

The logo for the International Asteroid Warning Network (IAWN) is located in the top left corner. It features a stylized Earth with a red line representing an asteroid's trajectory passing through it. To the right of the Earth, the text "International Asteroid Warning Network" is written in a blue, sans-serif font, with each word on a new line.

International
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International Asteroid Warning Network (IAWN) Update

Kelly Fast - NASA PDCO
IAWN Coordinating Officer

IAWN support team at the University of Maryland/Planetary Data System
Small Bodies Node (Bauer, Reddy, Spahr, Warner, *et al.*)

Update to SMPAG
10 October 2023

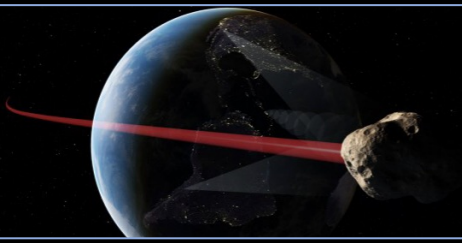
<https://iawn.net/>

Background

IAWN is a worldwide collaboration of asteroid observers and modelers that was recommended by the United Nations

From the IAWN Statement of Intent:

“The intent of the International Asteroid Warning Network (IAWN) is to establish a worldwide effort to detect, track, and physically characterize near-Earth objects (NEOs) to determine those that are potential impact threats to Earth. This network is comprised of a partnership of scientific institutions, observatories, and other interested parties performing observations, orbit computation, modeling, and other scientific research related to the impact potential and effects of asteroids.”



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International Asteroid Warning Network (IAWN)

A worldwide collaboration of asteroid observers and modelers recommended by the United Nations

**IAWN includes
53 signatories
from over 25 countries
(October 2023)**

Newest signatories to IAWN include:

Australia	Univ. New South Wales, Canberra
Australia	Univ. Western Australia
Czech Republic	Klet Observatory
Japan	JAXA
France	K19-PASTIS
Italy	Virtual Telescope Project
Kazakhstan	Fesenkov Astrophysical Institute
Slovakia	Kysuce Observatory G02
United States	Mind's Eye Observatory

For details, membership, and for IAWN observing campaign information, see:
<https://iawn.net/>

UN Office of Outer Space Affairs Committee on Peaceful Uses of Outer Space

Overview for NEO Threat Response



United Nations
COPUOS/OOSA

*Inform in case of
credible threat*

Parent Government Delegates

Determine Impact time,
location and severity

International Asteroid
Warning Network
(IAWN)
www.iawn.net

Coordinated
by NASA

Observers, analysts, modelers...

