The Educational Program of Youth Center "Space Communications and Informatics"

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Topics of The Educational Program

1. **Space communications.**
2. **Solar-terrestrial physics.**
3. **Remote sensing.**
4. **International Space Station.**
5. **Amateur Radio Club Station.**
6. **Modern electronics and computing.**

Space communications :

OSCAR = Orbital Satellites Carrying Amateur Radio :
OSCAR- 51 - operate since June 29, 2004, http://www.amsat.org
OSCAR –54 (VUSat) – operate since May 5, 2005
Early Birds - AO-27, FO-29, GO-32, SO-41, MO-46, SO-50
All Microsats operate with open telemetry ! Such mode of transmission is used for scientific and educational microsats – watch the series of microsats in many Universities Programs – best one in Surrey University (UK).
Last sample - MOST – refer: www.astro.ubc.ca/MOST/overview.html
Easy access to space comms is via Amateur Radio on ISS : http://www.ariss.org

Russian Radio Amateur Satellites have designation "RS"
Russian-Australian School Satellite KOLIBRI-2000 (RS-21) was in 2001
Universitetsky-Tatyana : http://cosmos.msu.ru (RS-23) was in 2005
Mozhaetz – 4, - 5 (RS-22, RS-24) for Mozhaisky Space Military Academy, St.Petersburg, was in 2002-2004

Microsatellite OSCAR-51

- **Analog Uplink:**
- **145.920 MHz FM (PL - 67Hz)**
  1268.700 MHz FM (PL - 67Hz)
- **Analog Downlink:**
- **435.300 MHz FM**
  2401.200 MHz FM
- **PSK-31 Uplink**
- **28.140 MHz USB**
- **Digital Uplink:**
- **145.860 MHz 9600 bps, AX.25**
  1268.700 MHz 9600 bps AX.25
- **Digital Downlink:**
- **435.150 MHz 9600 bps, AX.25**
  2401.200 MHz 38,400 bps, AX.25

Microsatellite MOST

http://www.astro.ubc.ca/MOST/overview.html

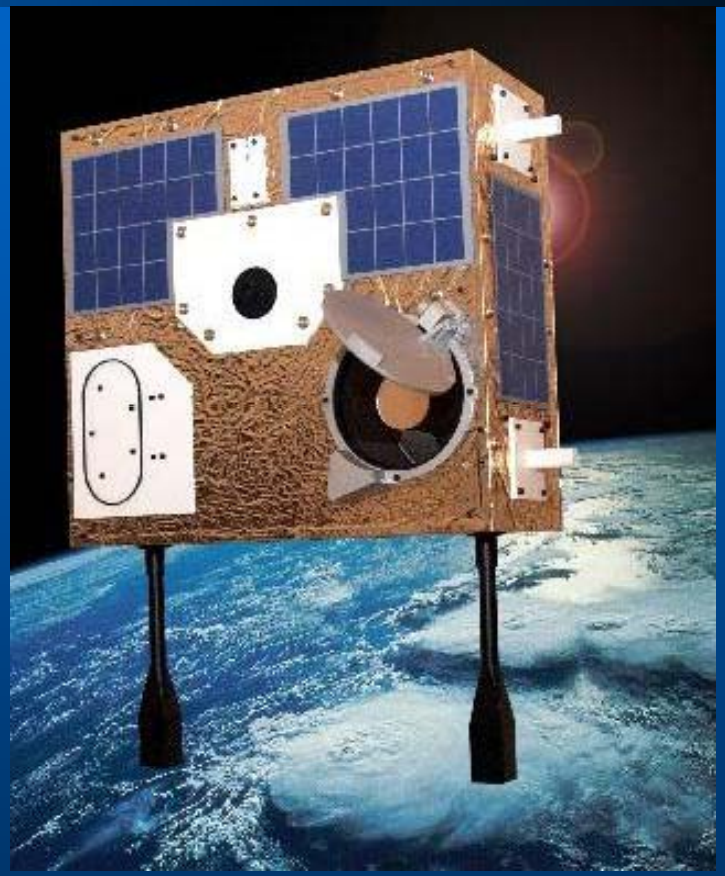
MOST (Microvariability and Oscillations of Stars) is the Canadian micro-satellite project dedicated to seismology of Sun-like and magnetic stars as well as to study microvariability in Wolf-Rayet winds and many other targets.

microsatellite 65 x 65 x 30 cm; mass ~ 60 kg, solar panels and attitude control system with reaction wheels and magneto-torquers within 10 arc/sec accuracy Three S-band stations in Toronto, Vancouver, and Vienna .

with uplink 9,600 kBs and data downlinked at 38,400 kBs.Optical Telescope with 15 cm across, CCD camera with 1024 by 1024 pixelsfilter in the range 350 - 700 nm.

