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MEMORANDUM

FOR : **THE REGIONAL EXECUTIVE DIRECTOR**
Regions CAR, I, II, III, NCR, IV-A, IV-B V, VI, VII and VIII

FROM : **THE CHIEF OF STAFF**
Field Operations-Luzon, Visayas and Environment

SUBJECT : **THE SPACE LAUNCH OF THE LONG MARCH 5B (MENGTIAN LABORATORY MODULE) BY THE PEOPLE'S REPUBLIC OF CHINA, BETWEEN 31 OCTOBER AND 05 NOVEMBER 2022**

DATE : NOVEMBER 03, 2022

This pertains to the Memorandum dated 28 October 2022 from the Executive Secretary relative to the space launch of the Long March 5B (Mengtian Laboratory Module) by the people's Republic of China, between 31 October and 05 November 2022.

According to the Philippine Space Agency, the possible drop zones are identified approximately 72 kilometers away from Bajo de Masinloc, Palawan and approximately 39 kilometers off the Northwest Coast of Busuanga, Palawan. The actual drop zones may vary according to the earth's rotation, weather and climatic conditions, and rocket failure, among others.

Relative to this, you are hereby advised to take proactive and precautionary measures to mitigate any potential risk of injury to people or damage to property presented by the Long March 5B launch. Attached is the said Memorandum and Executive Briefer for reference.

For consideration, please.


ATTY. RICKY A. ARZADON, CESO IV

Office of the President
of the Philippines
Malacañang

MEMORANDUM FROM THE EXECUTIVE SECRETARY

FOR : **SECRETARY RENATO SOLIDUM, JR.**
Department of Science and Technology

: **SECRETARY JOSE FAUSTINO, JR.**
Department of National Defense

: **SECRETARY ENRIQUE MANALO**
Department of Foreign Affairs

: **SECRETARY MA. ANTONIA YULO-LYZAGA**
Department of Environment and Natural Resources

: **SECRETARY BENJAMIN ABALOS, JR.**
Department of the Interior and Local Government

: **SECRETARY CLARITA CARLOS**
National Security Council

: **CG ADM ARTEMIO ABU**
Philippine Coast Guard

: **CG REAR ADM ROY ECHEVERRIA**
National Coast Watch Center

SUBJECT : **THE SPACE LAUNCH OF THE LONG MARCH 5B (MENG-TIAN
LABORATORY MODULE) BY THE PEOPLE'S REPUBLIC OF
CHINA, BETWEEN 31 OCTOBER AND 05 NOVEMBER 2022**

DATE : **OCT 28 2022**

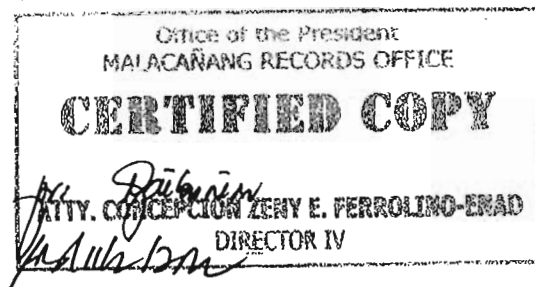
In line with information from the Philippine Space Agency and the Civil Aviation Authority of the Philippines that between 31 October and 05 November 2022, the People's Republic of China will launch from the Wengchang Space Launch Center the Long March 5B rocket carrying the Mengtian Laboratory Module for the Tiangong Space Station, may the undersigned request your good offices to take the necessary proactive and precautionary measures to manage the risk of damage to life, limb and property arising from the said operations.

The possible drop zones are identified in the PhilSA Executive Brief (**Annex A**) to be **(a)** approximately 72 kilometers away from Bajo de Masinloc, Palawan; and **(b)** approximately 39 kilometers off the northwest coast of Busuanga, Palawan. The actual drop zones may vary according to earth rotation, weather and climatic conditions and rocket failure, among others.

For your urgent and appropriate action please.

Thank you.


LUCAS P. BERSAMIN





Republic of the Philippines
Office of the President
Philippine Space Agency



OFFICE OF THE DIRECTOR GENERAL

MEMORANDUM FOR THE PRESIDENT

21 October 2022

THROUGH: ATTY. LUCAS P. BERSAMIN
Executive Secretary

ATTN: SEE ATTACHED DISTRIBUTION LIST

SUBJECT: REPORT REGARDING THE SPACE LAUNCH OF THE LONG MARCH 5B (MENGtian MODULE) BY THE PEOPLE'S REPUBLIC OF CHINA

Pursuant to Section 10(i) of Republic Act No. 11363 or the "Philippine Space Act" which mandates the Director General of the Philippine Space Agency (PhilSA) to serve as the Presidential Adviser on Space Matters, the undersigned hereby submits a brief report on the upcoming Long March 5B (Mengtian Module) (CZ-5B) Rocket Launch by the People's Republic of China.

