Prof. Valeriy A. Menshikov (Russia)
International Academy of Astronautics (IAA), Member of Board of Trustees,
Russian Academy of Cosmonautics named after K.E.Tsiolkovskiy, Vice-President,
IGMASS Project Manager from IAA

Scientific and Technical Subcommittee
Committee of Peaceful Uses of Outer Space
Forty-Seventh Session
Vienna, February 8-19, 2010
Indian Ocean Earthquake & Tsunami

Sichuan Earthquake
Fatal casualties: 69,227
374,643 injured
17,923 missing (2008)

Haiti Earthquake
Fatal casualties – hundreds thousands (2010)

2009 First Semester Natural Disaster Economic Damage (Million US$)

- Earthquakes: 2703
- Drought & Wildfire: 735
- Storms: 1300
- Floods: 2547

Image credits:
On October 8, 2009, Earth approaching unobserved asteroid busted at upper atmosphere (15-20 km.) directly under South Sulawesi province (Indonesia). According NASA, this fatal destruction of 10 m size stone object, which entered into dense atmosphere on the speed more than 20 km per second, realized energy 50 thousands tons TNT equivalent (three times more powerful than Hiroshima nuclear blast). The event was fixed by West Ontario University Observatory, distant 16000 km. away from its epicenter. Now, we know about dozens asteroids and comets approaching our planet (for example, 99942 Apophasis, 1997VRZ, 1994 WK12), which in case of its fall down into the Earth, could trigger off global catastrophe.
Some Signs of Recent Haiti Disaster

Results of satellite image with cloudy fields anomalies upper activated subduction zones just before earthquake, which appeared more than day before the disaster.

Image from TERRA Satellite

Jan.11, 2010 2.55 p.m.

Cloud fields erosion stressed by red lines

Haiti Island

Done by researcher Dr.Lidya Morozova, Far East Branch, Russian Academy of Sciences
International Global Aerospace Monitoring System (IGMASS) is a large organizational and technical system, integrating itself side by side especially designing and creating a space constellation of small and micro satellites with onboard equipment to monitor and detect early signs of destructing emergencies and existing and advanced national and international airborne and ground facilities (contact and distant sensors), Earth observation facilities, meteorological, space communications and navigation systems (or especially allocated informational or organizing and technical resources), including appropriate launch, control and satellite acquisition devices and infrastructure, variety of receiving and processing monitoring data equipment.
forehanded warning of world community about risks and threats of natural disasters and man-caused emergencies, next step forward development and integration of planetary informational and navigation-telecommunication recourses for global threats protection and solving of general humanitarian issues

global and efficient forecasting of natural disasters and man-caused emergencies on the Earth and at outer space on the basis of integrated utilization of world wide space monitoring potential
Permanent and continuous space monitoring of the Earth lithosphere, atmosphere, ionosphere and outer space with the purpose of revelation early signs of dangerous natural disasters and man-caused emergencies

Collecting, onboard satellite processing and transmitting monitoring data into ground space information receiving stations

Generalising and integrated processing global monitoring data, which has been collected from space-based, air-born and ground facilities, at national, regional and international emergency centres; monitoring information interpretation, storage and visual displaying

Near real-time communication to states concerned and specialized UN structures about educible natural and man-made risks and threats
Proper navigational and telecommunicating acquisition consumers all over the world for emergency operations, catastrophe’s medicine, humanitarian operations; transport Corridors systems creation, optimisation cargo and people transfer; abolition of illiteracy, preservation of cultural values, distant learning concept and experts training development

Effective warning about global risks an threats in and from outer space: asteroid danger and anomaly phenomena

Gradual forming unified planetary “informational environment of security” for the convenience of reducing global risks and arising threats protection
### IGMAMSS Project Initialization

<table>
<thead>
<tr>
<th>Activity</th>
<th>Location/Year</th>
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<tbody>
<tr>
<td>Presenting on profile International scientific forums</td>
<td>Dnepropetrovsk, Ukraine (2007, 2009); Korolyov, Russia; Tunis; Shanghai, China (2008); Versailles, France (2009); Rome, Italy (2010), Glasgow, Scotland (2008)</td>
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<tr>
<td>Project Manager Assignment and IGMAMSS’ working experts group creation (from IAA)</td>
<td>Yubileynyy, Russia (2009)</td>
</tr>
<tr>
<td>Project Researches and preparing of IGMAMSS’ working experts group conclusion</td>
<td>Daejon, Republic of Korea (2009)</td>
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<tr>
<td>Submitting Project Researches and IGMAMSS’ working experts group conclusion to the IAA.</td>
<td>Limassol, Cyprus (2009)</td>
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<tr>
<td>Project detailed discussion and making decision about its submitting to the UN</td>
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</tbody>
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IGMASS Ground Segment: International Monitoring Data stations, International and Regional Crisis Management Centers; Launching and Flight Control facilities, Global Distant Learning etc and Catastrophe’s Medicine Communication Infrastructure

IGMASS Orbital Segment:
- Small, micro monitoring satellites, equipped by variety of advanced instruments for detection early signs of natural disasters and technogenic catastrophes