MOST launched by Rockot launcher at June 30, 2003, from Plesetsk on polar sun-synchronous orbit approx. 820 km, period ~ 100 min, have a Continuous Viewing Zone (CVZ) about -19 to +36 degrees in which a selected target star observable for up to 60 days without interruption.

http://ams.astro.univie.ac.at/space_most.php

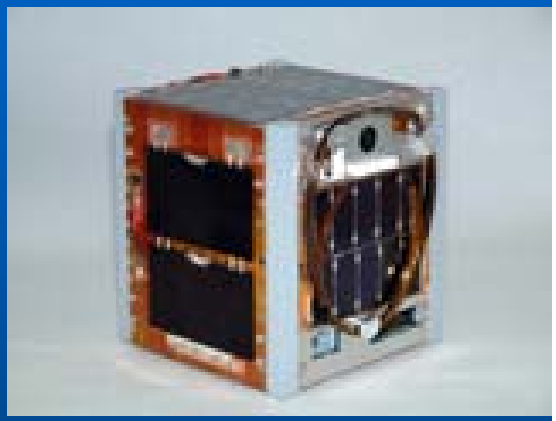


Microvariability & Oscillations of STars

MOST

Microvariabilité & Oscillations STellaires

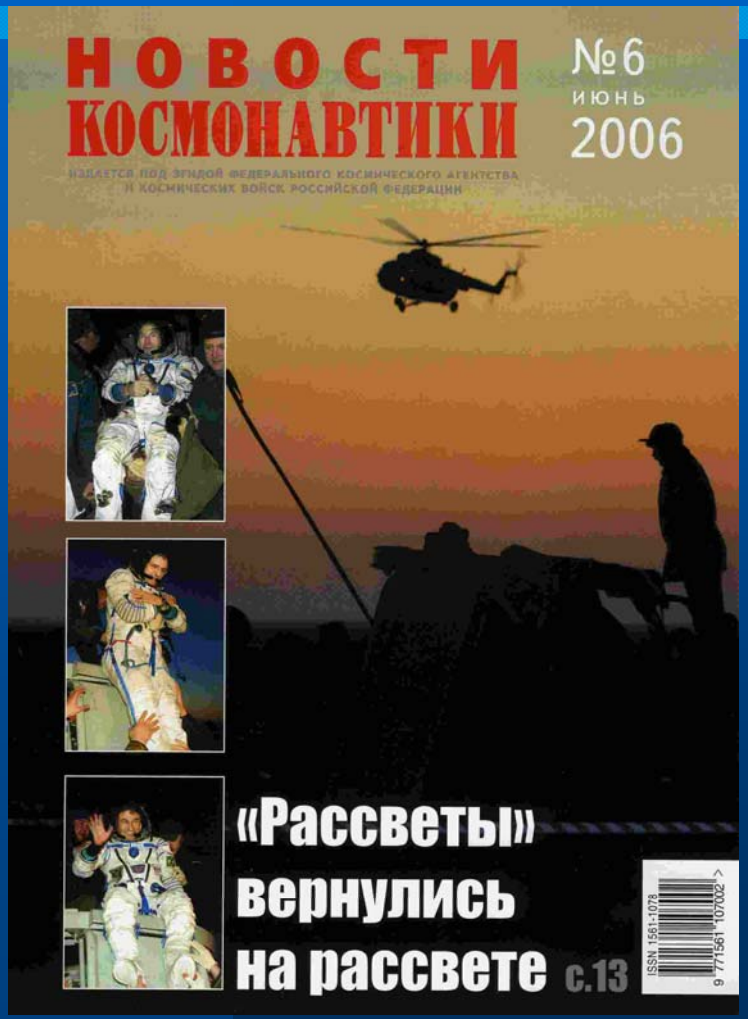
Nanosatellites - CubeSats



- **The Norwegian Student Satellite Project - NCUBE, call LA1CUB, 437.305 Mhz**
- **University of Würzburg, Germany and Aalborg University, Denmark, 437.450 Mhz**
- **University of Tokyo, call JQ1YCW, 437.490 telemetry, 436.847 beacon**

CUBE SAT KIT

International Space Station :



1. ISS have amateur radio, see http://www.ariss.org
2. Most detailed information (dairy) about ISS published in "Novosti Kosmonavtiki" magazine, which used as curriculum materials for educational projects
3. It is possible to monitor ISS on VHF 143.675 MHz

Solar-terrestrial physics :

Basic Knowledge on Sun-Earth relationships in Russian :
www.kosmofizika.ru

Space Weather :
http://www.iki.rssi.ru
http://www.izmiran.ru

Curriculum materials in Russian :
http://top.izmiran.rssi.ru/~children

Reading Book + CD-ROM on STP

- **Outer Space With Us – the book for reading on the table and with computer – including CD-ROM and illustrated glossary**
- **Troitsk, 2006, Trovant Publishers, requests via authors**

