolic path, was 2.1 km from the moon's surface, slowing down to about 50 metres per second.

Suddenly there were bated breaths all around. The tense faces and body language indicated that something was wrong even as the big screen in the media centre went blank.

Some 15 minutes later, at 2.15 a.m., ISRO Chairman K. Sivan declared that they had lost contact with the lander when it was just 2.1 km from its landing spot, during the

fine-braking phase.

It is surmised that the lander, *prima facie*, got physically disoriented. It deviated from its path as it lost communication with the control rooms and deep space antennas of ISRO in Bengaluru and of NASA in California and Canberra.

Was it because of the newly used throttleable thrusters? That is the answer ISRO is piecing together from the last numbers and data on the lander's final journey collated by all the tracking teams.

VSSC scientists keep fingers crossed

Two crucial payloads were on the missing lander; two others are on the orbiter

SPECIAL CORRESPONDENT
THIRUVANANTHAPURAM

Scientists at the Space Physics Laboratory (SPL) of the Vikram Sarabhai Space Centre (VSSC) at Thumba here are keeping their fingers crossed as the ISRO continues its efforts to establish contact with Vikram, the lander on the Chandrayaan-2 mission which has now been traced by the orbiter.

Of the 14 payloads aboard India's second moon mission, four are from the SPL.

Of the four, two - RAMBHA-LM (Radio Anatomy of Moon Bound Hypersensitive Ionosphere and Atmosphere-Langmuir Probe) and ChaSTE (Chandra's Surface Thermophysical Experiment) - are on the lander, which is believed to have crash-landed during Saturday's soft-landing mission on the lunar south pole. RAMBHA, which is expected to



While ISRO is trying to establish contact with Vikram, the Space Physics Laboratory is in a tizzy. *K. MURALI KUMAR

provide valuable information on the lunar ionosphere, is made up of two components; one aboard the lander and the other, on the orbiter.

On the bright side for the SPL, its payload on the orbiter - CHACE-2 (short for Chandra's Altitudinal Composition Explorer) - is func-

said. CHACE-2 is designed to measure the composition of the lunar exosphere, and is an improvement on CHACE, which flew aboard the Moon Impact Probe (MIP) on the 2008 Chandrayaan-1 mission.

Ionosphere study

The second SPL payload aboard the Chandrayaan-2 orbiter, the RAMBHA-Dual Frequency Radio Science experiment (RAMBHA-DFRS), will study altitude variations of electron density in the moon's ionosphere.

The hardware for this payload was developed by the ISRO Telemetry, Tracking and Command Network, Bengaluru. "With this payload, we are only participating in the science part. We are using the DFRS communication channel with our ground receivers to calculate the ionospheric distribution," the SPL Director said.

3 declared foreigners dropped from NRC

NGO files plea against them, officials

SPECIAL CORRESPONDENT
GUWAHATI

Three members of a family have been dropped from the final National Register of Citizens (NRC) after the police registered a case against errant officials for including them despite being declared foreigners by a Foreigners' Tribunal (FT) three years ago.

In 2016, the tribunal no. 3 in Morigaon district of central Assam declared Jubeda Begum and her three children foreigners. All four have been absconding since.

But the final NRC published on August 31 included the names of Jubeda Begum, her son Jahar Ali and daughter Sahida Begum. Another son, Giasuddin Ahmed, was excluded.

Assam Public Works, a Guwahati-based NGO and one of the parties in the NRC case in the Supreme Court, on September 4 filed a complaint against the three and the NRC officials involved in

the inclusion of their names. The NRC authorities on Saturday updated the on-line data on inclusions and exclusions to show the status of the trios "reject". The authorities, however, did not offer any official clarification.