IGMASS Structure

Own Developed

International, regional and national projects and programmes of monitoring of natural disasters and emergencies

International, regional and national space systems

Meteorological
Navigational
Observation and RSC
Communication

International, regional and national ground facilities (contact and distant sensors) for monitoring natural disasters and outer space
INTERNATIONAL CRISIS MANAGEMENT CENTRES

UPPER LEVEL: utilization of monitoring information

NATIONAL AND REGIONAL EMERGENCIES FORCES

MEDIUM LEVEL: interpretation of monitoring data

NATIONAL AND REGIONAL CENTRES CRISIS MANAGEMENT

LOW LEVEL: receiving and proceeding of monitoring data

REGIONAL CENTRES OF AIR-BORNE AND GROUND SENSORS MONITORING DATA COLLECTING AND PROCEEDING

INTERNATIONAL MONITORING DATA RECEIVING STATIONS (5 stations all over the world)

NATIONAL AND REGIONAL MONITORING DATA RECEIVING STATIONS

International, regional and national ground facilities (contact and distant sensors)
**Main satellite characteristics**

- Mass (max): 120 - 400 kg;
- Mass of payload: 40÷120 kg.
- Lifetime: Satellite of upper level – up to 10 years, Satellite of lower level – 5 - 7 years

**Orbital structure:**

- Number of satellites in constellation:
  - Satellite of upper level – 6,
  - Satellite of lower level – 3-4.
- Orbits:
  - Satellite of upper level – GEO with even distribution of satellites in orbit plane,
  - Satellite of upper level – SSO, H=600-700 km, with even distribution of orbit planes along longitude of ascending node

**Payload**

Highly sensitive radiometric visible and IR range equipment, low (LF) and high frequency (HF) wave complexes, plasma complexes, complexes to monitor charged particles, magnetometer, s mass-analyzers, spectrometers
Countries Information-Source

Countries Information-Customers

UNIVERSITIES, RESEARCH CENTRES AND LABORATORIES

Institutions

Research Bodies

MAIN TECHNICAL CENTRE

TECHNICAL CENTRES

Ground Communication Channels (Internet, digital data transmitting)

Knowledge Sources

Knowledge customers
Catastrophe Medicine IGMASS Subsystem

Orbital Constellation of International, Regional and Domestic Telecommunication Systems

Orbital constellation Global Navigation Systems

GPS NAVSTAR

Galileo

GLONASS

Medical Offices:
National centres of Catastrophes Medicine, its regional and territorial branches, clinical bases; telemedicine systems

Casualties:
- participants of extreme expeditions;
- jammed up at the zones of emergencies;
- persons requested permanent medical control

Purpose: stature control, medical consulting the victims of emergencies
Some Results of IGMMASS Realization

- Wide-spectrum nonmaterial research on the Project including foreign expert participation are carrying out

- Active promotion of IGMMASS Project on International level
Some Results of IGMASH Realization

- Development engineering on creation of Multifunctional Space System of the Union State “Russia-Belorussia” as a foretype of IGMASH key segments are pursuing.

- Designed predictable patterns of small satellite prototypes for own developed IGMASH Orbital Segment are testing.

- Specialized ground infrastructure of receiving and processing IGMASH space monitoring information are deploying and testing.
HUMANITARIAN

- preservation of the people’s life and health due to early warning about global natural disasters and emergencies, delivery of extremely health care in case of its uprising and development;
- opportunities on making-up and realization complex of measures on parrying global natural and man-made risks and threats in the framework of spectrum of all possible approaches

FINANCE-ECONOMICAL

- maintenance of scientific, technological and technical potential of space-rocket industries of the countries-Project participants (construction of new capacities, business spreading etc.);
- preserving and sustaining financial and other aids and appliances courtesy of reducing consequences of natural and man-made emergencies;
- profit earning from monitoring data commercial realisation and using of business opportunities of distant education
Socio-political significance of IGMASS Project realization is an opportunity of unifying world community efforts in the framework of new, joint strategy of peaceful space exploration, which is focusing into providing secure and social sustainable development of globe society in XXI century, based on common and imperishable values of joint, irreversible solving global issues of modern Humanity and preserving the life on the Planet; prospects of strengthening political, diplomatic, economical and scientific positions of countries-participants of IGMASS Project on the ways of parrying unexpectedness's and abruptness's (risks and threats) of contemporary world
1. To support the initiative of IGMMASS Project realization in the framework of wide International cooperation under UN aegis, recording it in final documents of 47th Subcommittee Session.

2. To put under consideration of future COPUOS sessions political and juridical aspects of IGMMASS Project realization.

3. To form under the Subcommittee special study group on the issues of using advanced space technologies for the purposes of forecasting natural disasters and man-made catastrophes.

4. To engage into “International Public Committee on supporting IGMMASS Project”, which has been created due to IAA initiative and resolution of The First International Specialized Symposium (Cyprus, November, 2009), all institutions and persons concerned.
For obtaining additional information about IGMAS
Project, please, contact us:

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