



YUZHNOYE

d e s i g n o f f i c e

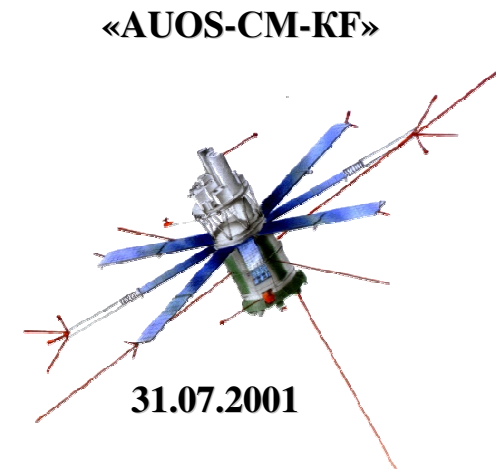
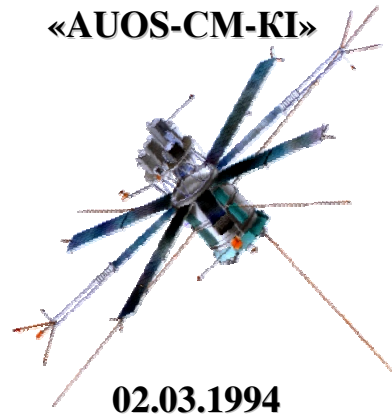
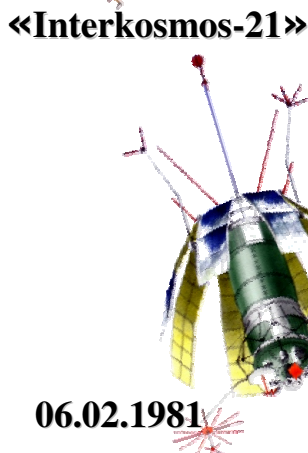
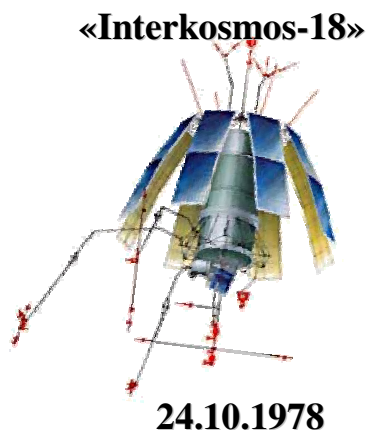
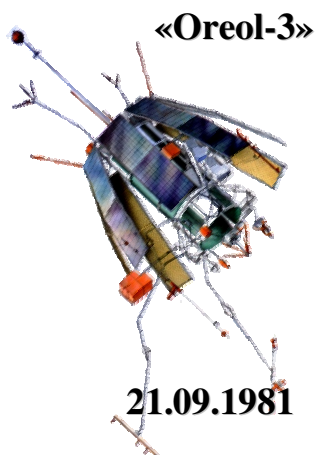
Research by Ukraine of the near Earth space

