

NEMO Vol 2.

Status of the NEar real-time MOnitoring system

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NEMO Logo



NEar-real time MOnitoring system

Emphasis:

Bright fireballs, not all meteors

Goal:

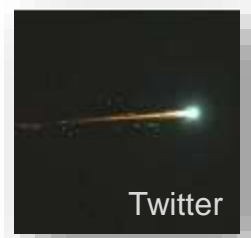
Validate models of meteoroid fluxes and the near-Earth asteroid population



Fireball over Warwick, Australia – 18. Aug. 2017

Main Objective

Fireball Sighting



Brighter
– 10 mag

Current Situation



Difficult (e.g. at ESA) to react to queries from public or journalists.

Coordination with FIS

Events brighter –10 mag



FIS

- **Fireball Information System** from Space Situational Awareness – Near Earth Object (NEO)
- in preparation at the NEO Coordination Center in Frascati, Italy

Goal

Information on Objects which:

- Regularly impact the Earth atmosphere
 - Are too small to be detected by NEO surveys
 - Cause bright fireballs
- ➔ Close the gap between large meteoroids and small asteroids



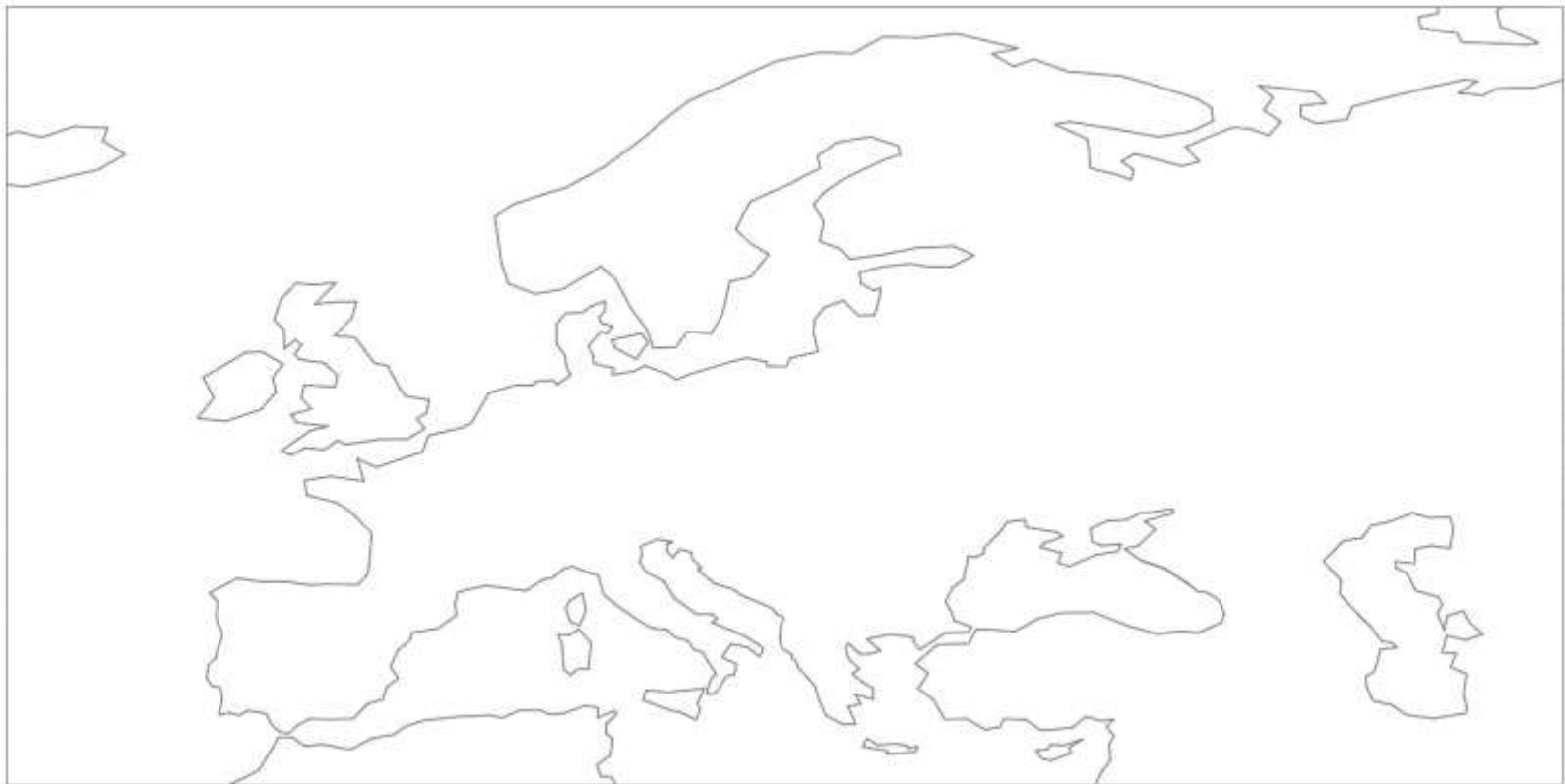
Data sources

- Data from infrasound stations of the CTBTO – Comprehensive nuclear-Test-Ban Treaty Organisation
- Publicly available data from US Government sensors
- Re-entry predictions of satellites and space debris
- Internet and social media
- Meteor networks



