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Attachment(s):

- (1) "Poster_2458-1", 750 KB pdf, one page.
- (2) "ISON_tech-07E", 2.7 MB pdf, 19 pages.

: Re:
: (1) Low Latitude Ionospheric Research (Italy)
: (2) Results of GEO and HEO monitoring
: by ISON network in 2012 (Russia)
:

Dear ISWI Participant:

There are two items for today:

----- (Item 1) from Sandro M. Radicella of ICTP of Italy.

>Subject: Workshop on GNSS Data Application to
> Low Latitude Ionospheric Research
>Date: Wed, 27 Feb 2013 12:14:46 +0100
>To: George Maeda <maeda@serc.kyushu-u.ac.jp>
>
>Dear George:
>Please find attached the poster of the Workshop. We
>already selected the participants to the Workshop (about
>50 from Africa, Asia and South America from 200 applicants)
>but we could still accept few people if they are cost free for us.
>Thank you for your interest in our activities!
>Best regards
>
>Sandro

----- (Item 2)

Attached is this presentation by the Russian Academy of Sciences
(Keldysh Institute of Applied Mathematics) :
"Results of GEO and HEO monitoring by ISON network in 2012"
(during the 50th session of STSC COPUOS 11-22 Feb 2013 at Vienna).

Effectively, it means the astronomical telescope donation
programme (previously conducted by Japan) will be continued
by the Russian Federation, through the Russian Academy of Sciences.
The attached document, therefore, indicates a continuation of
basic space science of the UN BSSI, which has a history spanning
two decades.

The attached document presents the following conclusions:

Conclusions

- * Partnership is established between UN BSSI and ISON
- * ISON network collects on a routine basis astrometric and brightness measurements for more than 1800 objects in GEO region and more than 1400 objects at HEO orbits
- * Obtained measurement data are processing to improve orbits and to find various events (appearance of a new object due to launches, fragments separation etc., possible close encounter, manoeuvres of different purpose)
- * Accumulated information is using to support spaceflight safety tasks, including those ones solving within the framework of ASPOS OKP system by Roscosmos jointly with RAS
- * ISON continues to develop an asteroid research program
- * Development of ISON -- the first international network for monitoring near-Earth space -- continues and all nations are welcome to join us.

Respectfully yours,

: George Maeda
: The Editor
: ISWI Newsletter



Workshop on GNSS Data Application to Low Latitude Ionospheric Research

6 - 17 May 2013

Trieste, Italy

The Abdus Salam International Centre for Theoretical Physics, in co-operation with Boston College (BC) of the United States, is organizing a **Workshop on GNSS Data Application to Low Latitude Ionospheric Research from 6 - 17 May 2013.**

WORKSHOP PURPOSE AND TOPICS

The low latitude ionosphere is a dynamic geophysical system that is difficult to study. Indeed the complex ionospheric and atmospheric dynamics within this region contribute to the formation of the so-called "Equatorial Anomaly" that extends from the magnetic equator to 30° geomagnetic latitude in each hemisphere. At low latitudes, unique phenomena occur (such as near-midnight TEC enhancements, TEC depletions or equatorial plasma bubbles and scintillation). They can affect Satellite Navigation Systems but, likewise, they can be studied using ground and space-based GNSS data. Many Developing Countries are located under the Ionospheric Equatorial Anomaly, where those effects on Satellite Navigation System are more remarkable.

In the last few years different institutions have started to deploy several experimental instruments of different kinds (e.g. GNSS receivers, ionosondes, magnetometers, etc in low latitude Countries, such as in Africa, South-America and Asia, over which the ionosphere had remained less known because of the scarce distribution of ionospheric sensors. As a consequence the new sets of data now available are expected to make possible improvements in ionospheric modeling efforts particularly considering data assimilation techniques. In addition the possibility to help explain some specific phenomena that take place in this region (and that are still not well understood) could be envisaged. Moreover, GNSS are used to provide positioning accuracy and safety for navigation on the ground, in the air and on the sea. Since the ionosphere is a major error source for GNSS performance, an improved knowledge of the low latitude ionosphere would help to address mitigation techniques for ionospheric effects on GNSS positioning applications (e.g. precision agriculture, environmental monitoring, civilian aviation) in the same geographic region.