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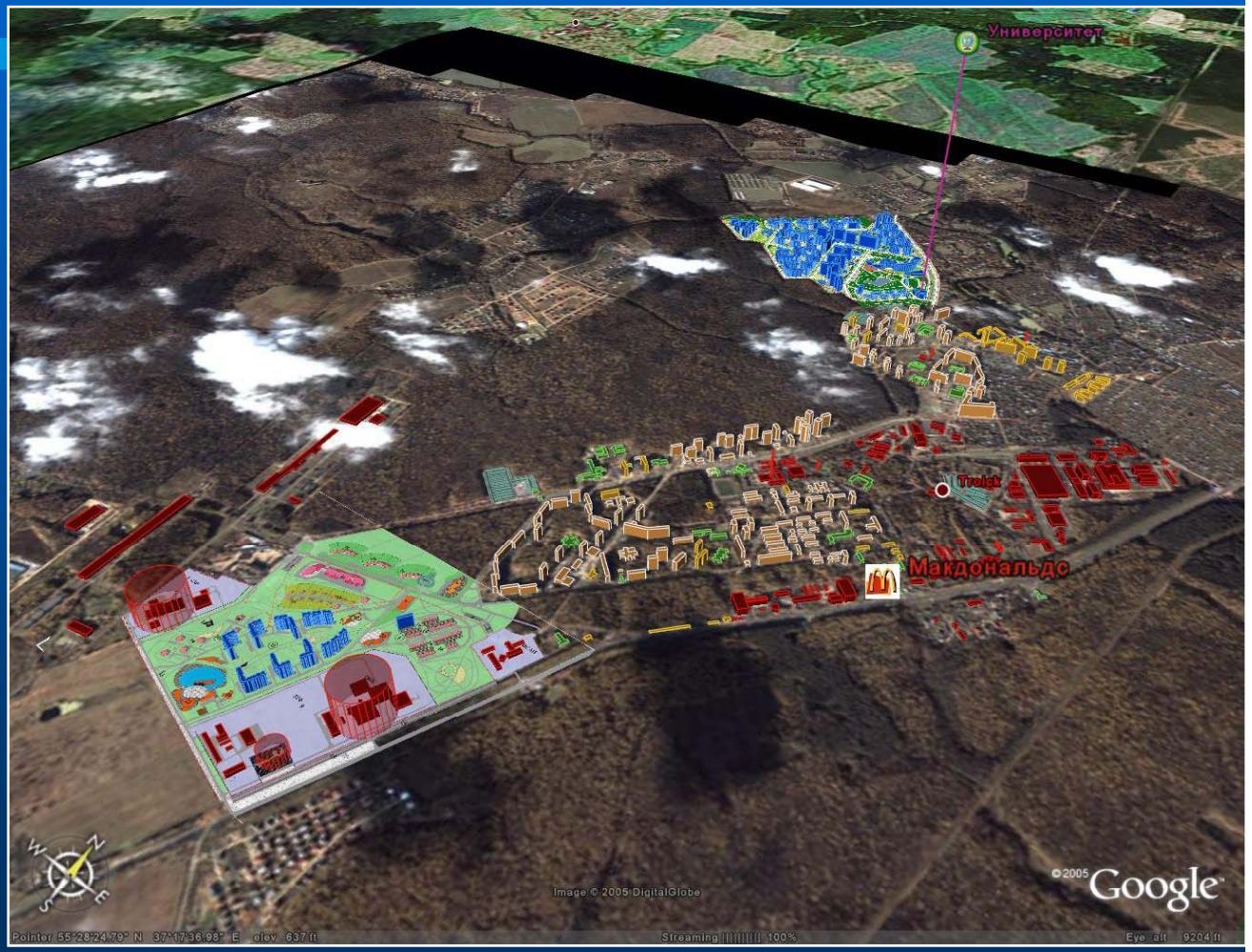
Remote sensing :

1. Global Remote Sensing Data (RSD) available from EARTH.GOOGLE.COM . We use such data as the prime source for all projects
2. All-Russian competition for pupils to search of remote sensing data supported by SCANEX company, see http://www.scanex.ru
3. Special publications for teachers how to conduct the usage of RSD in classes
4. Current RSD (images) data available from http://www.gismeteo.ru



Amateur Radio Club Station

1. **Amateur Radio Club operate since 1965 under calls as UW3KBA, later on UK3DBA, and now RK3DXB**
2. **More than 300 pupils get experience as radio operators and choose the career in electronics, engineering and science.**
3. **Now Club Station RK3DXB is used as the satellite control center**

Conclusions :

1. The Educational Program of Youth Center “Space Communications and Informatics” is based on 40 years of experience of Radio Amateur Station.
2. “de facto” amateur radio become standard tool for communications with microsatellites and nanosatellites.
3. Previous involvements in space experiments with ATS-6 satellite, INTERCOSMOS programs, MIR and ISS lead to developments of open communications systems.
4. The public interest to solar-terrestrial physics stimulate our contact with local schools and lead to form educational programs,
5. Public Outreach and Education activity in coming international programs IHY, IPY, eGY, etc. are served as the key points for our curriculums
6. Wide usage of INTERNET also stimulate the development of our educational topics.