Based on available information, the People's Republic of China is scheduled to launch the Long March 5B (Mengtian Module) rocket from the Wenchang Space Launch Center in Hainan Island, China, sometime between 31 October to 05 November 2022.

The Mengtian lab module is the second laboratory module of the Tiangong space station. It is a research facility that houses various laboratory cabinets for the conduct of materials and combustion science, basic physics and aerospace technology experiments.¹

Upon learning of the rocket launch, PhilSA sought to verify and gain more information by coordinating with the Civil Aviation Authority of the Philippines (CAAP). Per CAAP, Notice to Airmen (NOTAM) warnings were issued by the Civil Aviation Administration of China that referred to "Aerospace Flight Activities" on the same dates and CAAP has issued and disseminated these warnings accordingly.

The issued NOTAMs most likely refer to the Long March 5B (Mengtian Module) launch and describe the estimated drop zones of the rocket debris. Based on the NOTAMs, Drop zone 1 is approximately 72 km away from Bajo de Masinloc, while Drop zone 2 is approximately 39 km from Busuanga, Palawan.

¹ <https://news.cgtn.com/news/2022-08-20/China-s-Mengtian-lab-module-to-be-launched-to-space-station-in-October-1cENICXjdny/index.html>

Based on the expected drop zones, the rocket debris is not projected to fall over any land feature or inhabited area within the Philippine territory. Nevertheless, the falling rocket debris still poses considerable risk to ships, aircrafts, fishing boats, and other vessels that may pass through the drop zones.

In a similar incident reported during the previous Long March 5B (Wentian Module) rocket launch last 24 July 2022, the *payload fairing* was recovered floating off the shore of Dimipac Island in Busuanga, Palawan while its *core stage* debris landed on Philippine waters in an uncontrolled reentry. (**Annex A**)

Proactive and precautionary measures must then be taken to mitigate any potential risk of injury to people or damage to property presented by the Long March 5B (Mengtian Module) launch. Other concerns and remarks for further action for the country on this matter are provided in the enclosed executive brief.

Further clarifications and subsequent communications on the matter may be directed to the **Office of the Director General** through email address at odg@philsa.gov.ph, with a copy furnished to spicb@philsa.gov.ph.

We express our gratitude to the Office of the President for supporting the PhilSA and space science, technology and applications (SSTA) in the country.

Sincerely,



Digitally signed by
Marciano, Joel
Joseph Jr. S., Ph.D.

JOEL JOSEPH S. MARCIANO, JR., Ph.D.
Director General

Ref. No. JSM-P2022-881

Executive Brief on the Long March 5B Chinese Space Rocket Launch

Details of the Mission and Launch

1. The People's Republic of China is scheduled to launch the Long March 5 variant Long March 5B rocket carrying the Mengtian laboratory module from the Wenchang Space Launch Center in Hainan Island, China, sometime between 31 October to 05 November 2022.²

The Mengtian lab module is the second laboratory module of the Tiangong space station. It is a research facility that houses various laboratory cabinets for the conduct of materials and combustion science, basic physics and aerospace technology experiments.³

2. Long March 5B (Mengtian Module) is a 1.5-stage launch vehicle^{4,5,6} belonging to the Long March family manufactured by the China Academy of Launch Vehicle Technology. Its fuel consists of kerosene and liquid oxygen (LOX) for the boosters and liquid hydrogen (LH2) and LOX for the core stage.⁷

After lift off, the rocket stages usually separate in order to gain the necessary momentum as the rocket enters outer space. For the Long March 5B (Mengtian Module) rocket, these rocket stages are the *rocket boosters*, the *payload fairing*, and the *rocket core-stages*. These discarded rocket stages are usually designed and planned to shed over specific drop zones, usually bodies of water, and are selected to minimize the hazards of falling onto populated areas.