The tribunal had disposed the case of Jubeda Begum and her children *ex parte*. The order copy said they did not turn up despite multiple notices. "Jubeda Begum, the daughter of Mohammad, along with her sons Giasuddin Ahmed and Mohammad Jahar Ali and daughter Sahida Begum... who had illegally entered India (Assam) from Bangladesh after the cut-off date, March 25, 1971, are declared 'foreigners' under Section 2 (a) of the Foreigners Act, 1946," the order read. The tribunal asked the authorities to delete the names of the respondents from the voters' list, government schemes, family ration card, voter ID and driving licence.

NRC a humanitarian crisis: ex-judge

A.P. Shah says citizenship is one of the most basic, fundamental human rights

SPECIAL CORRESPONDENT
NEW DELHI

"In the context of Assam - as well as in the country - citizenship, as the right to have rights, is one of the most basic, fundamental human rights in modern societies. Deprivation of citizenship must follow the most rigorous procedure available; the overriding concern must be fairness, not quickness or efficiency," Justice A.P. Shah (retd) said at the concluding session of the two-day event on "Contested citizenship in Assam: people's tribunal on constitutional processes and human cost".

'Humanitarian crisis'

"We have heard the views and experiences of people excluded from the National Register of Citizens (NRC) in Assam, and of various leading experts, and we all agree that the NRC has spawned a humanitarian crisis. We worry because there are no signs of this crisis abating," he added, reading from the "jury report" presented on Sunday.



Deprivation of citizenship must follow the most rigorous procedure available; the overriding concern must be fairness, not quickness or efficiency.

A.P. SHAH
Former Chief Justice, Delhi High Court

He said a large number of minorities, religious, linguistic or ethnic, in Assam had lived with the fear of being told that they did not belong to India. "They may at any time be marked doubtful (D) voters, and prevented from exercising their franchise. A local border police constable can again at any time accuse them of being a foreigner and refer the case to a detention centre. Even after the final NRC, there are many demands for selective re-verification of the NRC," he said.

Justice Kurian Joseph (retd), Justice Madan B. Lokur (retd), Professor Faizan Mustafa and Syeda Hameed were present.

The panel said that after hearing the testimonies, they found that the "burden

of proof was shifted to the residents to prove that they were citizens. Documents such as those of birth, schooling and land-ownership which impoverished and unlettered rural residents anywhere would find hard to muster, were insisted upon.

Even when documents were produced, they were refused for discrepancies in the English-language spelling of Bengali names or in ages.

Professor Mustafa said, "Two very fundamental ideas of India - *Akhand Bharat* and *Vasudhaiva Kutumbakam* - have been violated. How can we agree to treat individuals the way we are treating people in Assam? We have to understand that this is not about inclusion

but exclusion and also, this is not about the people but the State."

Stating that the implication of the human cost has to be considered in this case, Dr. Hameed said that what she heard at the "public hearing" was like a stab in the heart.

"Imagine if what is happening to Assam is extended to the rest of the country... what would it mean for us?," she said.

Permanent paranoia

"The fear of being excluded from the NRC, being declared as foreigner, and finally being sent to a detention centre, has created a situation of permanent paranoia among vulnerable communities, especially Bengal-origin Assamese Muslims and Bengali Hindus living in the State of Assam. This fear has pushed the people to a snapping point and many are committing suicide. Women and their children bear a disproportionately higher burden of the process," the group said.

CBI, govt. must have arm's-length ties: Rai

Discusses pillars of democracy in book

PRESS TRUST OF INDIA
NEW DELHI

There is an urgent need to empower the CBI with a distinct mandate of keeping an "arm's-length" relationship with the government, says former Comptroller and Auditor-General Vinod Rai.

The former IAS officer, in his book titled *Rethinking Good Governance: Holding to Account India's Public Institutions*, stresses that these institutions serve as the pillars supporting the foundation of a robust and vibrant democracy.

He says that an alert Public Accounts Committee, holding frequent meetings, would be effective in keeping the executive under constant scrutiny and bring it to book when there is laxity, wastage or malfeasance.

From numerous occa-



Vinod Rai

sions when MPs failed to adhere to the expected decorum in the House, the serious deficit of impartiality and integrity within the CBI, to the issue of governance that has plagued the BCCI, and the imbroglio around the perceived lack of cohesion between the government and the RBI, Mr. Rai claims that such instances led to a gradual decline of independence and autonomy of these institutions over the decade.