Some specific goals

Europe: Objects > 10 cm



Local Meteor Detections 29 June 2018 – the Netherlands

IMO International Meteor Organization

Event#2230-2018 - Witness Locations and Est. ground trajectory



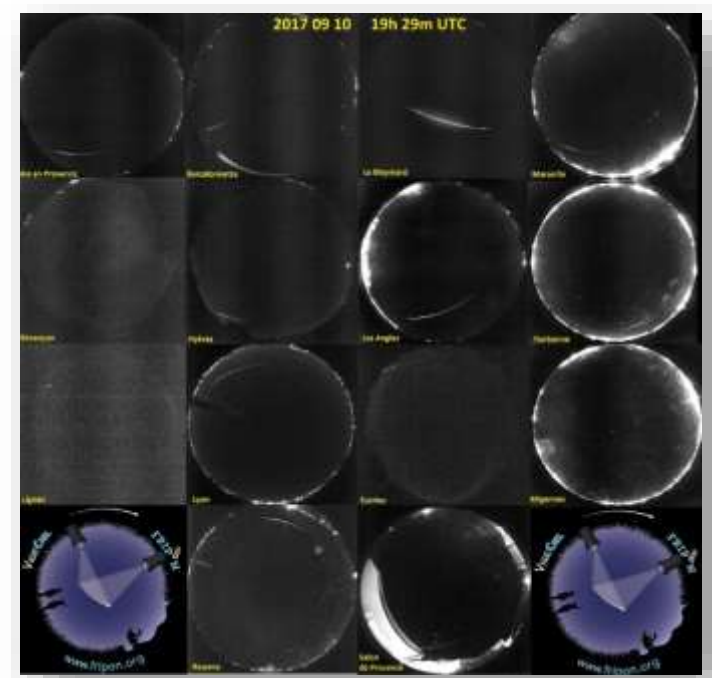
www.imo.net

FRIPON

Fireball Recovery and InterPlanetary Observation Network

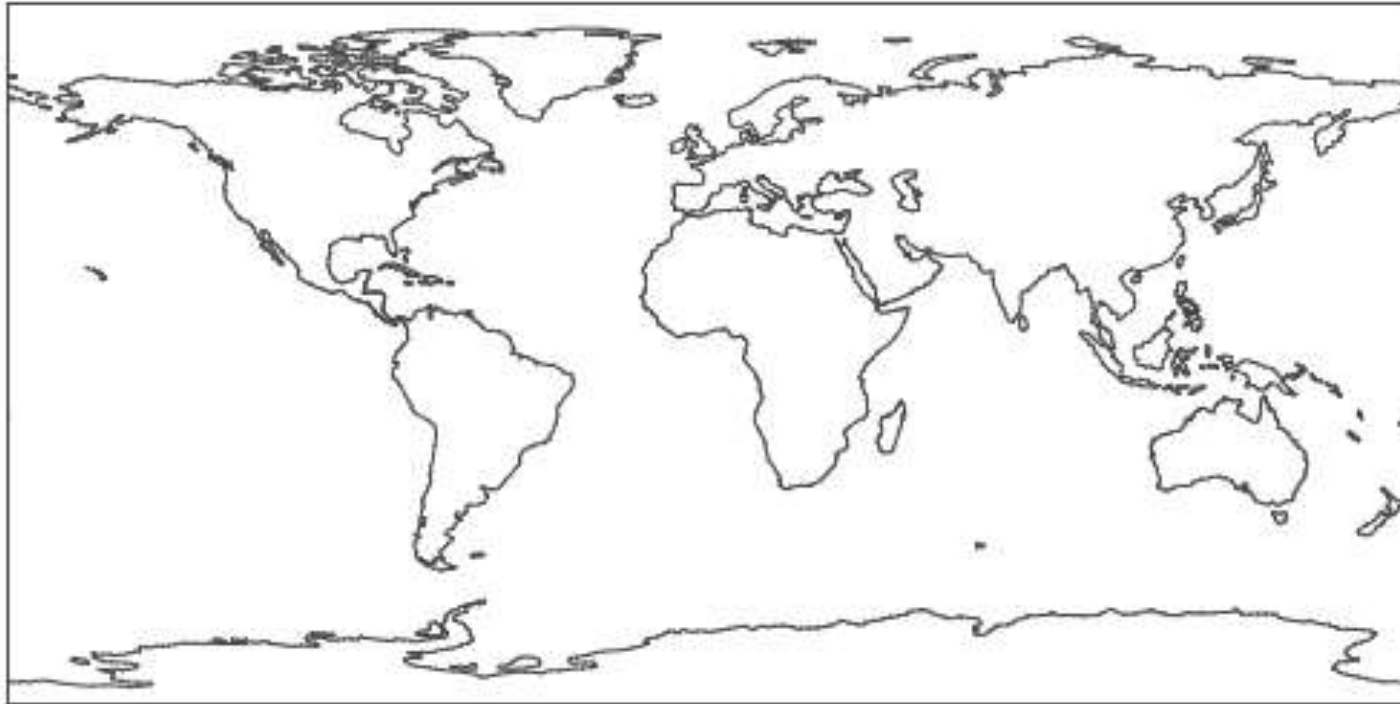


