UNOOSA & JAXA
KiboCUBE project, 4th round

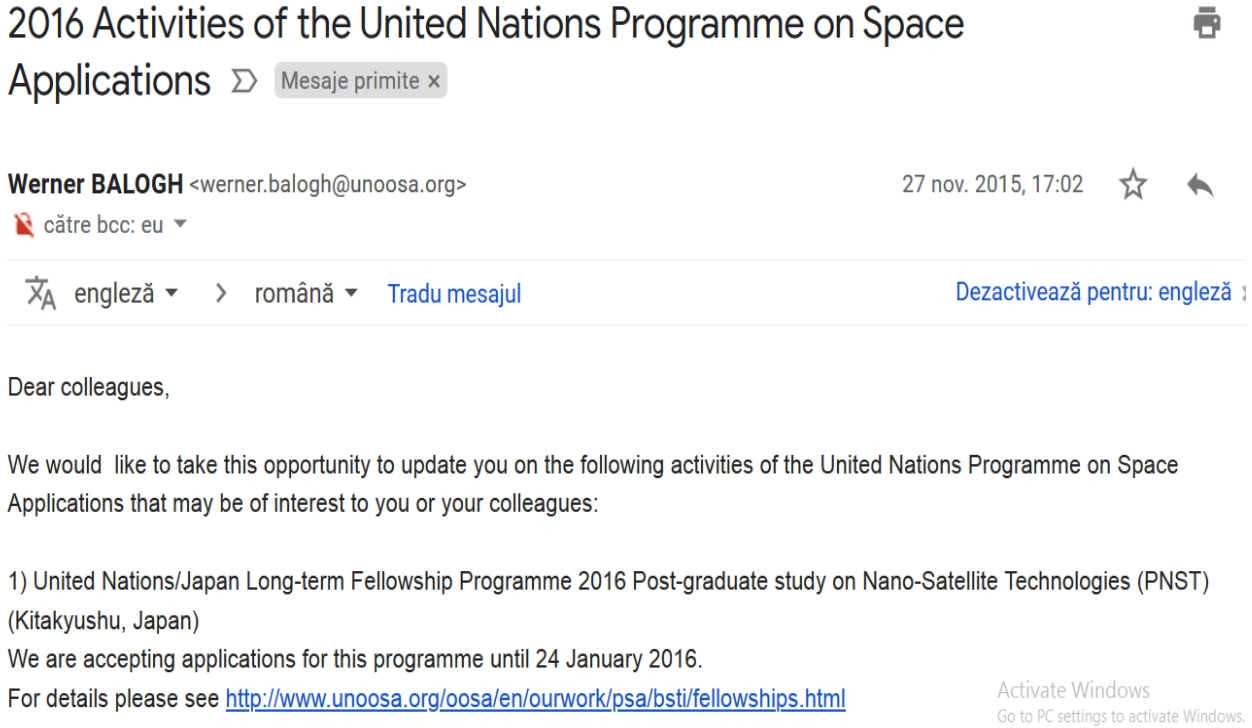
KiboCUBE projects UNOOSA's webinar, October, 9th, 2020.

1. TUM Center of Space Technologies

- Established in 2012
- The only space related research center from Republic of Moldova
- 35 people directlyinvolved (PhD, master, license students)
- Over 60 students attend Satellite Communication course
- Six laboratories
- Astronomic observatory
- 2 fully functional ground stations at 200 km away.