Chinese trawlers in southern Indian Ocean worry India

The huge increase in numbers in the southern Indian Ocean far from the Chinese coast has raised concerns

DINAKAR PERI
NEW DELHI

There has been a huge increase in Chinese deep-sea fishing trawlers in the southern Indian Ocean far from the Chinese coast which has raised concerns in the government and the security establishment, according to official sources. This was discussed in the recent coastal security meetings involving Director-General (DG), Shipping, the Navy and other stakeholders.

"In the last four years, on an average at least 500 Chinese trawlers were present in the region and around 32,250 incidents per year were recorded," a senior de-

fence source said. The trawlers were, however, not in India's Exclusive Economic Zone (EEZ) but beyond, the source added. This includes trawlers from China, Hong Kong and Taiwan.

Breaking this up further, there were 1,100 occurrences near Somalia and 1,500 occurrences near the Coast of Oman. Occurrences are recordings of the Automatic Identification System (AIS) aboard trawlers and ships recorded when they are activated. So a trawler can be recorded multiple times based on its AIS signature. Chinese trawlers have institutional backing and have processing facilities with them which



The rise in the number of Chinese trawlers in the Indian Ocean was discussed at coastal security meetings. *K.K. MUSTAFAH

are sold in the vicinity, the source added on the modalities of the operation.

While India has good inland fishing, the ocean fish-

ing capacity is way below capacity. There have been recommendations for the need to boost domestic deep-sea fishing. "Our deep-

sea fishing is in bits and pieces. We need to boost that," the source said.

The maritime movements in the region are tracked at the Navy's Information Management and Analysis Centre (IMAC) at Gurugram, which is the single-point centre interlinking all the coastal radar chains and other inputs along the coastline. The AIS information comprises name, MMSI number, position, course, speed, last port visited, destination and so on. This information can be picked up through various AIS sensors including coastal AIS chains and satellite based receivers.

To address this, the Na-

tional Maritime Domain Awareness initiative aims to integrate fishing, ports, customs so that the database is available to everyone. Currently, the States have their databases. As part of this evolving mechanism, the National Committee for Strengthening Maritime and Coastal Security is scheduled to meet this week to discuss the implementation.

There has been a national effort to install AIS systems on ships under 20m for which a pilot study has been carried out. AIS works through satellite and the ISRO has already delivered 1000 transponders for trails in Gujarat and Tamil Nadu.

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1. UNIT: M.M. COMPLEX: PTE No: ENQ No.19-20/001567/MM01 (01), Dt: 30.08.2019: Two wheel Bogies.	Due date of opening: 01.10.2019
2. PTE- ENQ/19-20/001610/MM01 (05), Dt: 30.08.2019: 10 items of Cardan Shaft.	Due date of opening: 03.10.2019
3. PTE No: ENQ No.19-20/001641/MM01 (01), Dt: 02.09.2019: Gear Box Internals - 8 items.	Due date of opening: 03.10.2019
4. PTE: ENQ/19-20/001676/MM18 (03), Dt: 02.09.2019: Procurement of (i) Site Mixed Bulk Explosive Cast Booster. Qty.: 4000 Kilograms. (ii) Site Mixed Explosive High Strength: Qty.: 2000000 Kilograms.	Due date of opening: 03.10.2019
5. ENQ/19-20/001437/MM04 (08) Dt: 02.09.2019: Circulating Water Pump Motor.	Due date of opening: 04.10.2019
6. ENQ/19-20/001702/MM25(01) Dt:04.09.2019: 245 KV single phase outdoor oil filled type capacitance voltage transformer - 13Nos.	Due date of opening: 01.10.2019
7. ENQ/19-20/001724/MM22(01) Dt:05.09.2019: 3D Terrestrial Laser Scanner-1 No.	Due date of opening: 03.10.2019

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