- Flux determination
- Sky Coverage



Some specific goals

Global: Objects > ca 1 m



Social Media



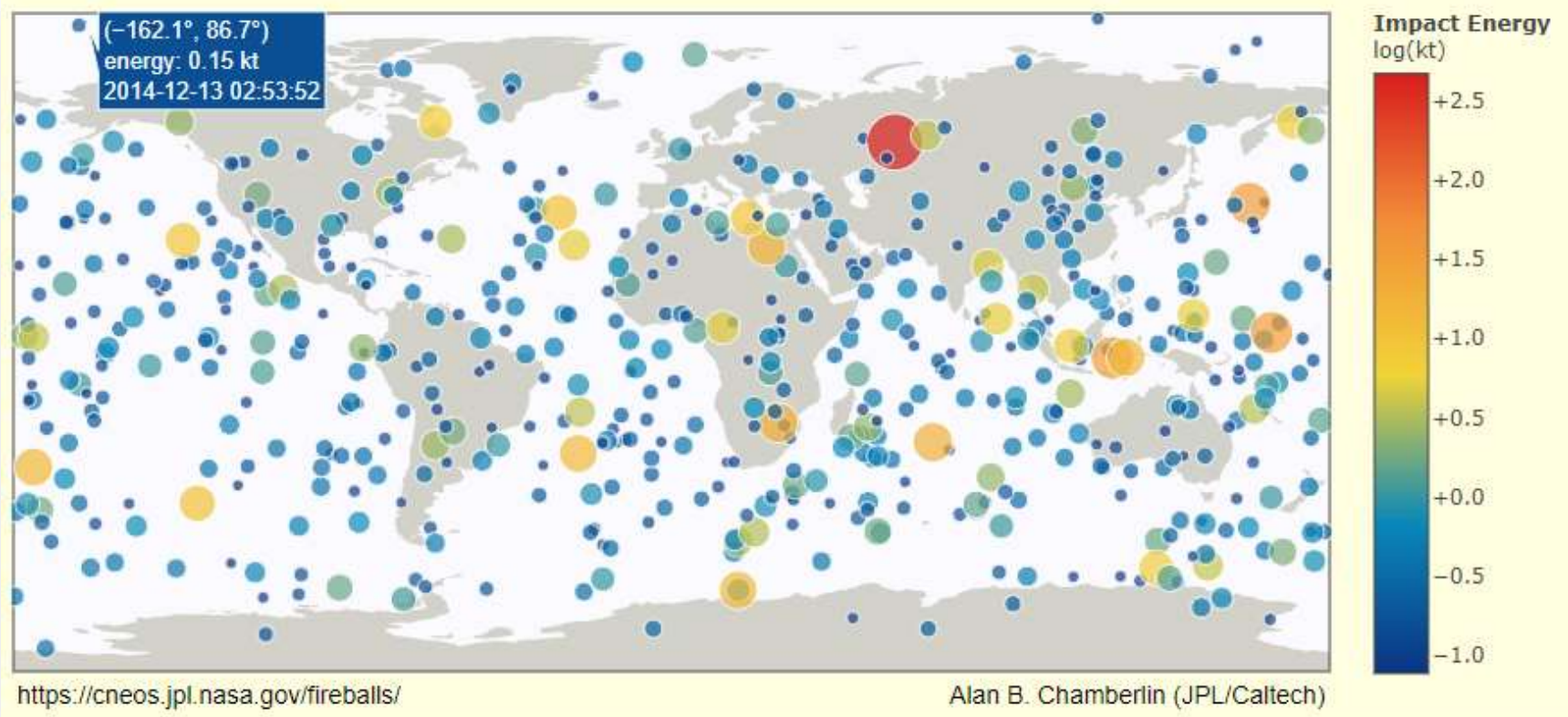
IMO



Google Alerts

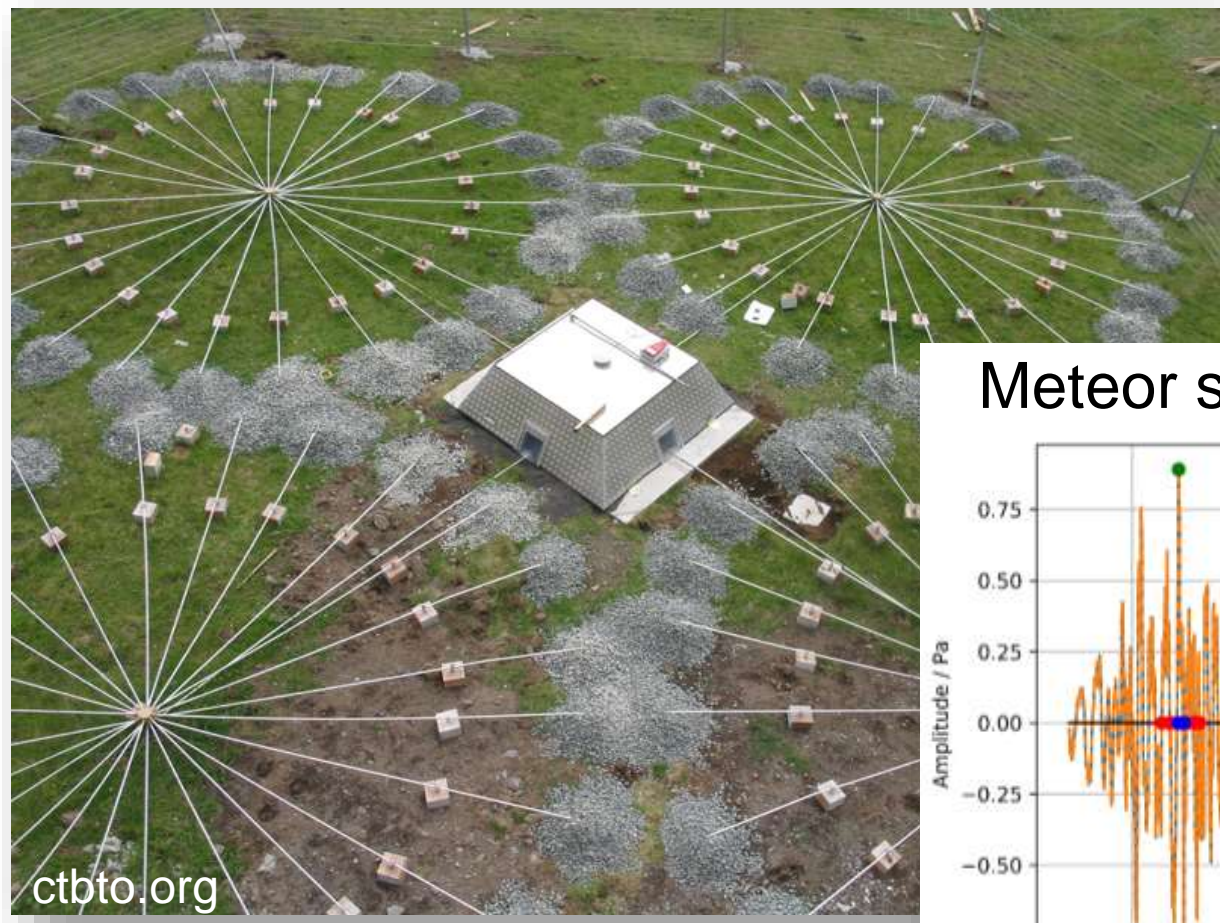
The NEMO-PC

NASA US Govt. Satellite Data

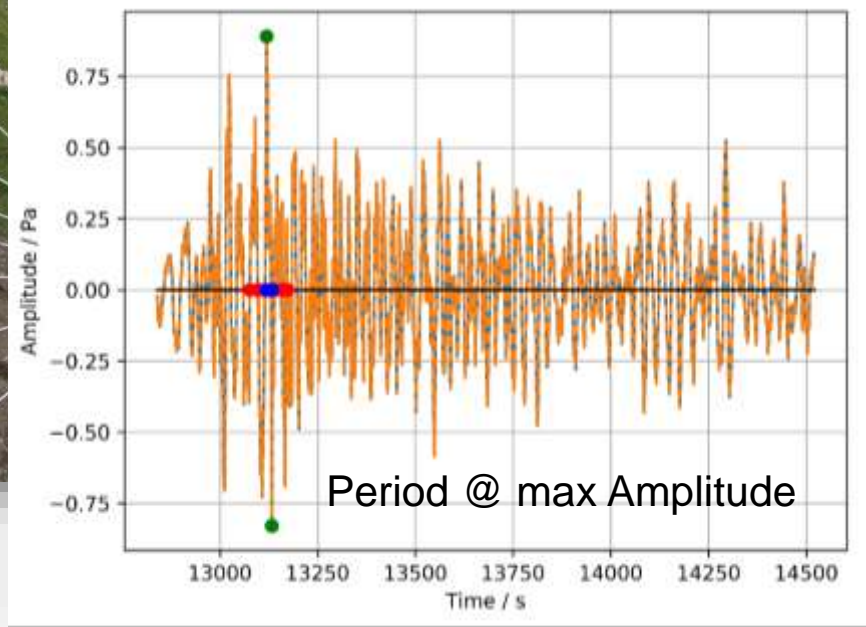


From CNEOS (Center for NEO Studies) and JPL (Jet Propulsion Laboratory)