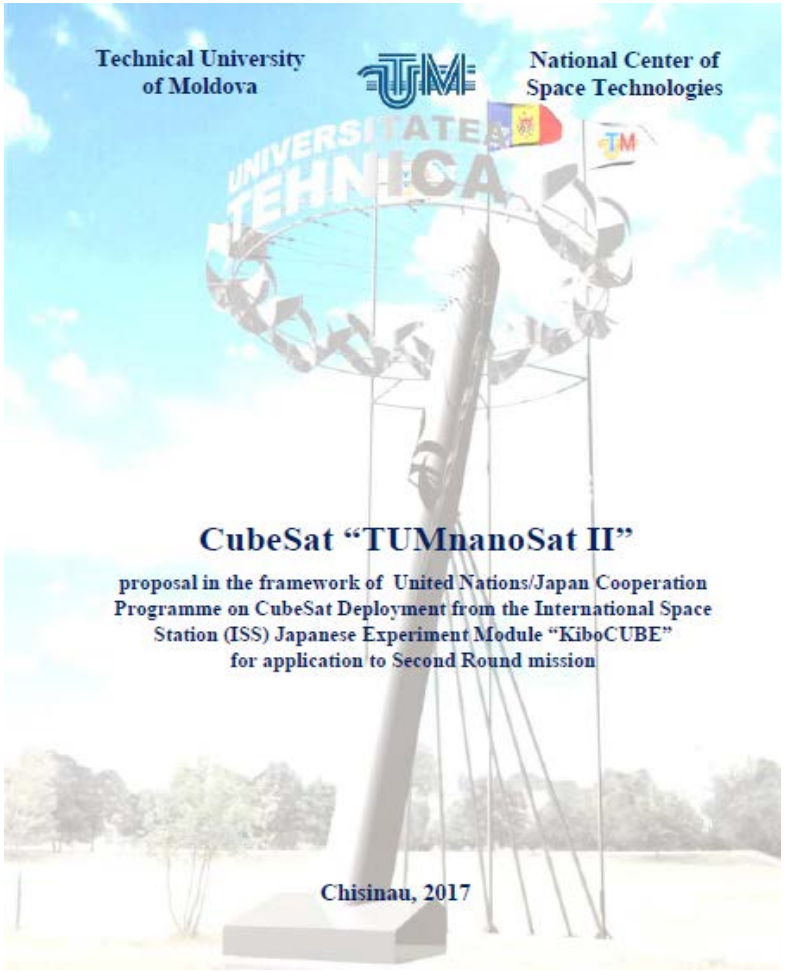
1. How did we get to know about the opportunity?

Our team found out about KiboCube projects in 2016 at the same time from 2 sources: the UNOOSA website and an email from Dr. Werner Balogh, Programme Officer, Space Science & Technology, Space Applications Section, Office for Outer Space Affairs (OOSA).



2. Why did we apply to KiboCUBE?

For a country with limited resources as Moldova, KiboCube provided an unique opportunity to boost educational and research project in space technologies. Our team made two diferent proposal for TUMnanoSAT deployment from the International Space Station (ISS) "KiboCUBE" at 2-nd (2017) and 4th (2019) rounds.



Main missions at the 2-nd (2017):

- Development of **effective communication** subsystem "satellite-ground station" with the possibility to modify the communication rate range and ensure high reliability;
- Establishment of the **microsatellite decline** using optical signals by the LED and GPS data of satellite for tracking and measure of orbital parameters.

Main missions at the 4-nd (2019):

- testing of **sensors subsystem for satellite attitude** determining (magnetometers, micro-gyroscopes, sun sensors) in order to optimize process control satellite attitude;
- endurance testing in conditions of space radiation of the **radiation nanosensors and electronic components** operation, including the onboard computer, digital memories.

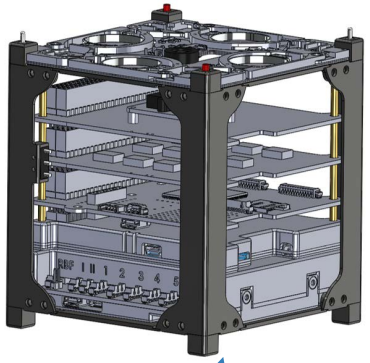
3. What is the status of TUMnanoSAT satellite?