More specifically the following topics will be considered:

- Fundamentals and Applications of GNSS;
- Basics on the ionosphere and space weather effects;
- Low Latitude Ionosphere;
- GNSS derived ionospheric data;
- Ionospheric models;
- Ionospheric irregularities in low latitudes;
- Data assimilation in ionospheric models;
- Ionospheric specification and forecast in low latitudes;
- Longitudinal differences in low latitude ionosphere;
- Low latitude ionosphere effects on Satellite Navigation Systems.

This pdf circulated in
 Volume 5, Number 024,
 on 28 Feb 2013.



The Workshops will be taught by worldwide experts in GNSS science and technology.

PARTICIPATION

The Workshop calls for the participation of a number of researchers/professors from developing countries to consolidate the establishment of GNSS programs and research at university level in their region. The activity will be conducted in English, therefore participants should have an adequate working knowledge of this language.

As a rule, travel and subsistence expenses of the participants should be borne by the home institution. Every effort should be made by candidates to secure support for their travel expenses. However, limited funds are available for some participants, who are nationals of, and working, in developing countries. Such support is available only for those who attend the entire activity. There is no registration fee.

HOW TO APPLY FOR PARTICIPATION

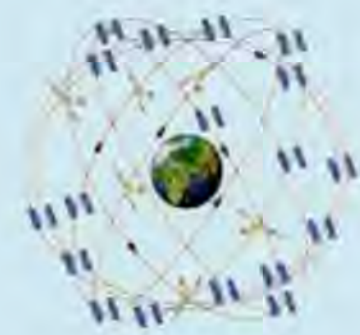
The application form can be accessed at the activity website
http://cdsagenda5.ictp.it/full_display.php?id=a12180

Once in the website, comprehensive instructions will guide you step-by-step, on how to fill out and submit the application form.

Deadline for requesting participation: **31 January 2013**

ACTIVITY SECRETARIAT

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MAIN CO-SPONSORS:

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Deadline is extended
 for those who can
 pay their own way.