Potential deflection
mission plans

Space Missions Planning
Advisory Group
(SMPAG)
www.smpag.net

Chaired
by ESA

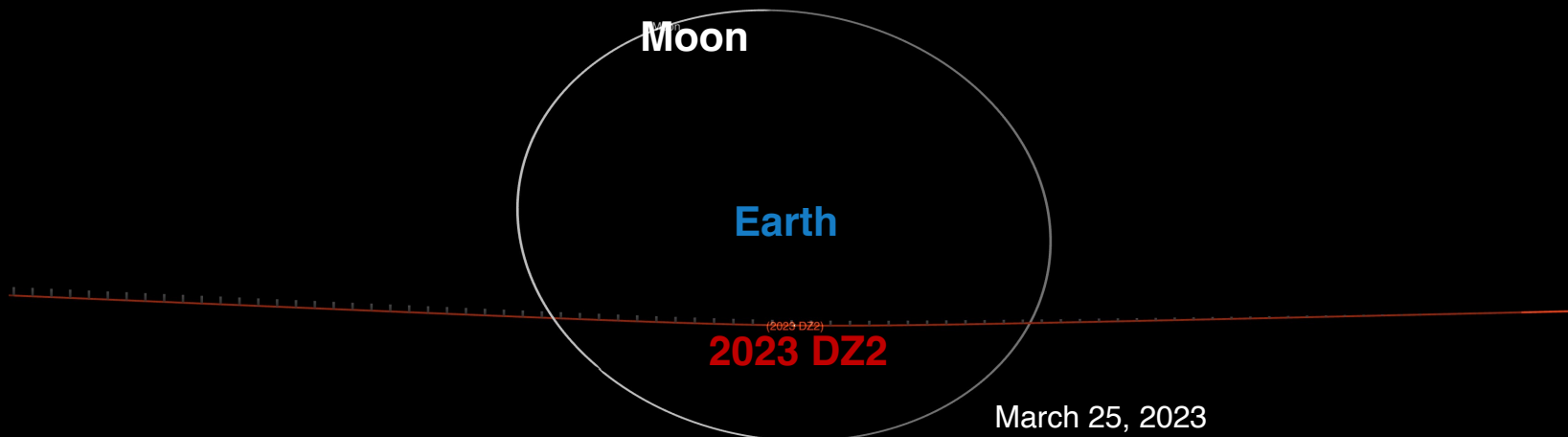
Space agencies and offices

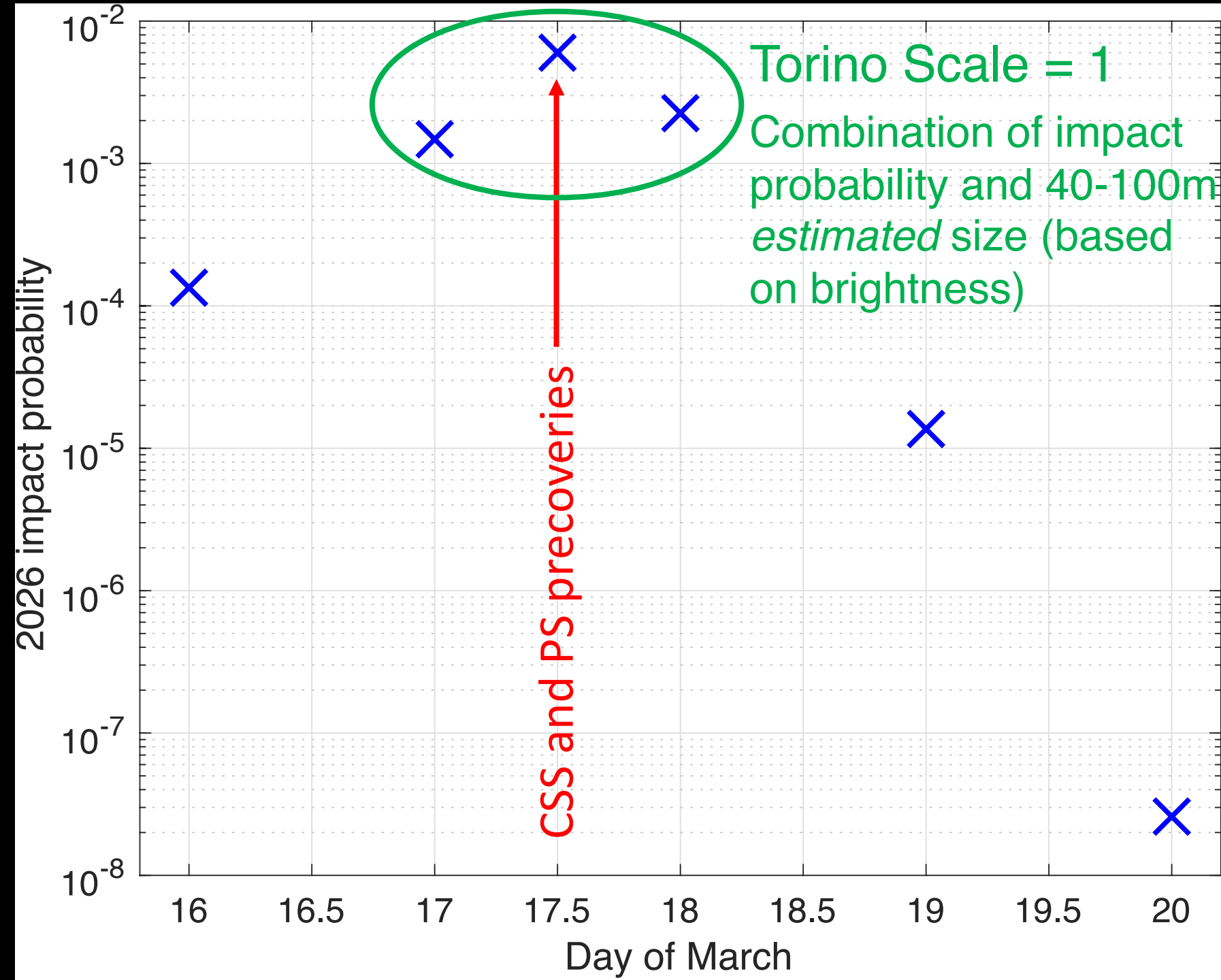


2023 DZ2

Short warning observing campaign

- On March 16, 2023, the Minor Planet Center announced the discovery of near-Earth asteroid 2023 DZ2 by joint Romanian-Spanish team Para-SOL at MPC Code 950: Roque de los Muchachos Observatory (La Palma Observatory)
- 2023 DZ2 was initially estimated to be 40-100 meters in size based on brightness
- Initially, 2023 DZ2 was found to have an impact risk in 2026 that was quickly ruled out by other astrometric observations
- The asteroid was inbound for a close approach within half the lunar distance from the Earth on March 25, 2023





2023 DZ2

Short warning observing campaign

- 2020 DZ2 was ideal for an IAWN rapid response characterization campaign
 - Exercise the capability of the planetary defense community to collect observations and physically characterize the object on very short notice
 - Size, shape, albedo, composition, rotation period, binary nature
 - Observing Window: 20-27 March 2023
- Three Zoom telecons during the limited observing window to discuss results as they become available (led by Reddy and Kelley)
 - Volunteers led working groups for: Photometry, Spectroscopy, Thermal Modeling, Radar and Hazard Modeling
 - Over 40 observers from dozens of countries participated and shared data