KiboCUBE: Team from the Republic of Moldova Selected for Fourth Round

June 10, 2019 (JST)

National Research & Development Agency
Japan Aerospace Exploration Agency (JAXA)
United Nations Office for Outer Space Affairs (UNOOSA)

The Japan Aerospace Exploration Agency (JAXA) and the United Nations Office for Outer Space Affairs (UNOOSA) have been cooperating under the KiboCUBE programme launched in 2015 to provide opportunities to deploy CubeSats from the Japanese Experiment Module "Kibo" of the International Space Station (ISS).
JAXA and OOSA have selected a team from the National Center of Space Technologies of the Technical University of Moldova for the fourth round of KiboCUBE, which called for applications from October 1, 2018 to February 28, 2019. (Reference 1).
KiboCUBE contributes to the UN Sustainable Development Goals (SDGs), especially Goal 4 "Quality Education" and Goal 9 "Industry, Innovation, and Infrastructure," and this programme aims to contribute to the enhancement of space related technology in developing countries. Last year, JAXA and OOSA have agreed to extend the KiboCUBE programme, and we are welcoming many applications for the current fifth round of KiboCUBE. (Reference 2).



KiboCUBE: Team from the Republic of Moldova Selected for Fourth Round
10 Jun

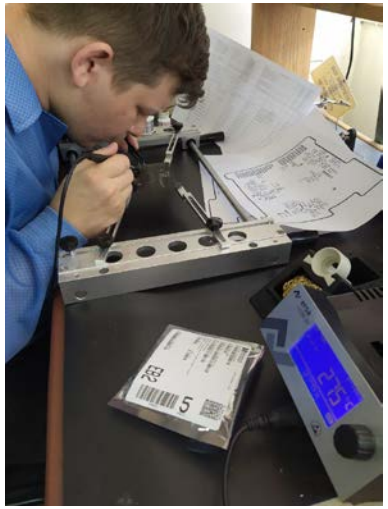
KiboCUBE Fourth Round Submit
28 Feb

First model of satellite
3 May

Kick-off meeting TUM/JAXA
9 Sep

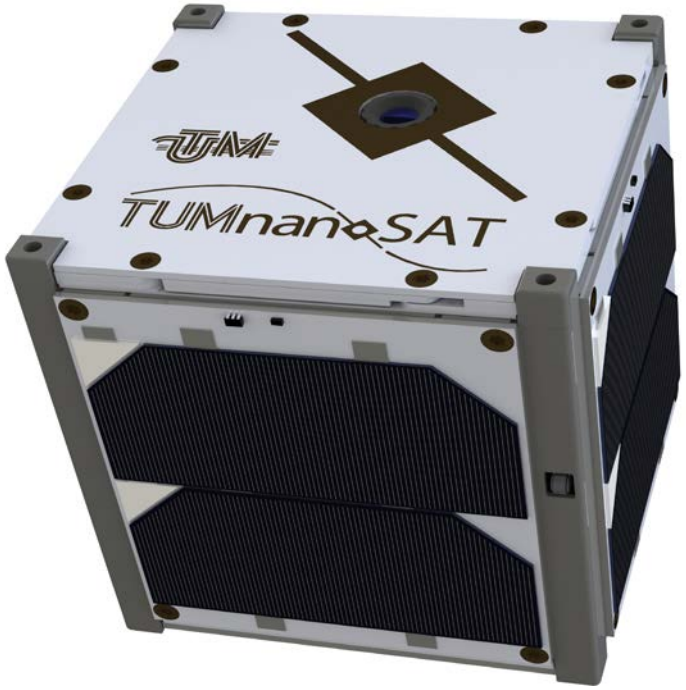
Expected Launch
2021

2018 | May | Aug | Nov | 2019 | May | Aug | Nov | 2020 | May | Aug | Nov | 2021



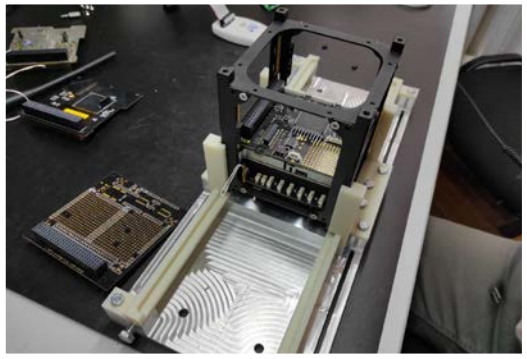
TUMnanoSAT satellite development, payload design and prototyping