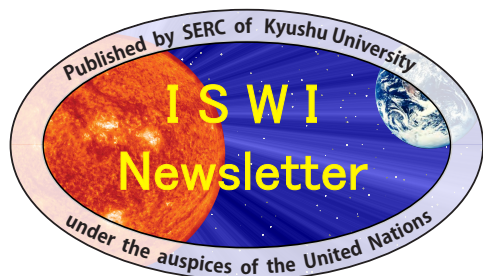
DEADLINE
 for requesting participation

31 January 2013



Russian Academy of Sciences
Keldysh Institute of Applied Mathematics

Results of GEO and HEO monitoring by ISON network in 2012



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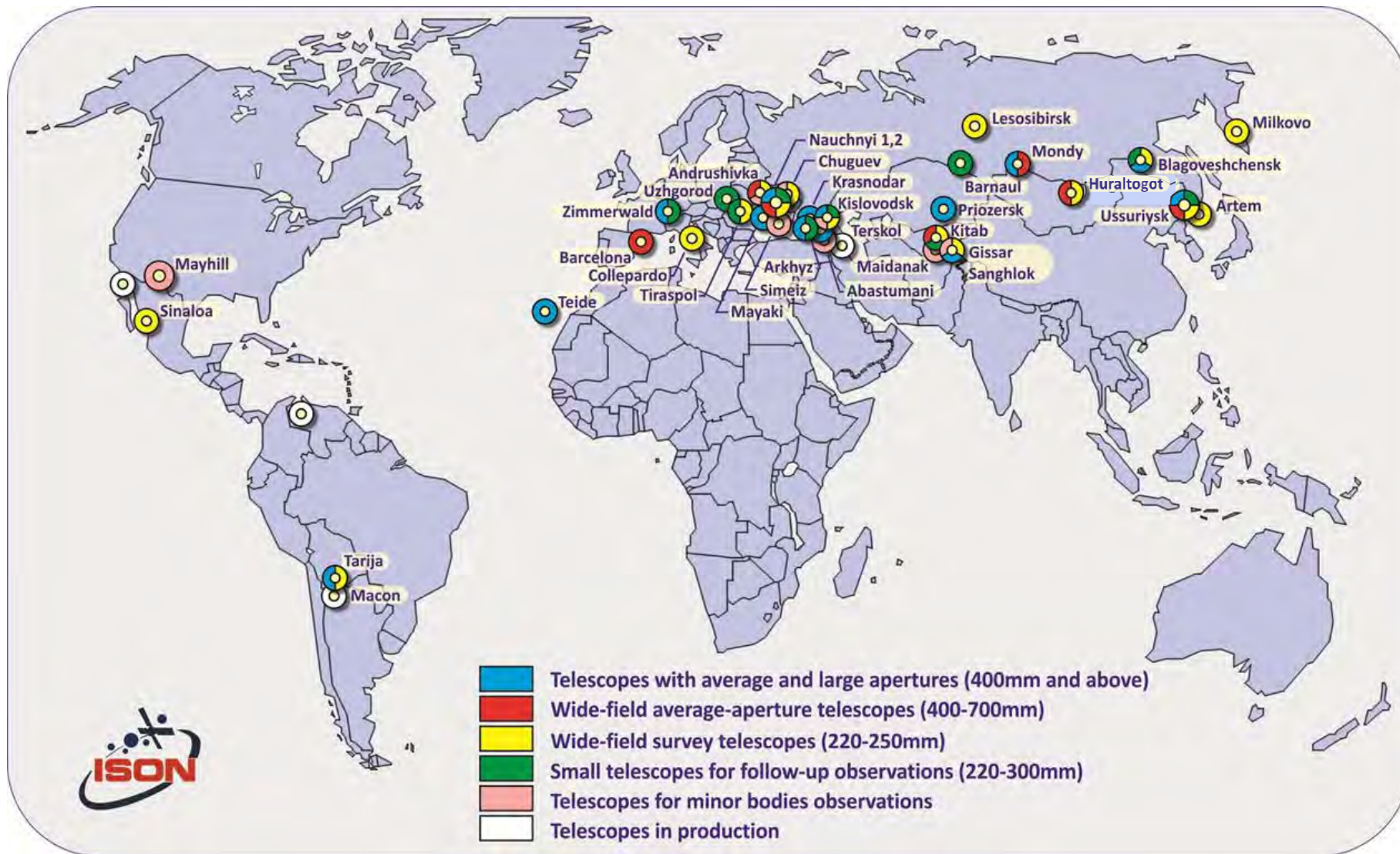
50th session of STSC COPUOS
Vienna
11-22 Feb 2013

ISON – International Scientific Optical Network

As of Dec 2012 ISON joins:

- Observation scheduling, coordination and data processing center (KIAM RAS)
- 32 facilities (including 28 ones for space debris observations) in 13 countries with nearly 50 telescopes of different class (aperture from 19 cm to 2.6 m)
- Company for the network maintenance and instruments development (ASC Project-Technics)

ISON observatories



ISON Research Goals in Space Debris Area

- Estimation of real population of space debris at higher geocentric orbits
- Determination of physical properties of discovered space debris objects
- Determination of probable sources of newly discovering space debris fragments
- Verification of existing models of space debris distribution and evolution at higher orbits
- Higher orbit space debris risk assessment
- Improvement of technologies of studying of space debris population using optical instruments
- Improvement of motion models for space debris objects with complex physical properties

ISON Milestones in 2012

The UN BSSI and ISON cooperation is established. UNBSSI-ISON Outreach Seminar as a side event of the 55th Session of the UN COPUOS

New partners joined ISON:

- The Autonomous University of Sinaloa (Universidad Autónoma de Sinaloa, UAS), Mexico
- The Research Centre of Astronomy and Geophysics of the Mongolian Academy of Sciences

3 facilities put into operation:

- Cosalá, Sinaloa, Mexico
- Khureltogoot, Mongolia
- Kislovodsk, Russia

Regular Molniya-type HEO surveys started.

270 new high orbit (GEO and HEO) debris are discovered



UN BSSI - ISON



UN Basic Space Science Initiative (BSSI) - ISON Outreach Seminar took place as a side event of 55th Session of the UN COPUOS on June 11th, 2012.