- The team determined that 2023 DZ2 is a 30-meter (± 10) E-type asteroid with a rotation period of 6.3 min, with associated hazard modeling

Notification by IAWN - Threshold

IAWN shall warn of predicted impacts exceeding a probability of **1%** for all objects characterized to be greater than **10 meters** in size*

Reference: Report SMPAG-RP-003 on Recommended Criteria & Thresholds for Action for Potential NEO Impact Threat (led by IAWN) at smpag.net

**Roughly equivalent to absolute magnitude of 28 if only brightness data can be collected.*

Notification by IAWN – Who?

The IAWN Coordinating Officer or a member of the IAWN Steering Committee will notify:

- Chair, Space Mission Planning Advisory Group (SMPAG)
- United Nations Office of Outer Space Affairs (UNOOSA)
 - UNOOSA will notify UN Member States

IAWN signatories will also notify and work with their own governments according to their own national policies, as applicable.

2023 Planetary Defense Conference Hypothetical Asteroid Impact Threat Exercise Notification by IAWN – “2023 PDC”

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INTERNATIONAL ASTEROID WARNING NETWORK (IAWN)

POTENTIAL ASTEROID IMPACT NOTIFICATION – HYPOTHETICAL SIMULATION

Date: April 3, 2023
 From: International Asteroid Warning Network
 To: Chair, Space Mission Planning Advisory Group (SMPAG);
 United Nations Office of Outer Space Affairs
 Title: Potential for Impact of Near-Earth Asteroid 2023 PDC