IMS (International Monitoring System) - Infrasound



Meteor signal in waveform



NEMO Event



NEMO

NEMO Event



The Watchers
@TheWatchers_

Folgen

Very bright daylight #fireball explodes over #Russia, #meteorites possible



Very bright daylight fireball explodes over Russia, meteorites possible
A very bright daylight fireball exploded over western Russia at 01:11 UTC on June 21, 2018. The event lasted several seconds before the object disintegrated in a bri...
watchers.news

04:52 - 21. Juni 2018

NEMO Event



Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)

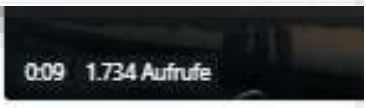
The Watchers
@TheWatchers_

Very bright daylight #fireball
#Russia, #meteorites possible



Very bright daylight fireball explodes over Russia
A very bright daylight fireball exploded over western Russia on June 21, 2018. The event lasted several seconds and was followed by a bright flash and a meteorite fall.

04:52 - 21. Juni 2018



14 46

Lassina Zerbo
@SinaZerbo

#CTBT #IMS detection of a #Bolide above western #Russia 🇷🇺 The automatic process used 4 IMS infrasound stations; IS43 (#Russia - Dubna), IS26 (#Germany) IS48 (#Tunisia) IS42 (#Portugal – Azores Island). Analyst review expected to add about 7 additional #infrasound stations.



Daytime fireball over Russia

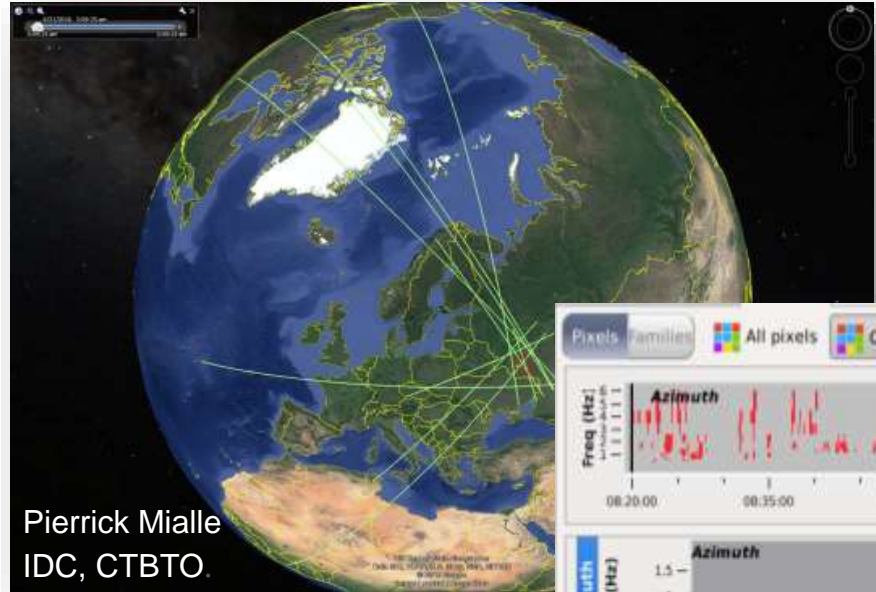
21 June 2018 - 01:15 UT (04:15 LT)