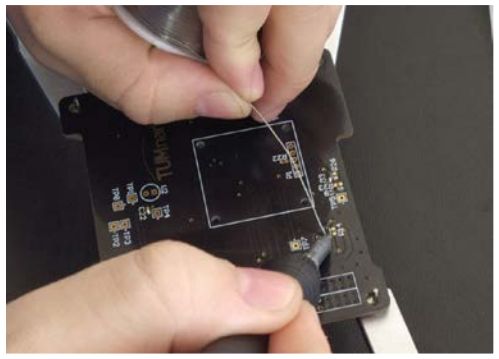
- A series of typical modules for nanosatellites were purchased: structure, EPS module, solar panels from EnduroSat and Solar Space companies;
- Modules for payload (camera and testing of radiation nanosensors) were designed, prototypes were manufactured and their functionality was verified;
- The EPS power supply module has been upgraded to meet JAXA launch requirements from the ISS;
- The "satellite – ground station" communication protocol was developed and its functionality was verified.
- Critical Design Review Panel ongoing .



Preparing the infrastructure for the project realization

- The laboratory and the necessary equipment for the execution of the assembly and verification procedures of the nanosatellite were made.
- The ground stations for communication with TUMnanoSAT have been finished and have been modernized for integration in the "SatNOGS" network.





Legal and organizational assistance

- Finalconfirmation from **IARU** regarding registration of frequency. They confirmed our frequency.

TUMnanoSAT	**Updated: 13 Jul 2020**		**Responsible Operator**	**Nicolae Secrieru ER1TUM**

- **API/ A and API/B** published after coordination of our national administration with ITU.

ID number (SNS)	adm	ORG or Geo.area	Satellite name	Earth station	long_nom	Date of receipt	ssn_ref	ssn_no	ssn rev/ Sup	ssn rev no	removal	Part/ Art.	WIC/IFIC (ific.mdb)	WIC/IFIC date
119545144	MDA		TUMNANOSAT		N-GSO	30.07.2019	API/A	12415					2907	29.10.2019
119545144	MDA		TUMNANOSAT		N-GSO	30.07.2019	API/B	1277					2918	14.04.2020

- A request was made tothe government of the Republic of Moldova to designate the satellite registration authority and we are waiting for the Government Decision to authorize the satellite registration: *GD no. 944/2010 on the approval of the Technical Concept of the Automated Information System "State Register of frequencies and radio communication stations" (Official Monitor of the Republic of Moldova, 2010, no. 202-205, art. 1038) on "registration of objects launched into space" .*

4. Hopes for the future

Short term plans (2020-:-2021):

- Manufacture of payload flight modules of the TUMnanoSAT;
- Integration and connection of NCST ground stations in the *SatNOGS*: *Global Network of open source satellite ground stations*, that combine software and cloud platform which allows ground stations across the globe to directly offer their spare receiving capacity to companies operating satellites;
- Complex satellite tests with the support of the Institute of Space Sciences from ROSA;
- Preparing TUMnanoSAT for its launch from the ISS by suporting of JAXA.

Long term plans (2021-:-2023):

- Elaboration of 2.5 / 3U CubeSat nanosatellite models with more complex scientific and educational missions within the project "*Development and launch of the series of nanosatellites with research missions from the International Space Station, their monitoring, post-operation and the promotion of space technologies*";