3. Upon learning of the rocket launch, PhilSA sought to verify and gain more information by coordinating with the Civil Aviation Authority of the Philippines (CAAP). Per CAAP, Notice to Airmen (NOTAM) warnings were issued by the Civil Aviation Administration of China that referred to "Aerospace Flight Activities" on the same dates and CAAP has issued and disseminated these warnings accordingly. **Annex B**
4. The issued NOTAMs states that "due to an aerospace flight activity" the flight safety in certain areas may be affected from 31 October to 05 November 14:00 to 20:00 PhST daily. The coordinates of the "expected unburned debris" landfall are also indicated. These are shown in Table 1.

The NOTAM most likely refers to the Long March 5B (Mengtian Module) launch and describes the estimated drop zones for the rocket debris.

² <https://forum.nasaspaceflight.com/index.php?topic=56208.0>

³ <https://news.cgtn.com/news/2022-08-20/China-s-Mengtian-lab-module-to-be-launched-to-space-station-in-October-1cENICXjdny/index.html>

⁴ <https://www.nasaspaceflight.com/2021/12/experimental-sats-CZ-5B/>

⁵ http://www.b14643.de/Spacerockets_1/China/CZ-5B/Description/Frame.htm

⁶ QIN, Tong, et al. "Development of China's New Generation Launch Vehicles." *Chinese Journal of Space Science* 38.5 (2018): 593-597 (URL: <http://english.cssar.cas.cn/ns/NU/201809/W020180906583001107643.pdf>)

⁷ QIN, Tong, et al. "Development of China's New Generation Launch Vehicles." *Chinese Journal of Space Science* 38.5 (2018): 593-597 (URL: <http://english.cssar.cas.cn/ns/NU/201809/W020180906583001107643.pdf>)

Table 1. Estimated drop zones coordinates and reference NOTAM

DROP ZONE 1	DROP ZONE 2
Unburned debris expected to fall in:	Unburned debris expected to fall in:
<u>13 59 00N 117 42 00E</u>	<u>12 45 00N 119 06 00E</u>
And will not exceed the range within the area:	And will not exceed the range within the area:
13 34 00N 117 57 00E -	12 19 00N 119 23 00E -
13 54 00N 118 16 00E -	12 39 00N 119 41 00E -
14 33 00N 117 30 00E -	13 12 00N 119 04 00E -
14 13 00N 117 12 00E -	12 52 00N 118 46 00E -

5. The booster stages and the *payload fairing* of this Long March 5B (Mengtian Module) rocket are expected to drop within the area designated as Drop zone 1 and Drop zone 2, respectively. Figure 1 shows the drop zone locations: Drop zone 1 is approximately 72 km away from Bajo de Masinloc, while Drop zone 2 is approximately 39 km from Busuanga, Palawan. Also shown are the “expected unburned debris” landfall.