50th session of STSC COPUOS

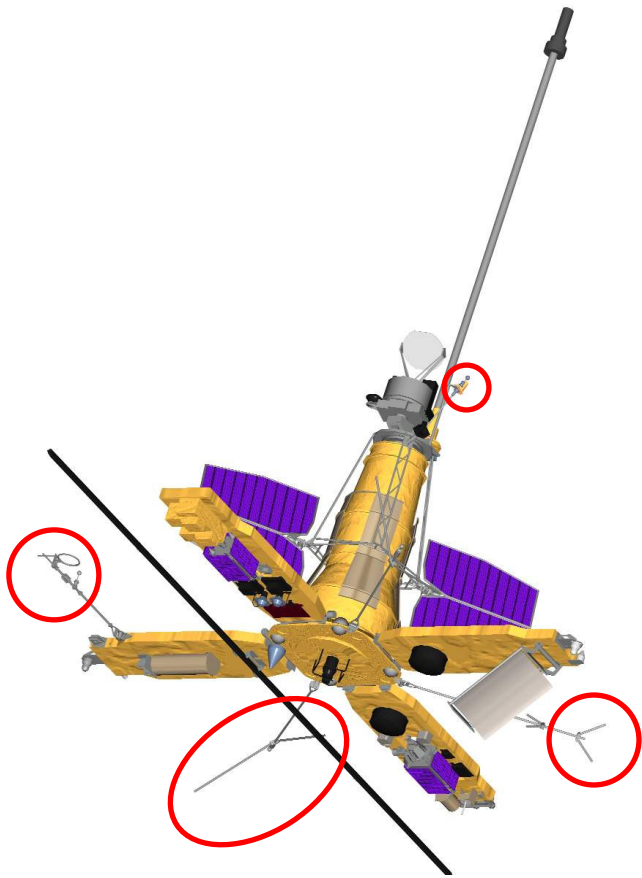
Vienna

11-22 Feb 3013

Heritage of Yuzhnoye SDO in the development of ionosphere monitoring space systems.



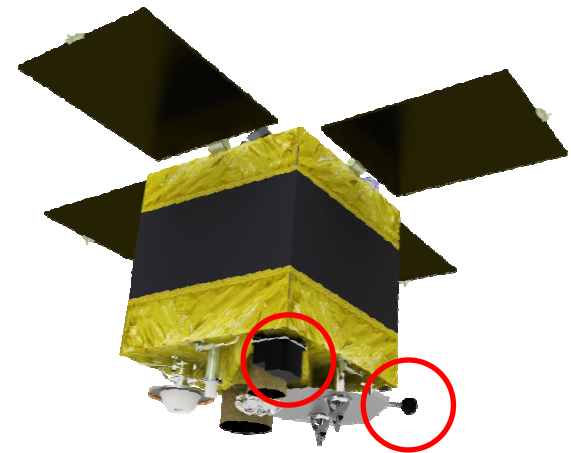
PROJECTS “VARIANT” and “POTENTIAL”