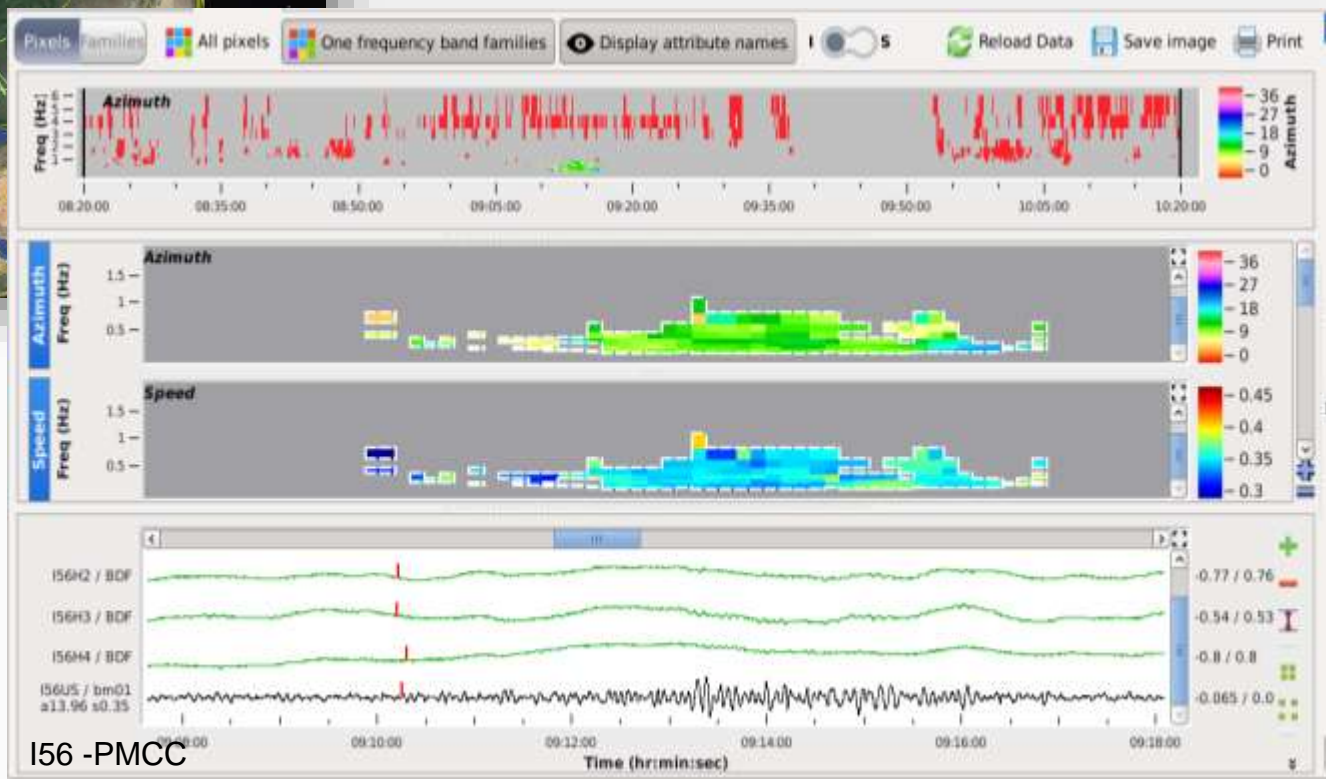
NEMO

Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)



Pierrick Mialle
IDC, CTBTO



Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)

10 Infrasound stations

- a source energy of **2.4 kt TNT.**
- a size of about **4 m**

CNEOS/JPL found

- a time of 01:16:20 UT
- a velocity of 14.4 km/s
- a source energy of **2.8 kt TNT.**



Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)

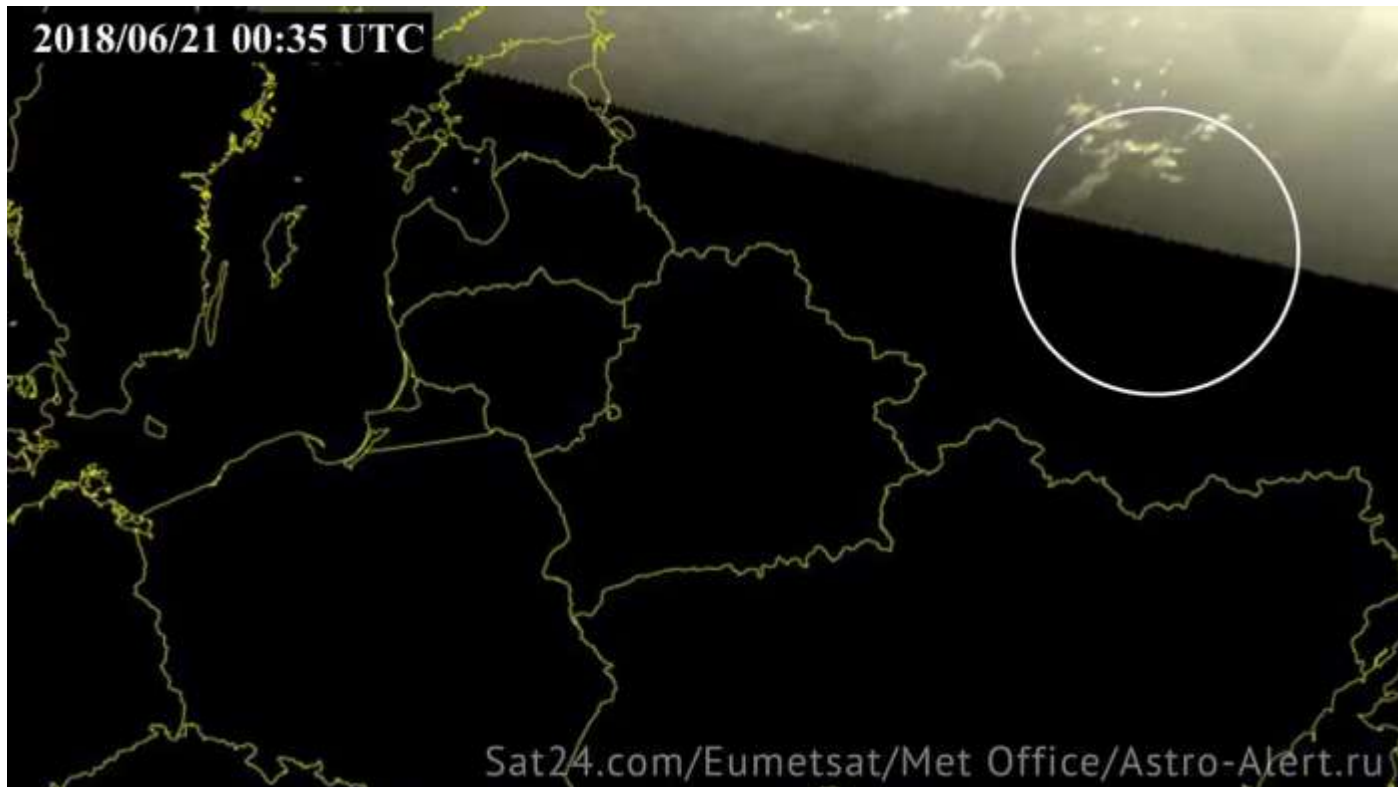


NEMO

Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)

Detected with weather radar

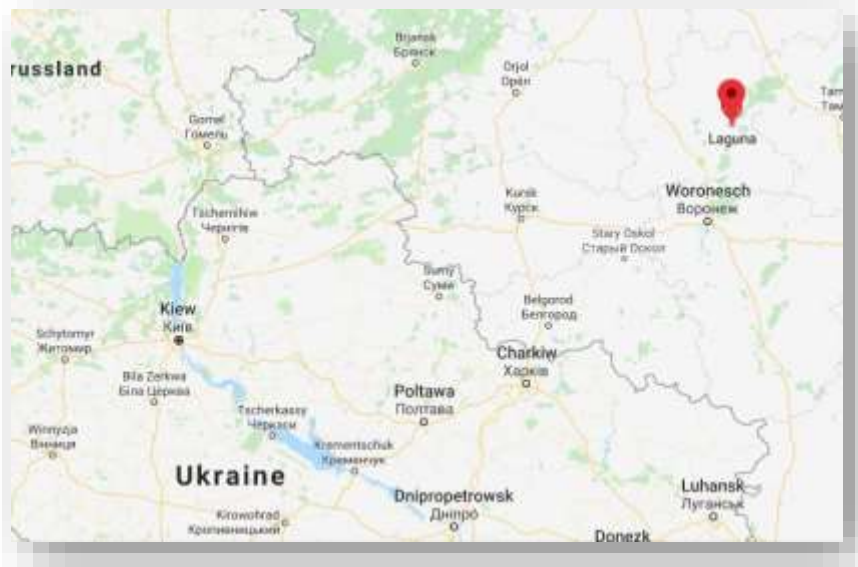


Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)