The established cooperation is a step towards broader involvement of all nations into fundamental and applied research of space debris problem, further development of international practice of information exchange and analysis in this area.

First ISON observation facility in Mexico – joint project with Universidad Autónoma de Sinaloa



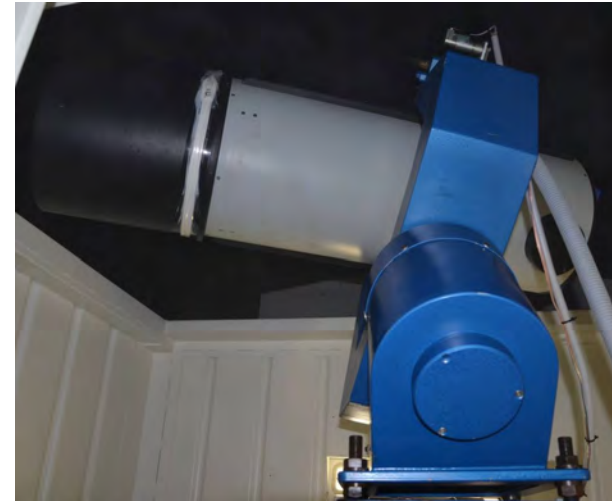
left: shelter with 25-cm telescope in Cosalá, Sinaloa (Mexico);

center: the commemorative plaque

right: outreach and educational seminar at the facility;

bottom: numerous visitors around the telescope at the opening ceremony

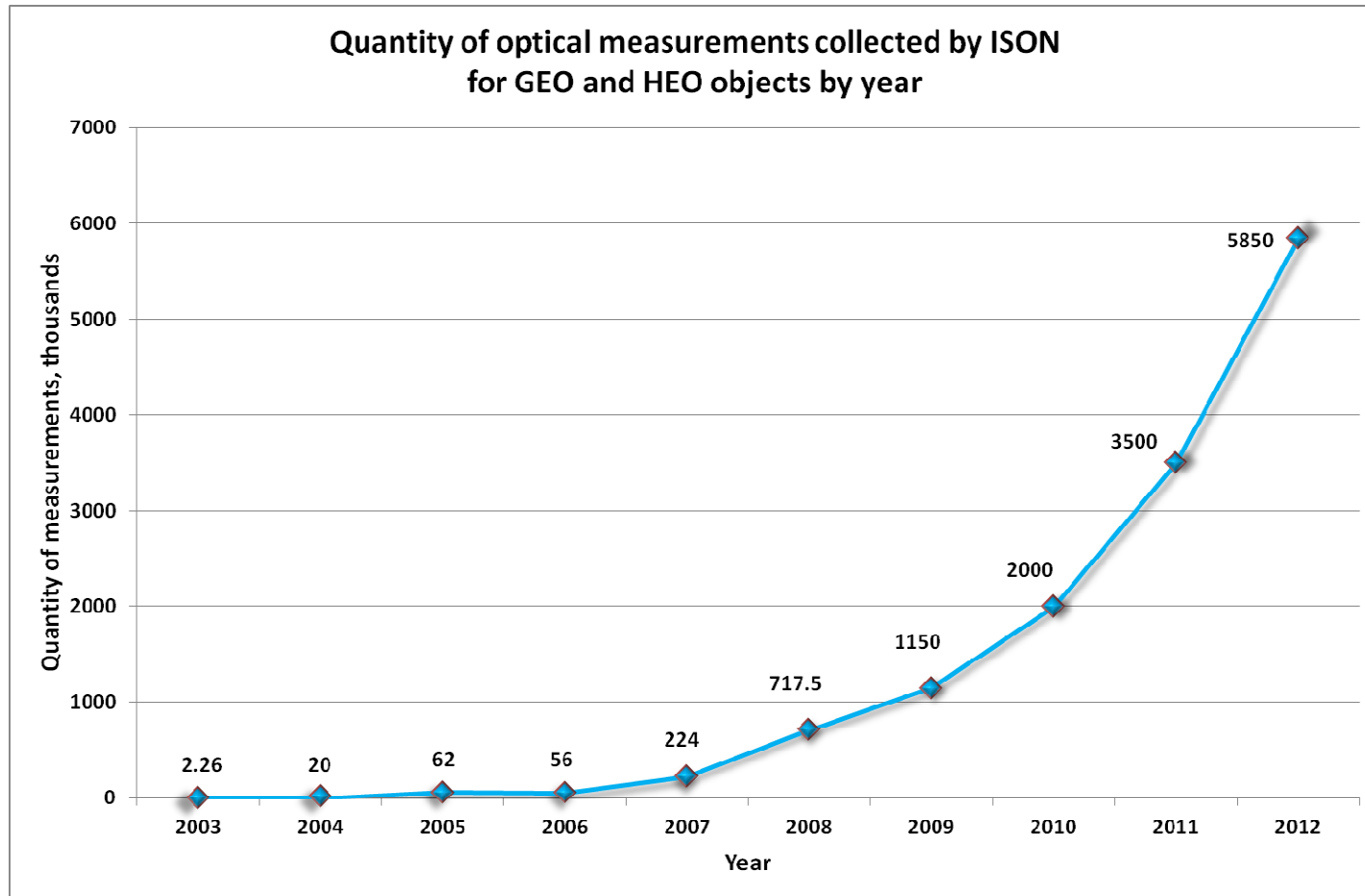
Kislovodsk observatory (25-cm, 2x20 cm and 40-cm telescopes)