Impact Probability:	1% as calculated by NASA JPL CNEOS and ESA NEOCC
Impact Date:	22 OCTOBER 2036
Impact Risk Corridor:	From the South Pacific to the southern Indian Ocean, crossing North America, the Atlantic Ocean, and Africa
Approximate Size:	220 - 660 meters (720 - 2160 feet) determined from its observed brightness and an assumed range of most likely surface reflectivities
Expected Damage Level if Impact Occurs:	Uncertain – Regional to Continental. Energy released most likely to be in the range 54 Mt to 5.5 Gt

ADDITIONAL DETAILS:

- There is a 1% probability that asteroid 2023 PDC will impact Earth on 22 October 2036 as calculated by the NASA JPL Center for Near-Earth Object Studies and the ESA Near-Earth Objects Coordination Centre. While there is uncertainty in whether the asteroid will impact Earth, if an impact occurs it will be on this date.
- The impact risk corridor, which is the region of Earth where it is possible that 2023 PDC could impact, extends from the South Pacific to the southern Indian Ocean, crossing North America, the Atlantic Ocean, and Africa.
- The asteroid 2023 PDC has been tracked since it was first observed on 10 January 2023 by an international team using the Dark Energy Camera (DECam) at the Victor M. Blanco 4-meter Telescope at Cerro Tololo Inter-American Observatory in Chile and searching in the twilight region of the sky looking for asteroids in the inner Solar System.
- Further observations will reduce the uncertainty in the asteroid’s trajectory and impact probability. The asteroid will be almost continuously observable after late 2023, although it will be distant and quite faint and will likely require large (2-meter) telescopes.
- The asteroid size of 220 - 660 meters (720 - 2160 feet) is determined from its observed brightness (absolute magnitude H is determined to be 19.4) and an assumed range of most likely surface reflectivities.
- The size cannot be estimated with further precision without radar observations or imagery from a spacecraft that can closely approach the asteroid. The asteroid is too distant for radar observations and will not come within range until 2036.

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<https://cneos.jpl.nasa.gov/pd/cs/pdc23/>

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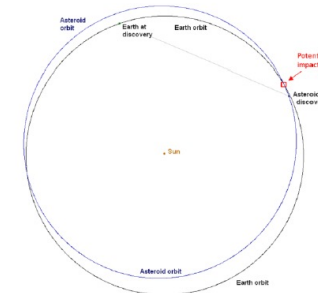
This notification is issued by the International Asteroid Warning Network (IAWN) in accordance with report [SMPAG-RP-003](#) on Recommended Criteria & Thresholds for Action for Potential NEO Impact Threat that defines the threshold for issuing warnings of possible impact effects, which is a probability of impact is greater than 1% and a rough size estimated to be greater than 10 meters (33 feet).

IAWN is a worldwide collaboration of asteroid observers and modelers that was recommended by the United Nations: <https://iawn.net>

Point of Contact: IAWN Coordinating Officer for the IAWN Steering Committee [email]

Graphics:

- Helio-centric orbit diagram relative to Earth orbit
- Impact risk corridor maps



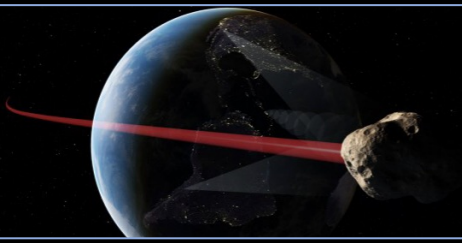
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2023 Planetary Defense Conference Hypothetical Asteroid Impact Threat Exercise Notification by IAWN – “2023 PDC”

- **Additional details and risk assessment were briefed by respective IAWN subject matter experts**

Exercise

- **Based on the hypothetical IAWN notification, SMPAG recommended in the exercise that a reconnaissance mission be quickly developed and launched**