Scientists from the Ural Federal University

- Found **3 meteorites**
- Smallest: 3 cm



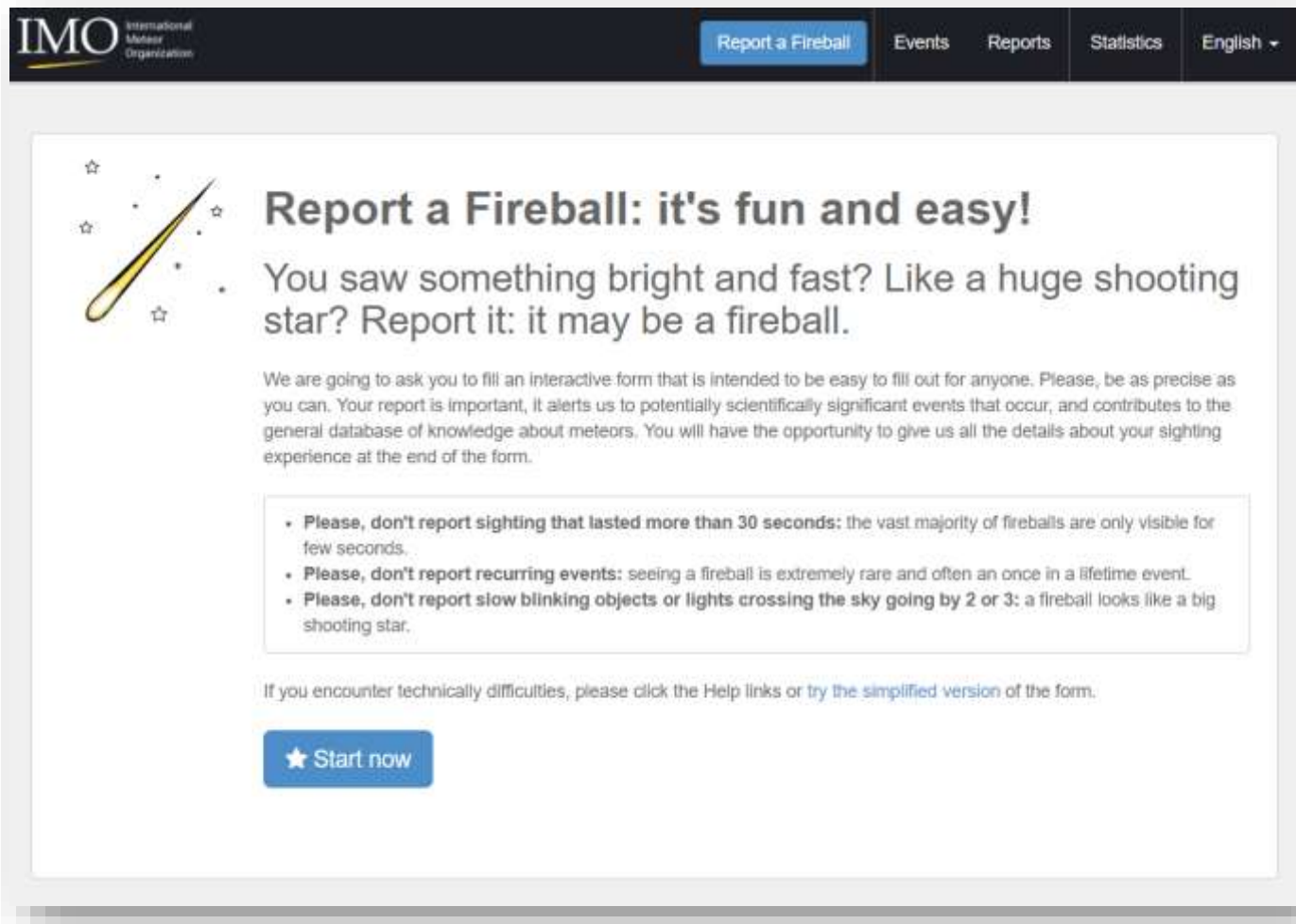
Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)



Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)



The screenshot shows the International Meteor Organization (IMO) website. At the top left is the IMO logo with the text 'International Meteor Organization'. To its right is a navigation bar with a blue button labeled 'Report a Fireball' and links for 'Events', 'Reports', 'Statistics', and 'English'. The main content area features an illustration of a fireball streaking across a starry sky. The heading reads 'Report a Fireball: it's fun and easy!'. Below this, the text asks if the user saw something bright and fast, like a huge shooting star, and encourages them to report it. A paragraph explains that the report is used for scientific purposes. A box contains three bullet points: 'Please, don't report sighting that lasted more than 30 seconds', 'Please, don't report recurring events', and 'Please, don't report slow blinking objects or lights crossing the sky going by 2 or 3'. At the bottom, there is a link to a simplified form and a blue button with a star icon and the text 'Start now'.

IMO International Meteor Organization

[Report a Fireball](#) [Events](#) [Reports](#) [Statistics](#) [English](#)

Report a Fireball: it's fun and easy!

You saw something bright and fast? Like a huge shooting star? Report it: it may be a fireball.

We are going to ask you to fill an interactive form that is intended to be easy to fill out for anyone. Please, be as precise as you can. Your report is important, it alerts us to potentially scientifically significant events that occur, and contributes to the general database of knowledge about meteors. You will have the opportunity to give us all the details about your sighting experience at the end of the form.

- **Please, don't report sighting that lasted more than 30 seconds:** the vast majority of fireballs are only visible for few seconds.
- **Please, don't report recurring events:** seeing a fireball is extremely rare and often an once in a lifetime event.
- **Please, don't report slow blinking objects or lights crossing the sky going by 2 or 3:** a fireball looks like a big shooting star.

If you encounter technical difficulties, please click the [Help links](#) or try the [simplified version](#) of the form.