Khureltogoot observatory in Mongolia started to work with ISON

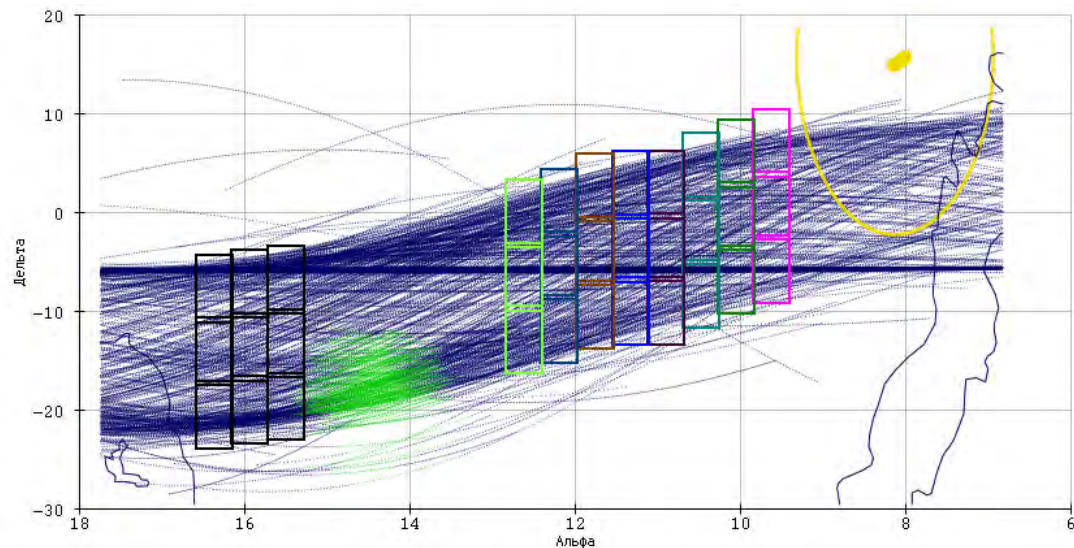


Growing amount of measurements collected by ISON, 2003 – 2012



Start of HEO surveys, extended GEO surveys

- 19.2 cm VT-78e and 18 cm VT-52c telescopes with 7x7 degree FOV are installed in Sanglok, Nauchnyi-1 and Khuraltogoot, twin 19.2 cm VT-78e telescope (FOV 7x5 deg for each channel) is installed in Kislovodsk
- **Kislovodsk, Sanglok and Khureltogoot** are carrying out extended GEO surveys (limited magnitude of detecting GEO objects – 14.5^m)
- **Nauchniy-1** carries out targeted surveys of apogee area of Molniya-type HEO objects that already resulted in discovery of many previously unknown debris



Extended GEO surveys (examples)