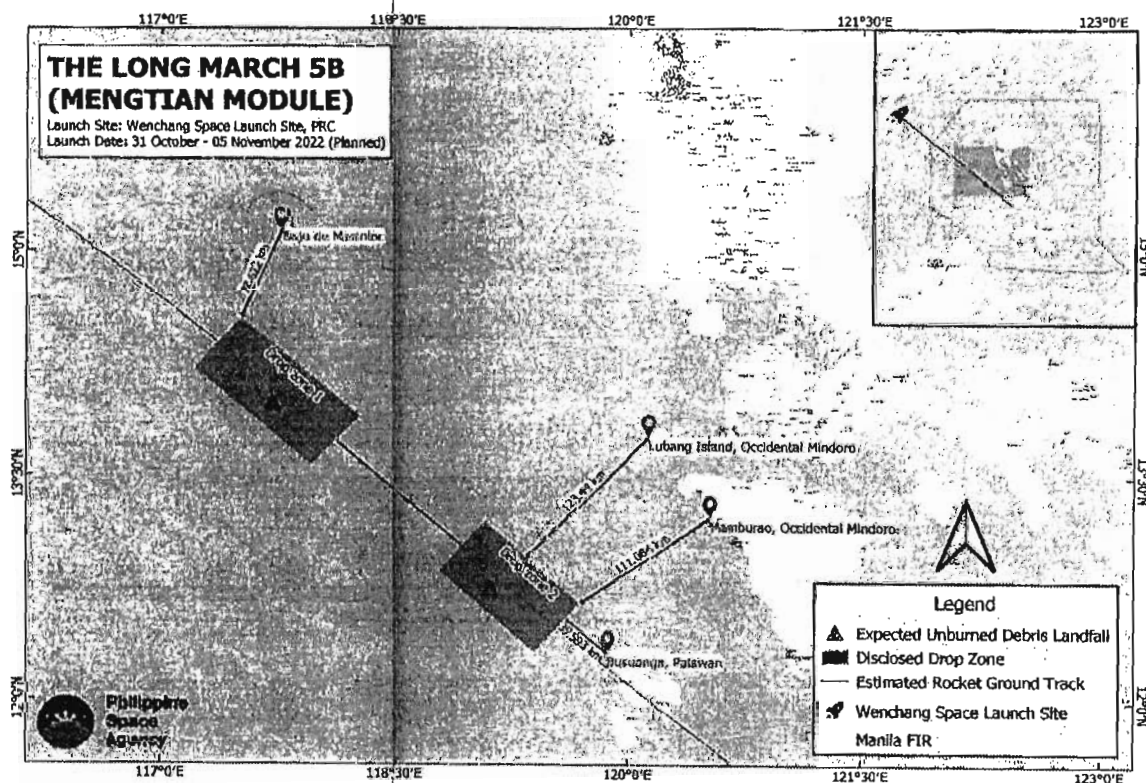


Figure 1. Estimated drop zones of the Long March 5B (Mengtian Module) Launch

China's Long March 5b rocket

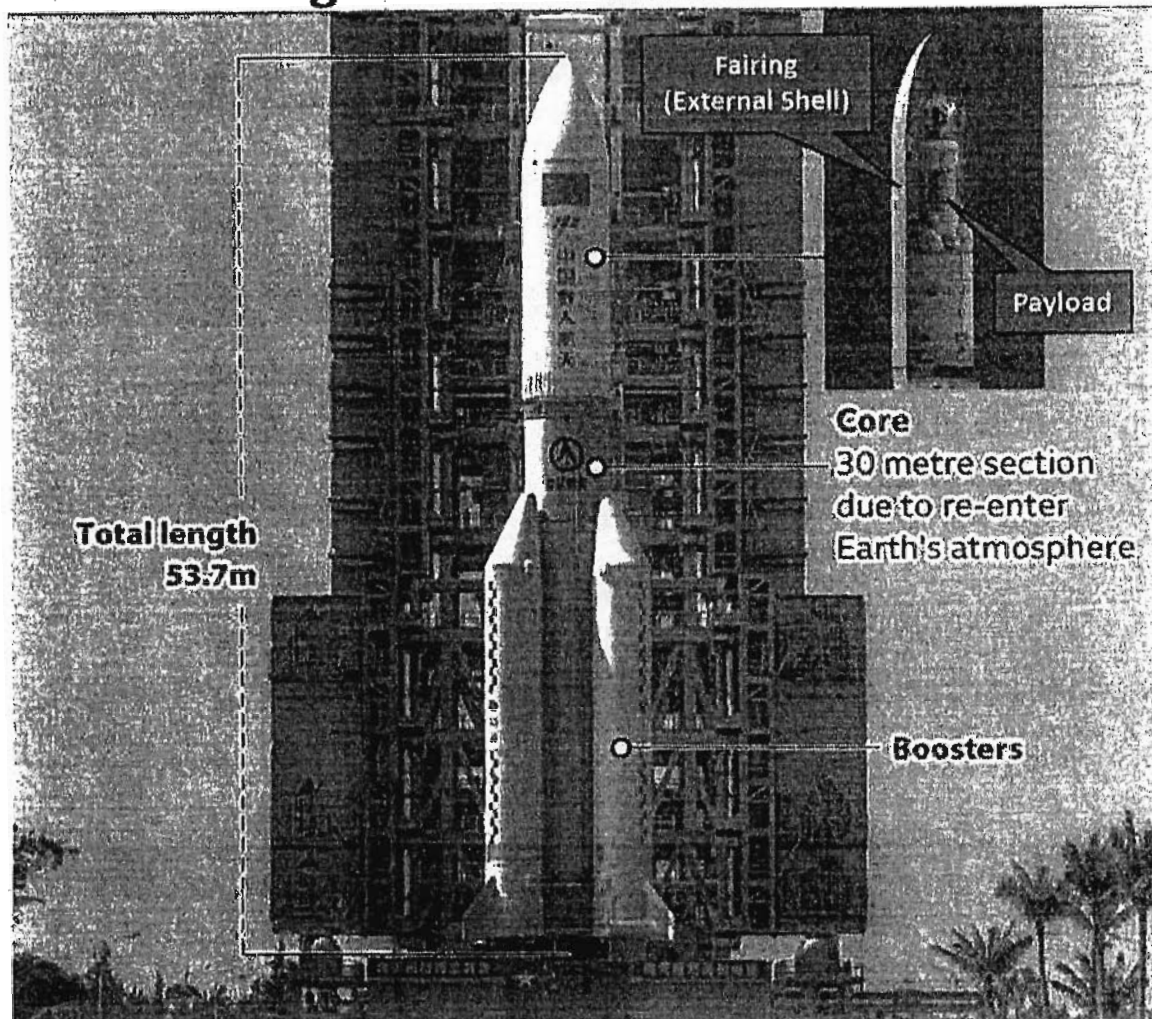


Figure 2. China's Long March 5B rocket on its launchpad at WSLC⁸

Concerns for the Philippines

1. As shown in Figure 1, the nearest drop zone is around 39 km off the north-west coast of Busuanga, Palawan. Based on this information, the rocket debris is not projected to fall over any land feature or inhabited area within the Philippine territory.
2. The actual drop zones, however, may vary from the expected areas due to perturbations caused by the rotation of the Earth, weather and climatic conditions, and other factors including but not limited to rocket failures.

⁸ <https://www.bbc.com/news/science-environment-52333548>

Therefore, there is still danger and potential risk of damage to ships, aircrafts, fishing boats, and other vessels that will pass through the drop zones of the falling rocket debris.

3. There is also a possibility that the remaining rocket debris will float around the area and may wash towards the nearby coasts in the future. In a similar incident reported during the previous Long March 5B (Wentian Module) rocket launch last 24 July 2022, the *payload fairing* was recovered floating off the shore of Dimipac Island in Busuanga, Palawan. (Annex A).
4. The possibility of an uncontrolled reentry of the *upper stages* also cannot be ruled out at this time. During the previous Long March 5B (Wentian Module) rocket launch last 24 July 2022, its *core stage* debris landed on Philippine waters in an uncontrolled reentry. (Annex A)

Recommended Actions

1. Proactive and precautionary measures must be taken to mitigate the risk posed by the Long March 5B (Mengtian Module) launch. Safety restrictions for air and marine access should be issued on and around the possible drop zones of the discarded stages of the Long March 5B (Mengtian Module) launch.