Exercise

Summary

- IAWN membership has grown considerably since its establishment in 2014
 - **Currently 53 signatories from over 25 countries - October 2023**
- IAWN observing campaigns exercise the ability of the worldwide astronomical and modeling community to quickly coordinate and communicate, laying a valuable foundation in the event of an actual identified asteroid impact threat
- For details, membership, and for IAWN observing campaign information, see: <https://iawn.net/>

Latest IAWN campaign papers in the peer-reviewed literature:

Apophis Planetary Defense Campaign

<https://iopscience.iop.org/article/10.3847/PSJ/ac66eb>

International Asteroid Warning Network Timing Campaign: 2019 XS

<https://iopscience.iop.org/article/10.3847/PSJ/ac7224>

The logo features a stylized Earth on the left, with a red line representing an asteroid's trajectory passing through it. To the right of the Earth is a grey, cratered asteroid.

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Backup

<https://iawn.net/>

- On February 15, 2013, the same day as the Chelyabinsk impact, the United Nations Committee on Peaceful Uses of Outer Space Working Group on Near-Earth Objects was meeting in Vienna to finalize a recommendation to the U.N. on how to defend Earth from possible asteroid impacts
- One result of this meeting was an endorsement by the U.N. General Assembly for the establishment of
 - an **International Asteroid Warning Network (IAWN)** for worldwide collaboration on the detection and tracking of potential impact hazards and;
 - a **Space Missions Planning Advisory Group (SMPAG)** as a forum for the national space agencies to collaborate on plans for preventing any possible asteroid impact
- In January 2014, the IAWN steering committee held its first meeting, and SMPAG met for the first time later that year

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To: Chair, Space Mission Planning Advisory Group (SMPAG);
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Title: Potential for Impact of Near-Earth Asteroid 2023 PDC

Impact Probability: 1% as calculated by NASA JPL CNEOS and ESA NEOCC

Impact Date: 22 OCTOBER 2036

Impact Risk Corridor: From the South Pacific to the southern Indian Ocean, crossing North America, the Atlantic Ocean, and Africa

Approximate Size: 220 - 660 meters (720 - 2160 feet) determined from its observed brightness and an assumed range of most likely surface reflectivities

Expected Damage

Level if Impact Occurs: Uncertain – Regional to Continental. Energy released most likely to be in the range 54 Mt to 5.5 Gt

Exercise

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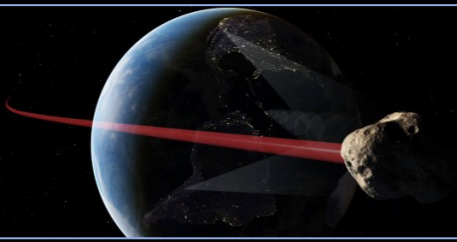
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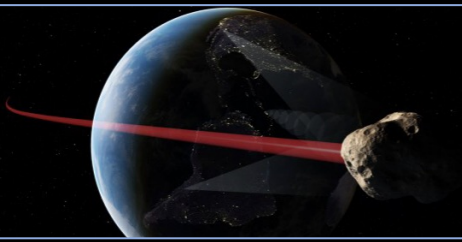
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- Impact risk corridor maps

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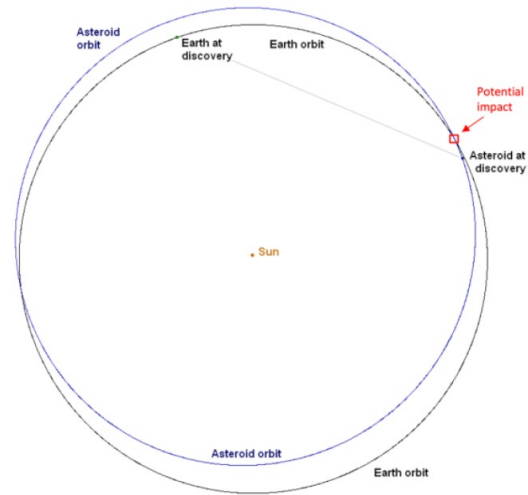


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