

The NEO problem: current activities in Russia

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General activities (Feb 2013 – Feb 2014)

- @ 2013 March, 12 – Round table of the Committees for science and defense of the Federation Council (Upper chamber of the Russia Parliament);
- @ 2013 November, a series of meetings in Roscosmos on cooperative approach to the NEO problem;
- @ Telecon EMERCOM-FEMA January 28, 2014;
- @ A number of expeditions were organized to the region of the fall of Chelyabinsk meteorite;
- @ All Russia science conferences in Chelyabinsk (April 2013) and in Krasnodar (October 2013) were held.

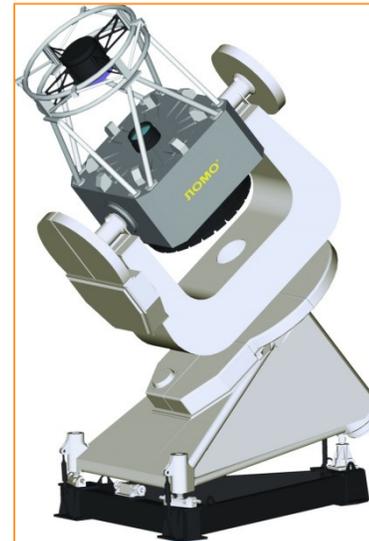
Basic aspects of the NEO problem

Major constituents of the NEO (Asteroid/Comet Impact Hazard - ACH) problem are:

- Detection and characterization
- Risk assessment
- Protection and mitigation

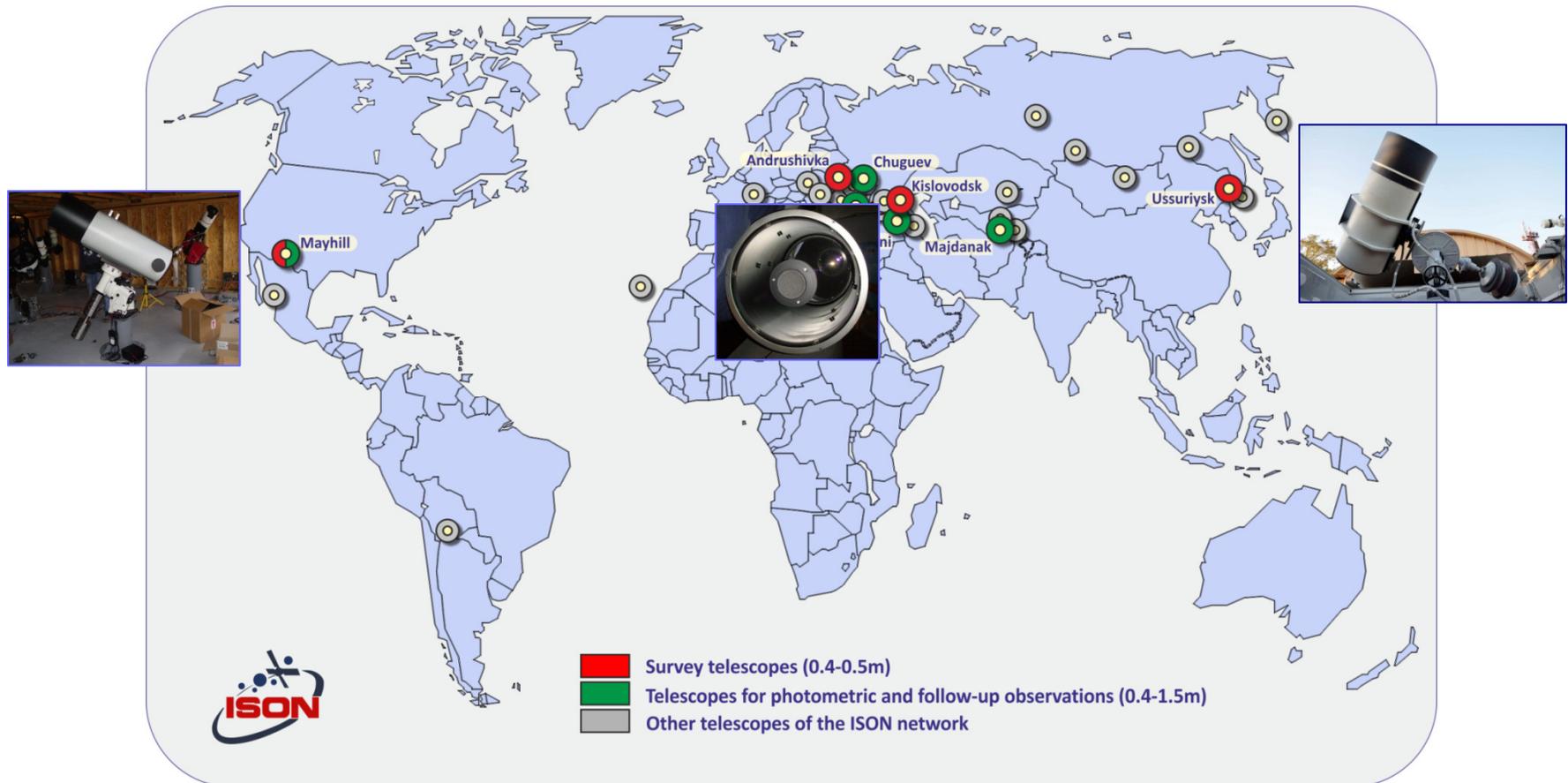
We work in all areas both at national and international levels.