Sanglok VT-78e first extended GEO surveys, Jan 2012

Date	Duration, hh:mm	Tracks	Measurements	Objects
17.01.2012	11:47	2297	16006	577
18.01.2012	12:33	2413	16910	609
19.01.2012	11:08	2265	16063	597
20.01.2012	12:28	2428	17030	637
28.01.2012	12:14	2383	16822	606
31.01.2012	11:44	2184	15553	580

Khureltogoot VT-78e selected extended GEO surveys, Dec 2012 – Jan 2013

Date	Duration, hh:mm	Tracks	Measurements	Objects	Average arc length per GEO object, min	Max arc length per GEO object, min
05.12.2012	12:20	1513	10550	363	171.5	514.6
07.12.2012	10:46	1495	10424	299	271.6	529.8
09.12.2012	12:18	1044	7098	331	165.4	536.9
12.12.2012	12:15	1171	8150	342	163.0	559.5
16.12.2012	12:16	1539	10516	340	283.3	542.2
05.01.2013	13:04	1403	9444	366	286.5	591.6
18.01.2013	12:48	1570	10441	421	311.1	595

Increased measurement arc length is very important from the point of view of obtaining more precise orbits from just one night observations.

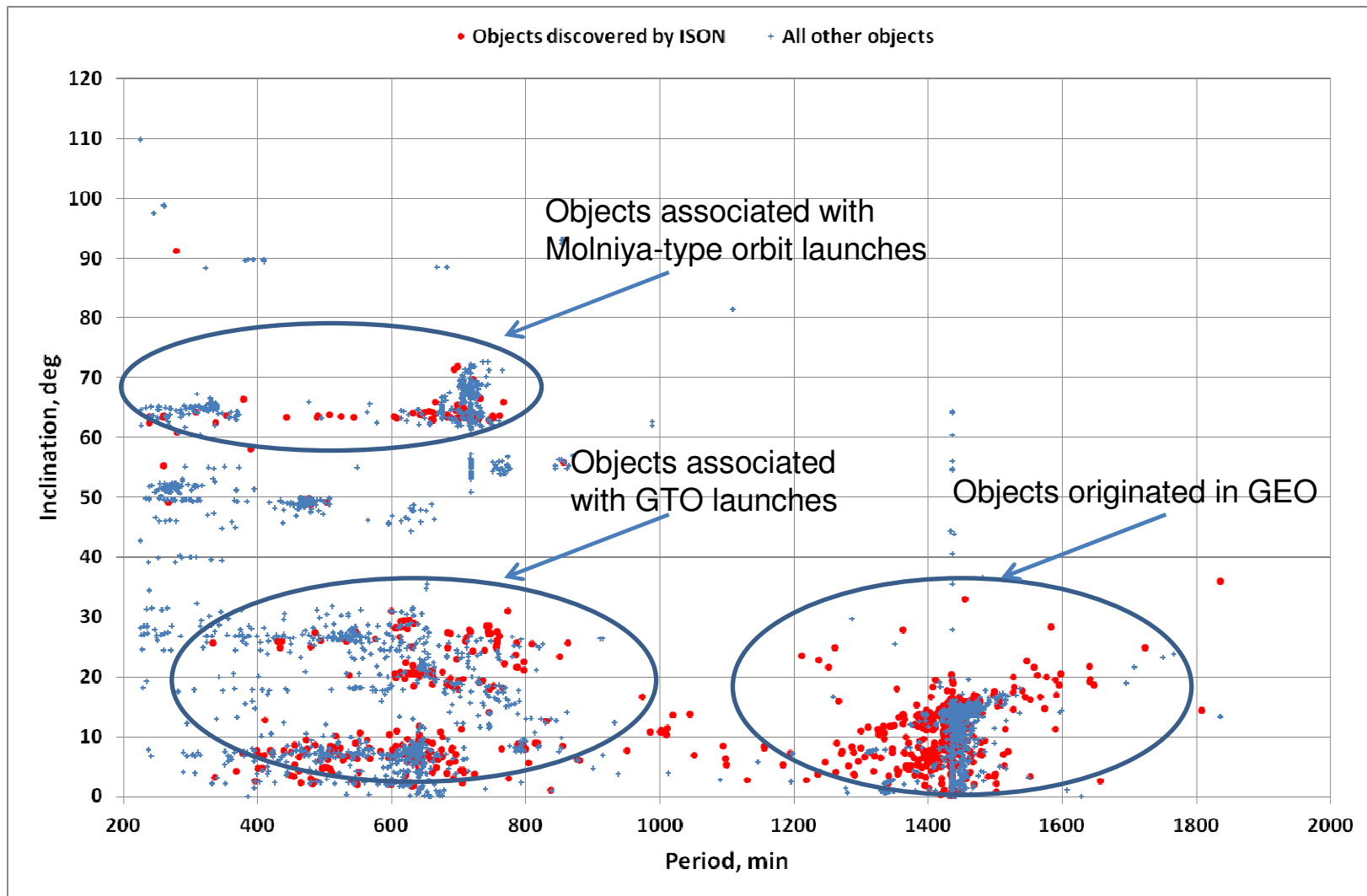
ISON Database of HEO, MEO and GEO objects