SICH-1M

Launched 24 December 2004

Decay 15 April 2006

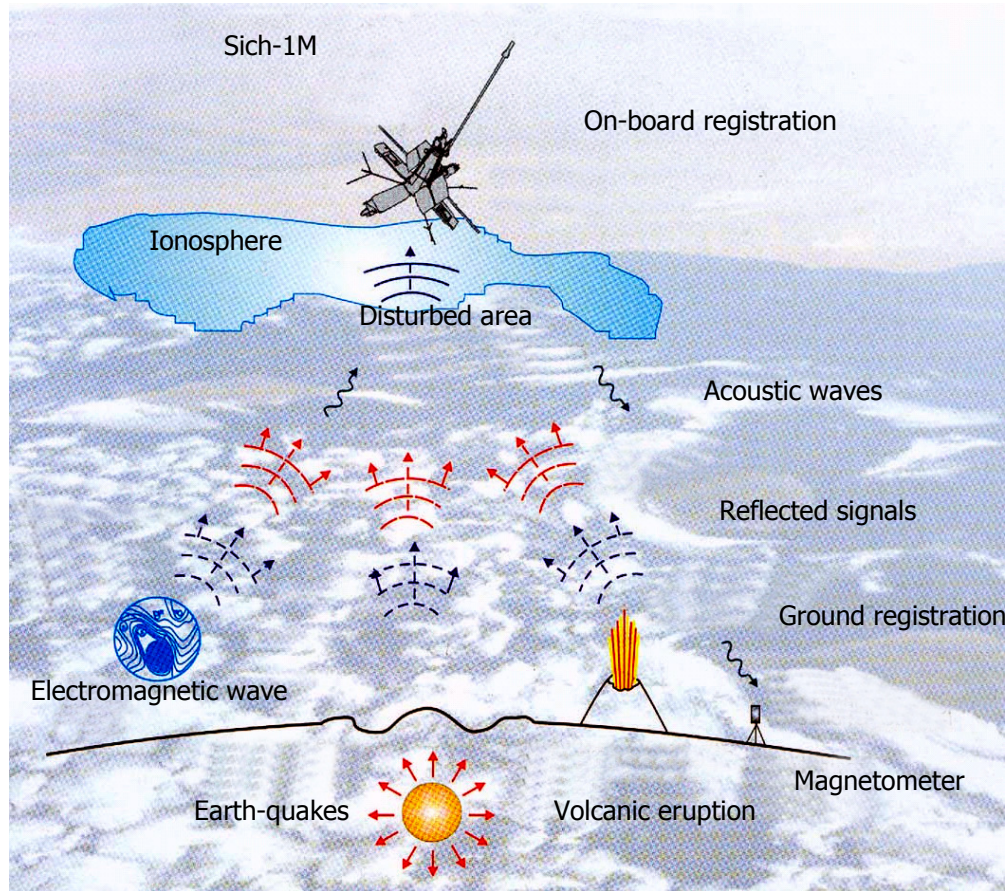


SICH-2

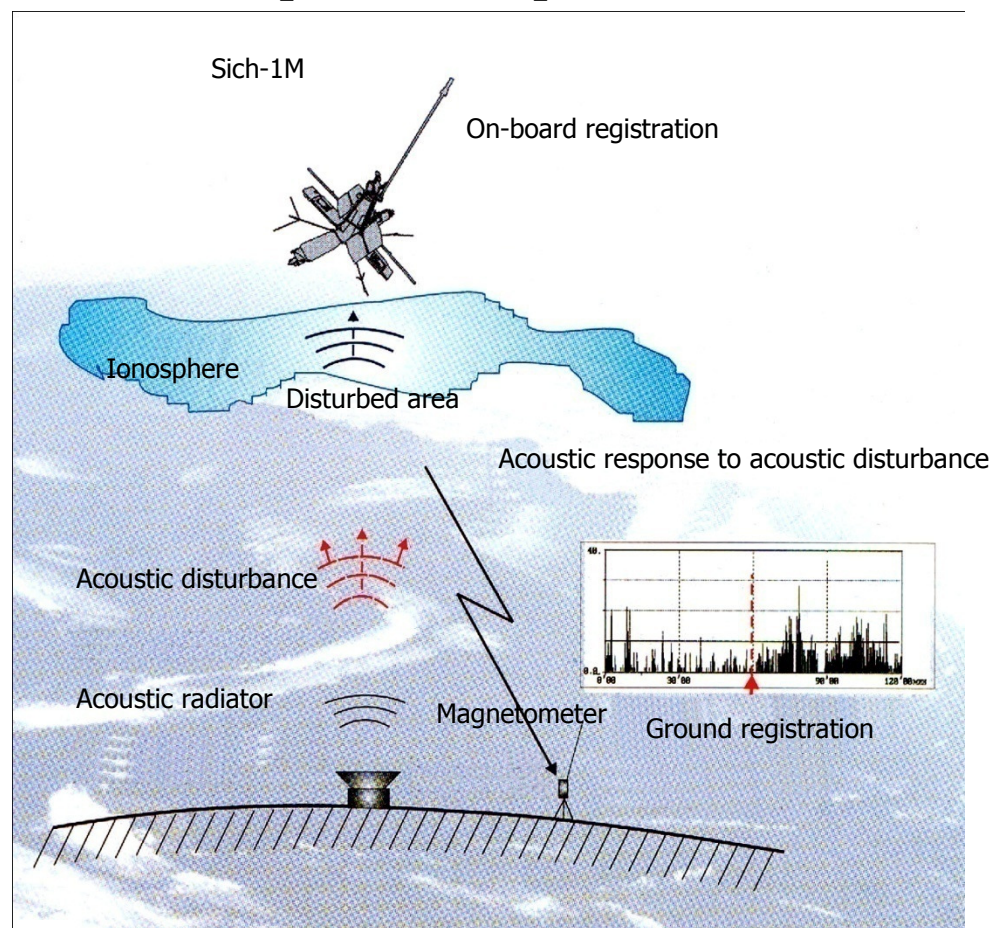
17 August 2011

PROJECT CONCEPT “VARIANT” OF SPACE SYSTEM «SICH-1M» (2004)