★ [Start now](#)

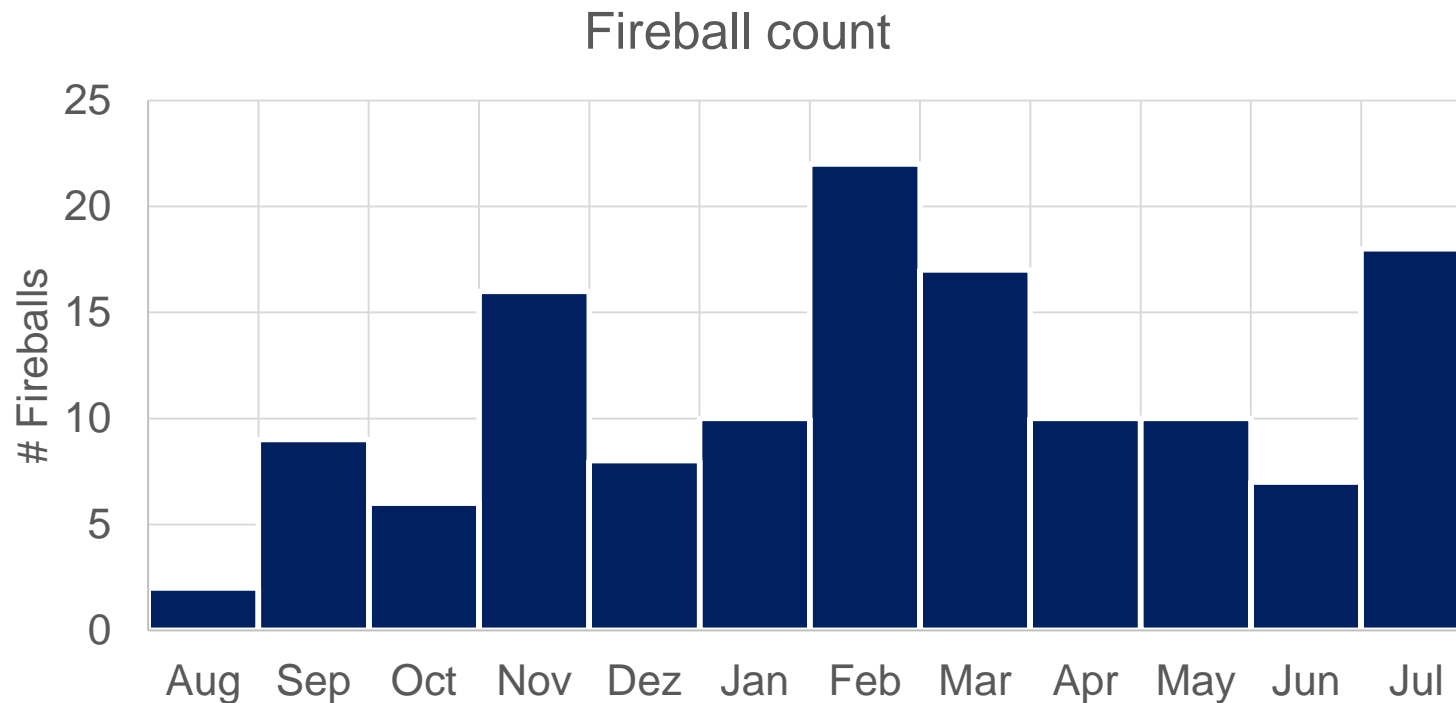
Daytime fireball over Russia

21 June 2018 - 01:15 UT (04:15 LT)

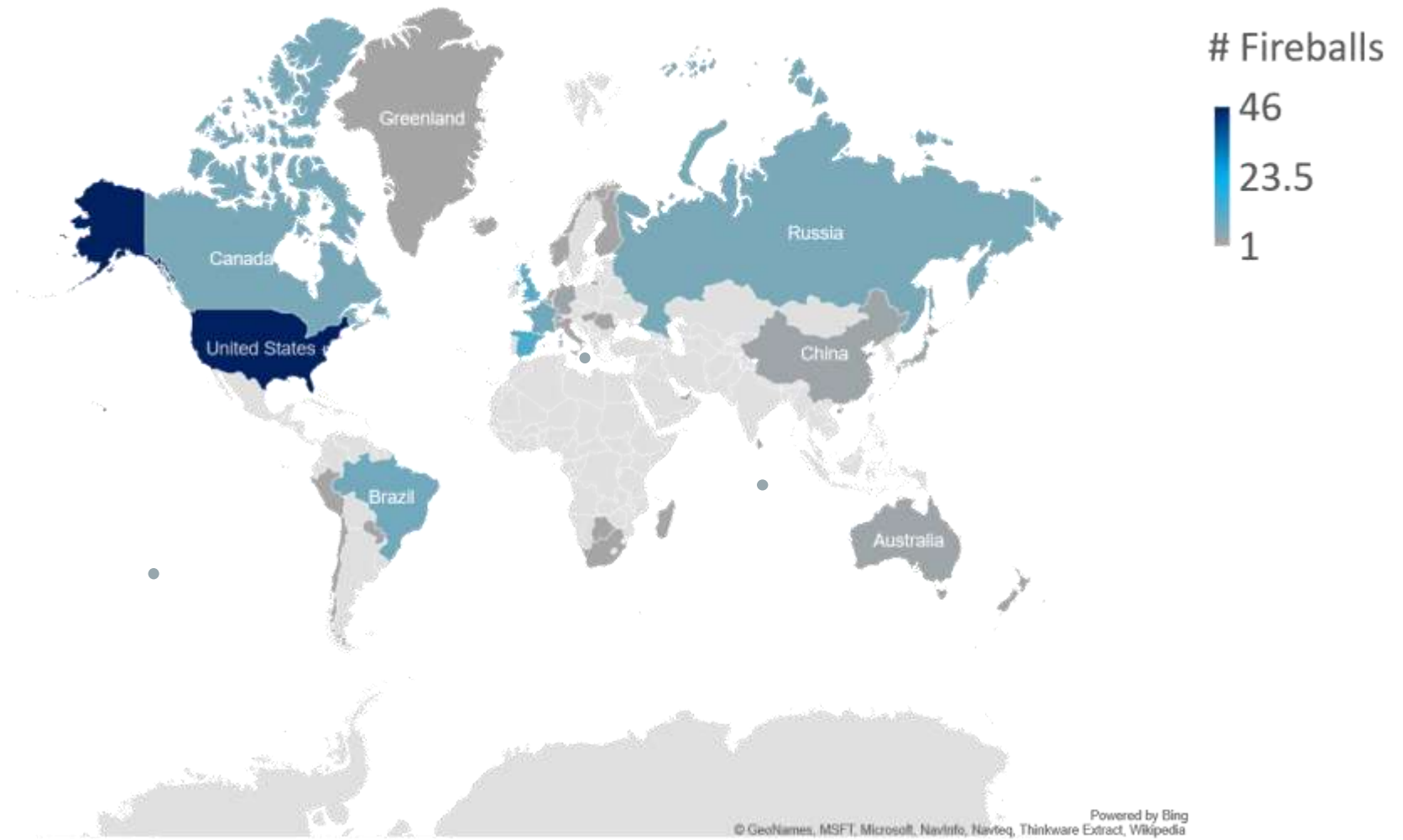
The screenshot shows the homepage of the International Meteor Organization (IMO). The header features the IMO logo and navigation links: News, Photos & Videos, Observations, Resources, WGN Shop, Conference IMC, and About. The main article is titled "Daytime Fireball over Russia on June 21" and is dated June 22, 2018. It is attributed to Theresa Ott and Esther Drolshagen, with 38 comments and tags for "Fireball" and "News". Social media sharing options for Google+, Twitter, Facebook (747 likes), and a general share button are visible. The article text describes a bright fireball over western Russia on June 21, 2018, at 01:15 UT (04:15 LT), which was captured on video and reported by witnesses from Kursk, Lipetsk, Voronezh, and Orel. A video player below the text shows a bright fireball streaking across a blue sky, with the Russian text "В НЕБЕ НАД ЦЕНТРАЛЬНОЙ РОССИЕЙ ВЗОРВАЛСЯ МЕТЕОРИТ, 21 ИЮ..." (A meteorite exploded in the sky over central Russia, 21 June...).