To the NEO massive detection



The telescope AZT-33VM (\varnothing 1.6 m) for massive detection of NEOs at large distances is under construction near Baikal Lake. We plan to complete it in 2017. This is supported by Academy of Sciences and Roscosmos.

ISON telescopes for NEO surveys and follow-up observations



ISON (International Scientific Optical Network) – one of largest Russian networks capable to observe NEOs at near space. It is partially supported by Roscosmos.

ISON : results on asteroids

Hundreds of light curves were constructed for tens of NEAs

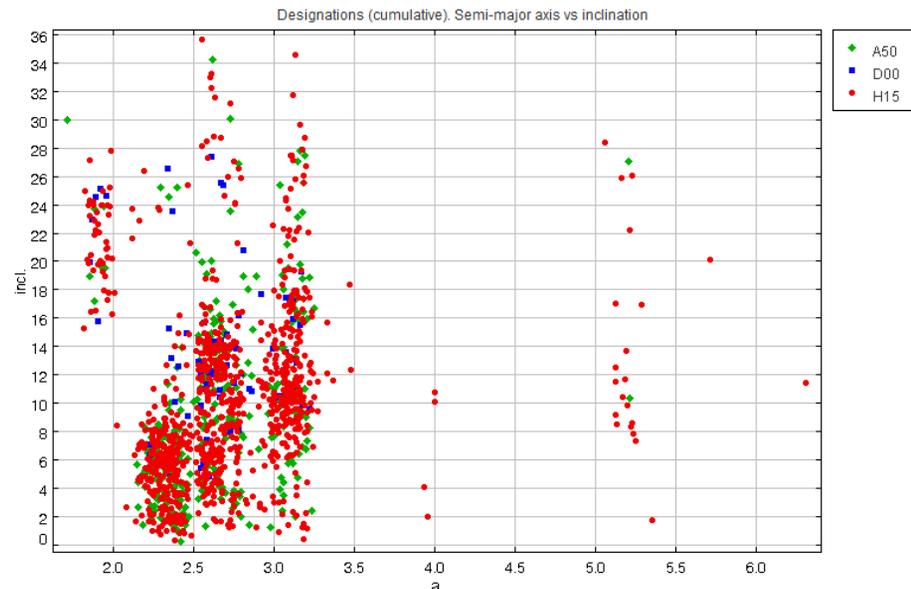
(3122) Florence, (20187) Janapittichova, (25916) 2001 CP44, (162004) 1991 VE, (7888) 1993 UC, 1998 VO, (47035) 1998 WS, 2000 WN22, 2001 WC47, 2002 GT, 2012 EG5, 2012 DX75, 2012 KP24, 2012 KT42, 2012 LZ1, 2012 QG42, 2012 TC4, 2012 DA14...