Research of influence terrestrial effects to the ionosphere



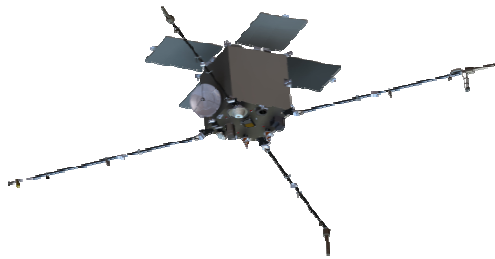
Ground-space experiment on research of acoustic channel of litospheric-ionospheric links



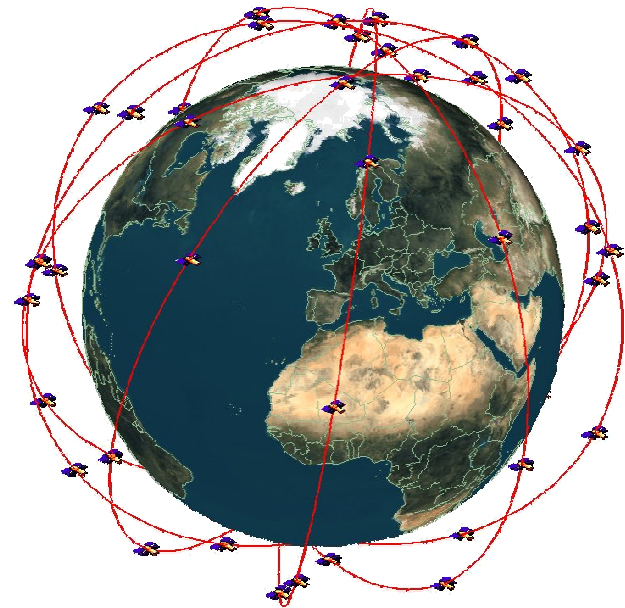
- **scientific and methodological substantiation of the efficiency of the LEO satellites use for SW monitoring, corresponding technological realization development and tests.**
- **multi-point global monitoring of dynamical processes in the ionosphere – study of the ionospheric disturbances created by the influences “from above” (from the Sun and open space) and “from below” (caused by natural and man-made high-energy impacts, such as earthquakes, hurricanes, explosions, starts of heavy rockets, etc.)**
- **Synchronous operation with the existing sub-satellite electromagnetic and meteorological polygons.**
- **Calibration of modern prognostic models of quiet and disturbed ionosphere.**