2. Notices and recommended actions should be communicated to relevant government agencies, such as the Department of National Defense (DND), Department of Environment and Natural Resources - National Mapping and Resource Information Authority (DENR NAMRIA), Department of Transportation - Civil Aviation Authority of the Philippines (DOTr CAAP), Department of Agriculture - Bureau of Fisheries and Aquatic Resources (DA BFAR), Department of the Interior Local Government (DILG), Philippine Coast Guard (PCG) and the National Disaster Risk Reduction and Management Council (NDRRMC).

Specific recommendations are outlined below.

Air Access

1. DOTr CAAP to continually enforce the no-fly zones in the area between 31 October to 05 November 2022. CAAP has declared the identified drop zone area as no-fly zones through the issuance of NOTAMs.
2. The Philippine Air Force (PAF), through its Air Defense Command, may be given advance notice of the rocket launch.

Marine Access

To ensure the safety of the public on the waters near the drop zones, temporary restrictions and danger areas should also be prescribed between 31 October to 05 November 2022. All marine safety zones should be detailed in a Notice to Mariners, Coastal Navigational Warnings, and NAVAREA XIV warnings:

1. The Philippine Coast Guard (PCG) and NAMRIA are recommended to issue relevant navigational warnings and to issue and enforce no-sail zone policies in the affected territorial waters. for this purpose.
2. DILG and BFAR are recommended to issue no-fish zones in the territorial waters affected.
3. DILG and relevant local government units (LGUs) are recommended to coordinate with their local residents and fishermen to prevent them from undertaking any off-shore activity during the prescribed time period.
4. The public is advised to immediately inform local authorities of any suspected debris sighted at sea or land.
5. PhilSA cautions everyone against retrieving or coming in close proximity to these materials since fallen rocket debris may contain remnants of toxic substances such as rocket fuel.

DISTRIBUTION LIST

SECRETARY RENATO SOLIDUM, JR.

Department of Science and Technology

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Department of Foreign Affairs

SECRETARY MA. ANTONIA YULO-LOYZAGA

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SECRETARY BENJAMIN C. ABALOS, JR.

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