YORP-effects is estimated: (2100) Ra-Shalom и (88710) 2001 SL9

Binarity of asteroids:

(3352) McAuliffe, (8373) Stephengould, (7888) 1993 UC, (68216) 2001 CV26, (137170) 1999 HF1, (329437) 2002 OA22, (8306) SHOKO

Discoveries: 6 comets - C/2010 X1 (Elenin), P/2011 NO1 (Elenin), **C/2012 S1 (ISON)**, C/2013 V3 (Nevski), C/2013 N4 (Borisov), C/2013 V2 (Borisov), 8 NEAs, 1500+ asteroids

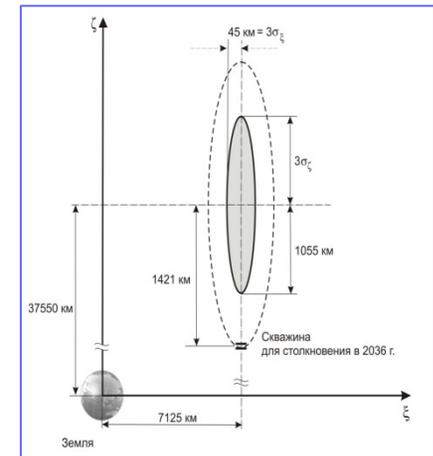


We consider participation in the IAWN as important step to the real international cooperation in detection and characterization the dangerous celestial bodies.

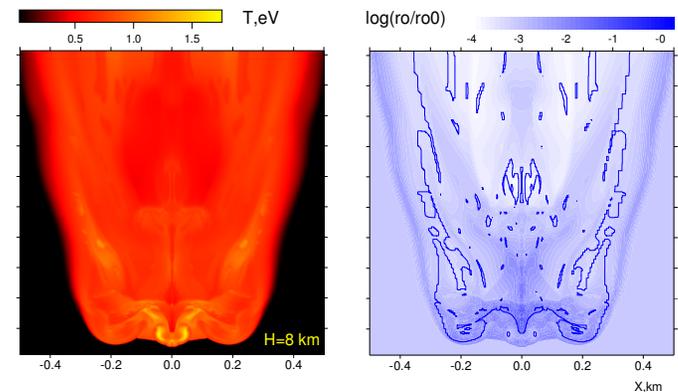
Risk assessment

risk = probability of collision × consequences

There exists a number of research capabilities in Russia for thorough determination of NEO orbit and probability collision. These are both in Academy of Sciences and universities.



The reasonably precise determination of consequences remains a challenge. There are research groups in EMERCOM and Academy of Sciences that develop the relevant technologies.



An initiative of construction the international bank of impact consequences

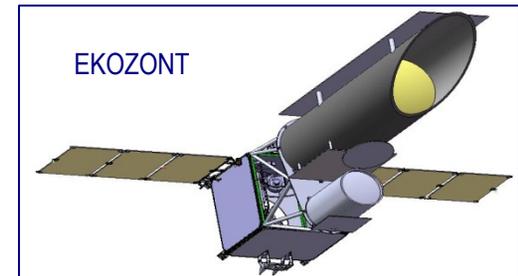
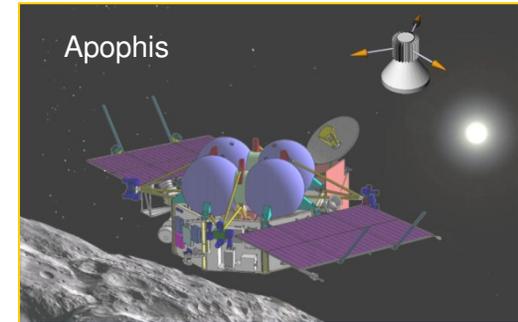
It was proposed at PDC-2013 to construct a data-bank of impact consequences. The data bank is considered to be similar to those elaborated and/or being under creation for tsunami and climatic hazards in some countries.

The consequences of a collision are very dependent on many details. The suggestion is to pre-calculate the consequences for all the most “sensitive” regions on the Earth during “quiet age” (before the next serious collision). This will speed up and facilitate decision-making process. It is clear that for some countries it will be problematic to construct an own part of the relevant data bank.

A dedicated international program would be helpful.

Protection and mitigation

Protection: Various projects of space based means for both to detect (to study) and to counteract (to deviate the threatening body or destroy it) are suggested.



We consider participation in SMPAG as important step to cooperation in space to counteract ACH threat.

Mitigation: After the Chelyabinsk event significant efforts were made in Russia to include newly appeared threats into the scope of national system of civil defense.

We consider establishing of suggested Impact Disaster Planning Advisory Group as important step to cooperation in space to counteract the NEO space threat.

Experts from EMERCOM are ready to participate in establishing the group and in future work.

NEO problem: time to work together!