YUZHNOYE IONOSAT PROJECT IMPLEMENTATION

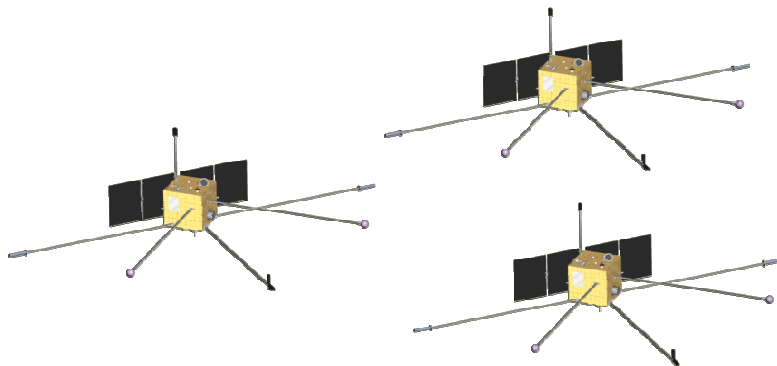
STAGE 1 – SINGLE SATELLITE



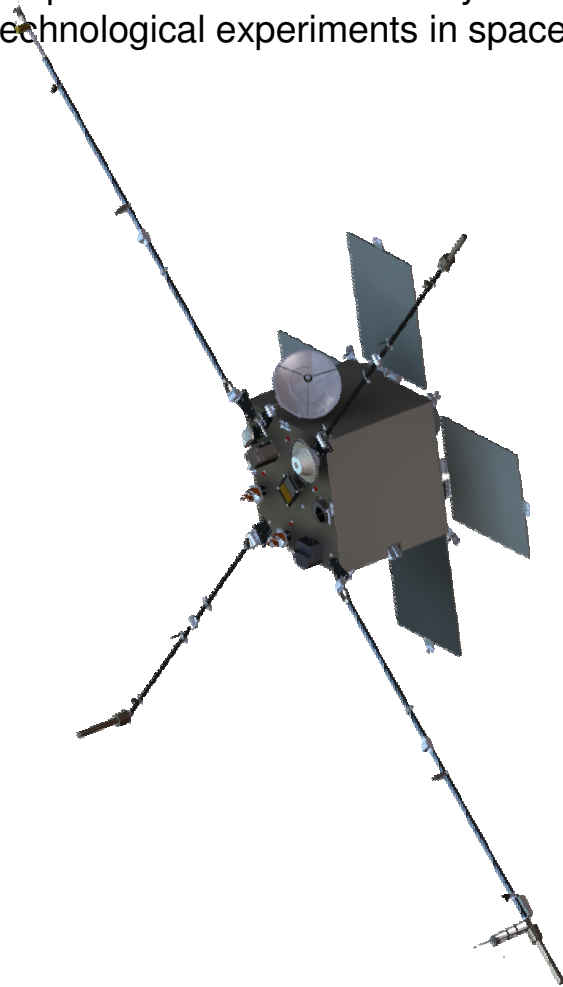
STAGE 3 – CONSTELLATION of CLUSTERS



STAGE 2 – SINGLE CLUSTER

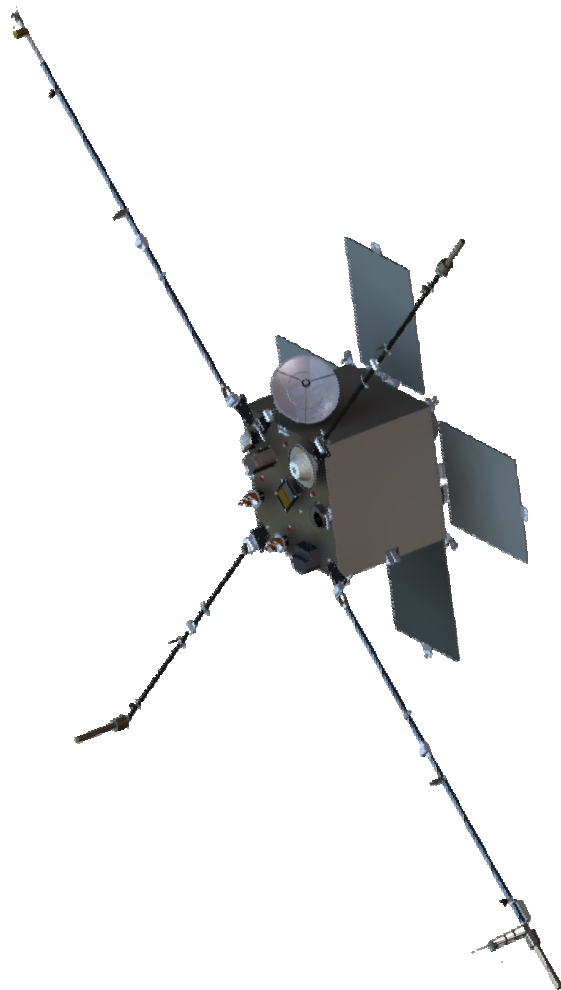


Purpose - observation of dynamic processes in the ionosphere of the Earth as well as implementation of technological experiments in space



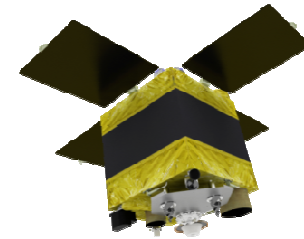
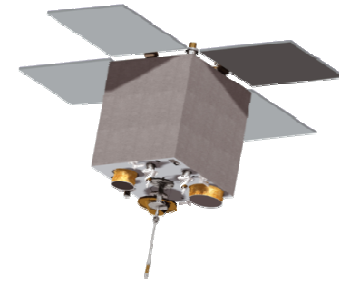
Main characteristics:

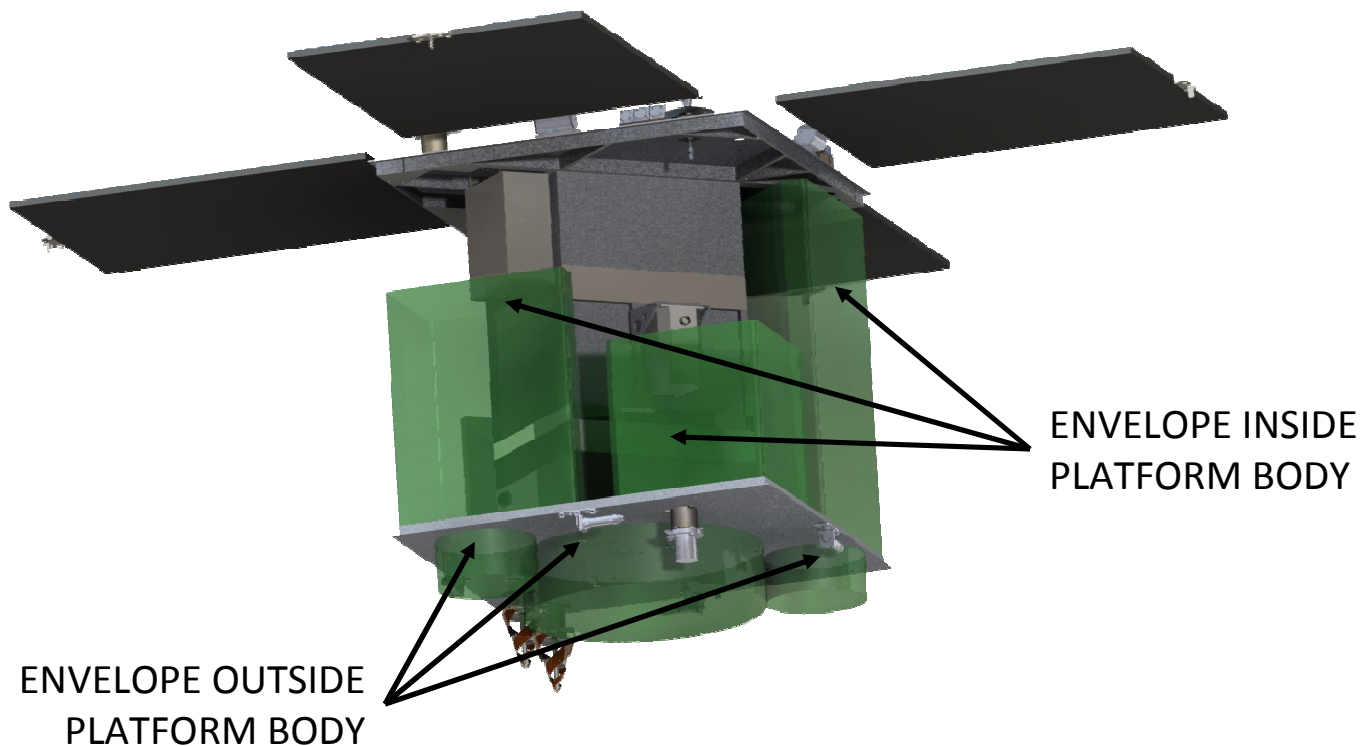
Satellite mass	~ 185 kg
Orbit:	
- type	circular sun-synchronous
- altitude	from 620 km to 710 km
- inclination	from 97.9 to 98.2 deg
- local mean solar time in descending node	from 10 to 14 hours
Orientation:	
- type	three-axis active
- orientation error in orbital coordinate system	no worse than 5 deg
- error in angular stabilization velocity	no worse than 0.01deg/sec
- error in orientation determination	no worse than 3 deg
Power supply subsystem:	
- type of solar array cells	GaAs
- type of battery cells	NiCd
Propulsion subsystem:	
- nominal thrust of one thruster	0.05 N
- total thrust pulse	~ 10 000 N*sec
Active lifetime	3 years
Launch-vehicle	Cyclone-4