As of Feb 1, 2013 the ISON database contains information for more than 3200 HEO, MEO and GEO objects with orbits updating using ISON optical measurements

897 of these objects are newly discovered during 10 years of ISON work

270 HEO and GEO space debris objects are discovered in 2012 (compare to 168 ones discovered in 2011 and 61 – in 2010).

HEO, MEO and GEO Objects in ISON Database



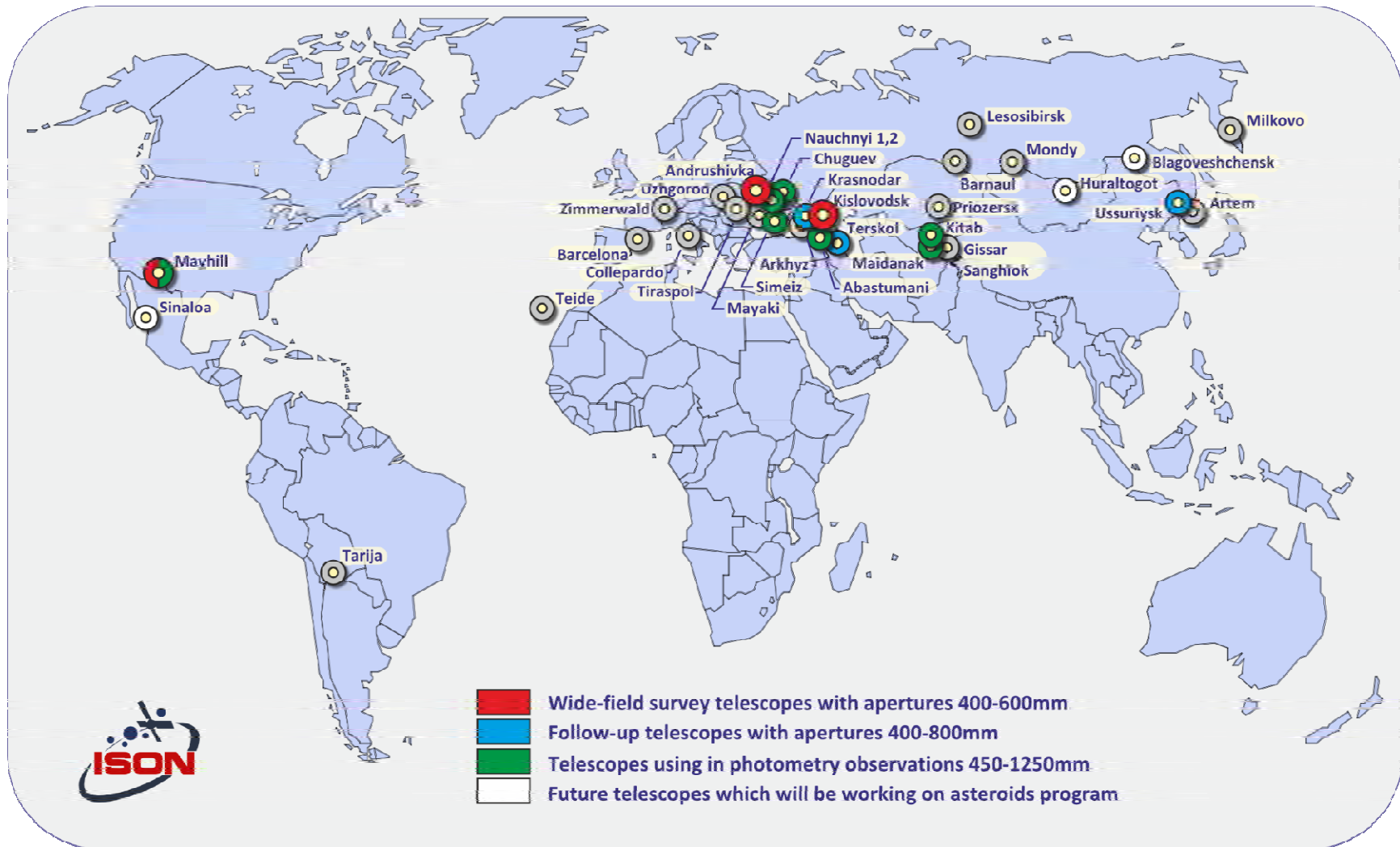
Identification of GEO debris sources

New work on identification of ISON discovered GEO debris is started.

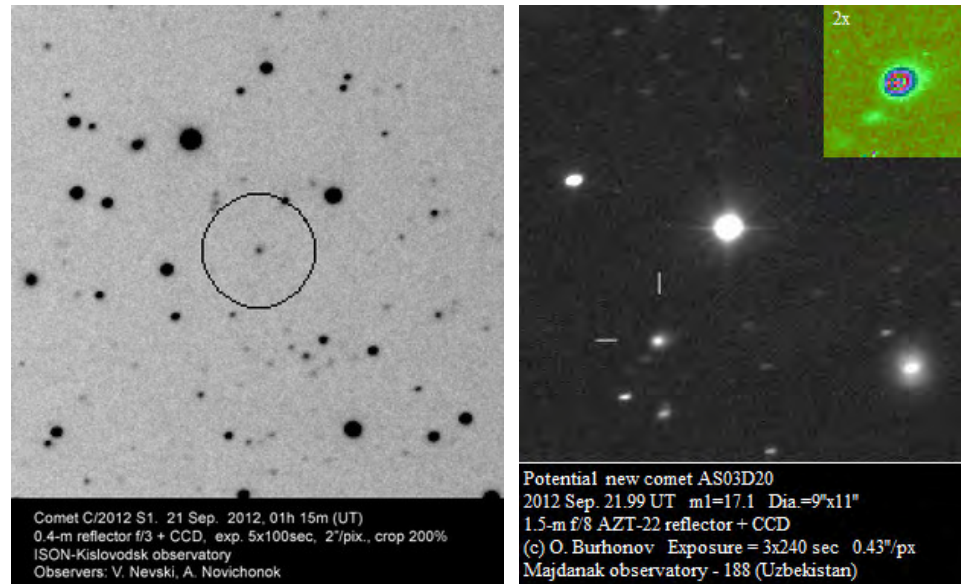
In 2012 we identified

- 4 GEO debris objects as associated with launches of FengYun-2 spacecraft in 1997, 2004, 2008 and 2012,
- 3 GEO debris objects as associated with launches of Meteosat first and second generation spacecraft in 1993, 1997 and 2012,
- 4 GEO debris objects as associated with launches of DSP spacecraft series in 1991, 1994, 1997 and 2007,
- 1 debris object as an AKM used to deliver GMS-2 spacecraft to GEO in 1981

ISON observatories involved into asteroids research



ISON comet (C/2012 S1)



Discovered on Sep 21, 2012 in ISON Kislovodsk observatory (Russia) and confirmed in Maydanak observatory (Uzbekistan), partner of ISON

Third comet discovered within the ISON project framework

A potentially Great Comet of the century – if it survives the Sun encounter (is due to fly 1.9 million km of the center of the Sun on Nov 28, 2013) then it is predicted to become brighter than the full moon and to be visible in the daytime sky

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Thank you for your attention!