NEMO Events

- First NEMO Event was in August 2017
- About one year of test-operation
- Since then there are 135 Events in our alert-data-base



World Map Event



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Outlook

- Stable NEMO monitoring of:
 - Twitter
 - Facebook
 - News
 - Etc.
- FRIPON fireball flux determination
- Reliable infrasound energy determination and semi-automation
- Data from existing fireball networks and other sources
 - ➔ Access, analyze, and combine



Thank you for your attention

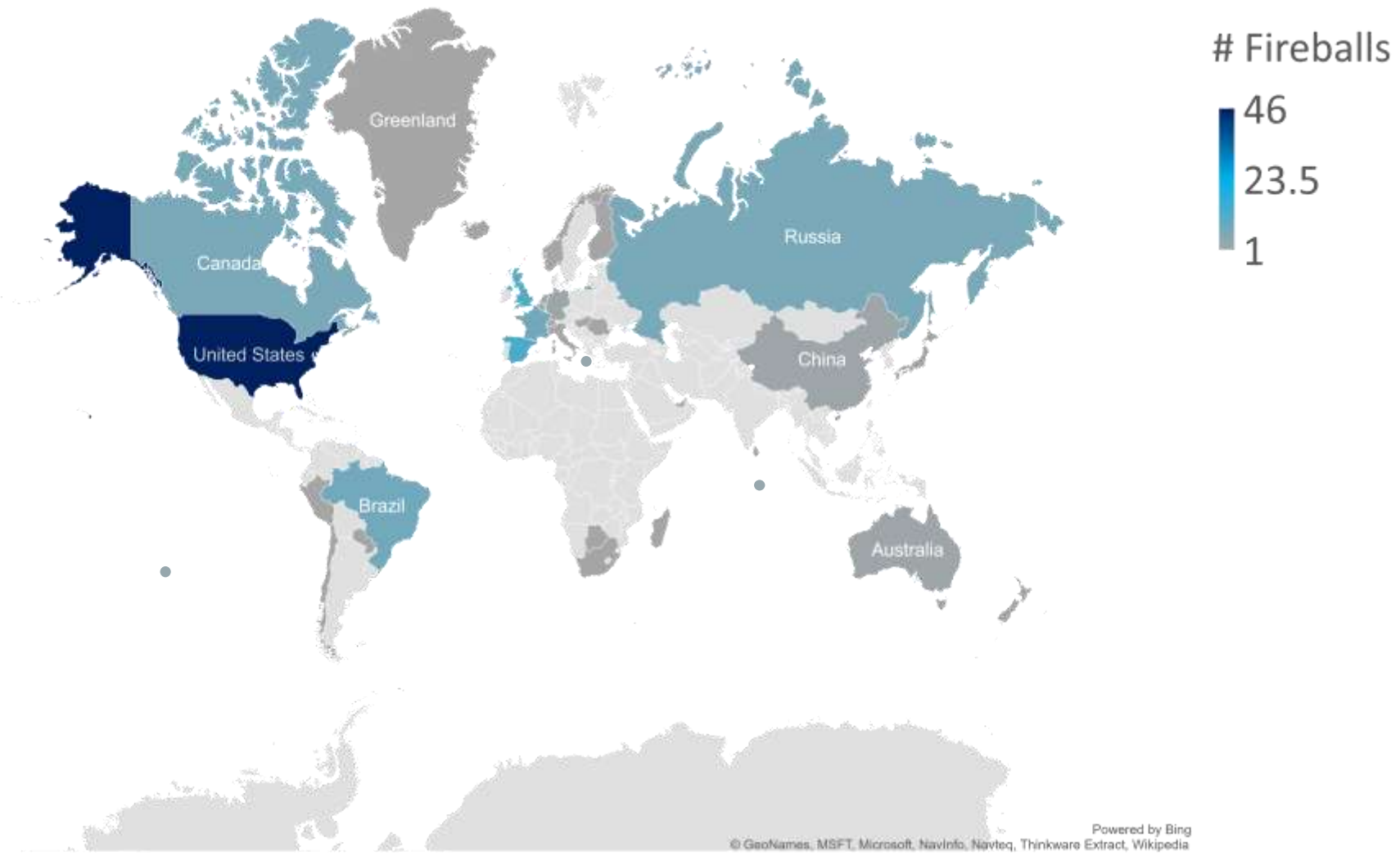


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World Map Event



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