1. Wave probes WP (3 pieces)	<p>Electric current density J: Frequency range 0.1 Hz - 40 kHz Noise $10^{-12} \text{A/cm}^2 \text{Hz}^{1/2}$</p> <p>Magnetic field B: Frequency range 0.1 Hz - 40 kHz Noise $10^{-14} \text{T/Hz}^{1/2}$</p> <p>Electric potential ϕ: Frequency range 0.1 Hz - 40 kHz Noise $10^{-6} \text{V/Hz}^{1/2}$</p>	Lviv Centre of Institute for Space Research (LCISR), Ukraine
2. Electric probe EP	<p>Electric potential: Frequency range DC - 200 kHz Noise $10^{-6} \text{V/Hz}^{1/2}$</p>	LCISR, Ukraine
3. Radiofrequency analyzer RFA	<p>High frequency variations, electric component. Frequency range 0.1 - 15 MHz</p>	Space Research Centre, Poland
4. Sensor of neutral and charged particles DN-DE	<p>Density and temperature neutral prtcl. $N_n: 10^5 - 10^{12} \text{cm}^{-3}$ charged prtcl. $N_i: 10^3 - 10^{11} \text{cm}^{-3}$ electron temp. 0.1 - 1.5 keV</p>	Institute of Technical Mechanics, Ukraine
5. DC flux-gate magnetometer FGM	<p>Frequency range DC - 1 Hz Resolution 0.01 nT</p>	LCISR, Ukraine
6. TEC meter	<p>Frequency $L_1 = 1217 - 1265 \text{ MHz}$ $L_2 = 1565 - 1615 \text{ MHz}$ 20 channels</p>	IZMIRAN, Russia
7. DPU	<p>Input information rate, Mb/c, 100 Output information rate, Mb/c, 64 Onboard memory, up to 28 GB</p>	LCISR, Ukraine

- Capability to accommodate payload of various purposes
- Capability to use onboard supporting complex instrumentation of various configurations
- Platform weight: up to 100 kg
- Payload weight: up to 100 kg
- Platform active three-axis attitude
- Attitude accuracy during payload operation: 0.2 deg
- Stabilization angular velocity: 0.005 deg/sec
- Daily average power for payload: up to 50 W
- Comfortable thermal conditions creation
- Required orbit parameters maintenance
- Active operation life: not less than 5 years





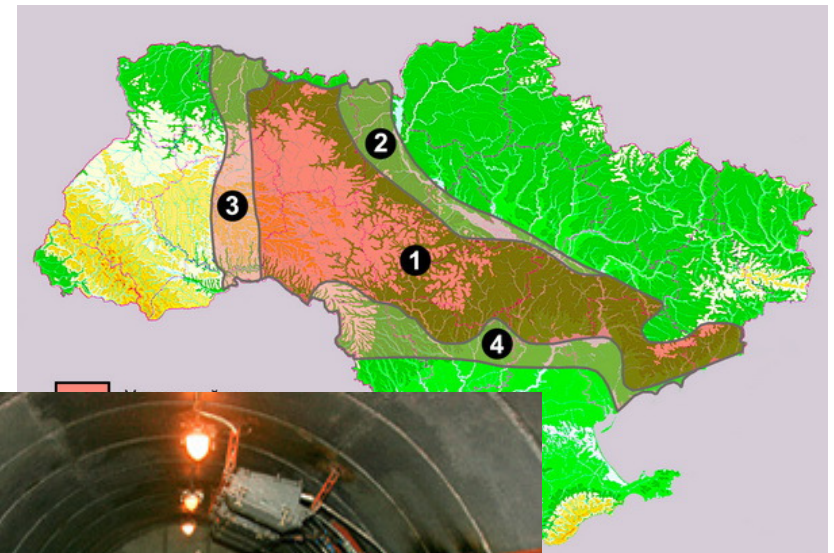
Payload instrumentation
Mass: up to 100 kg
Volume available: Inside - 70 dm³ Outside - 50 dm³

UKRANIAN GRUOND SUPPORT FACILITIES for seismo-ionospheric experiments

Radio-telescope URT-2



Data Main centre of the seismic control



**THANK YOU FOR YOUR
ATTENTION**

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