

SMOG-1, the 4 th.
Hungarian PocketQube Class Student Satellite
"Radio Frequency SMOG Measurement System on
Low-Earth-Orbit"

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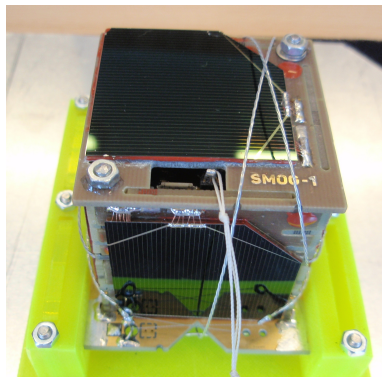
In Education: SMOG-1 & SMOG-P

1. DVB-T band Spectrum Monitor.
2. Measurement of Total Ionising Dose.
3. Application of hysteresis material to decrease orbit lifetime.

Single-point failure tolerant, cold-redundant on-board satellite sub-systems with local intelligence.

- ▶ 50 x 50 x 50 mm
- ▶ 183 g mass
- ▶ -40... + 80C temp. range
- ▶ 20g acc. load

- ▶ 06-12-2019, Electron - SMOG-P
- ▶ 22-03-2021, Soyuz - SMOG-1

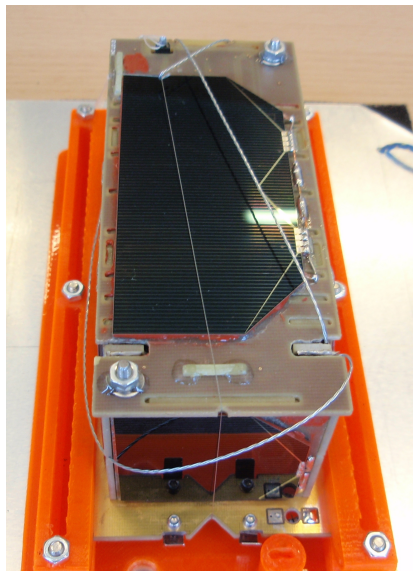


ATL-1 2-PocketQube Class Satellite

- ▶ 5 x 5 x 10 cm size
- ▶ 336 g mass
- ▶ avg. 500 mW DC, 1 W peak

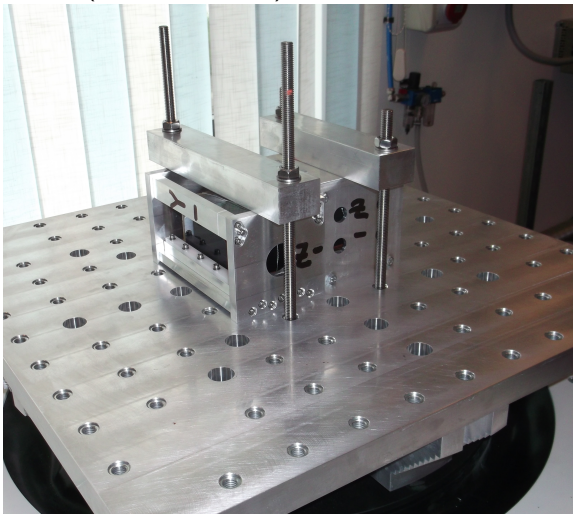
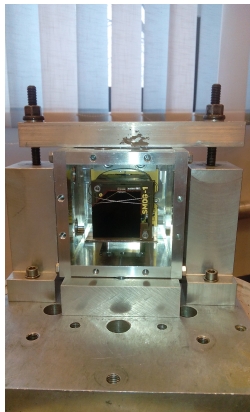
- ▶ 4 batteries
- ▶ 3 special thermal insulator materials

- ▶ 06.12.2019, New-Zealand,
Electron



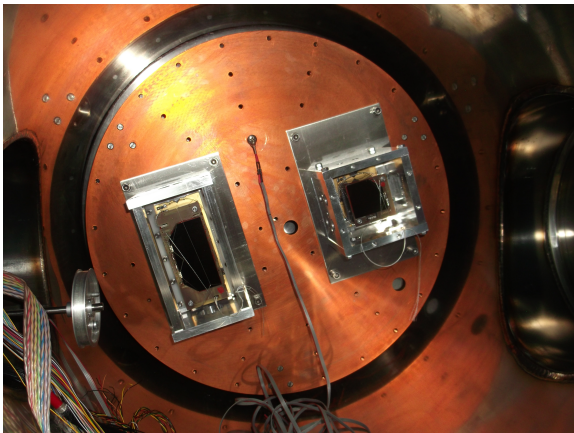
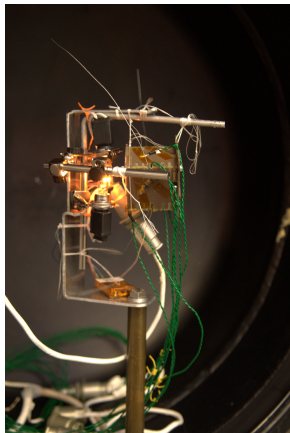
Shaking Test - BHE Ltd.

Qualification 20 g sine, 65 g random peak.
Acceptance 12 g sine (20 Hz -20 kHz), 10 g random.



Thermal Vacuum Test - Centre for Energy Research

+70 deg, 3h baking, -40..+80 deg 4 cycles



Frequency Coordination: Radio Amateur Satellites



SMOG-1 HA5BME

- ▶ 437.345 MHz
- ▶ 20 kHz downlink
- ▶ 12.5 kHz uplink
- ▶ 100 mW

SMOG-P HA4C

- ▶ 437.150 MHz
- ▶ 20 kHz downlink
- ▶ 12.5 kHz uplink
- ▶ 100 mW

ATL-1 HA1ATL

- ▶ 437.175 MHz
- ▶ 20 kHz downlink
- ▶ 12.5 kHz uplink
- ▶ 100 mW

"Running Out of Fingers" RocketLab Electron START

06-12-2019, Mahia Island, New-Zealand



- ▶ ATL-1 2P
- ▶ FossaSat 1P
- ▶ SMOG-P 1P
- ▶ TRSI 1P

- ▶ Noor1-A 3P
- ▶ Noor1-B 3P

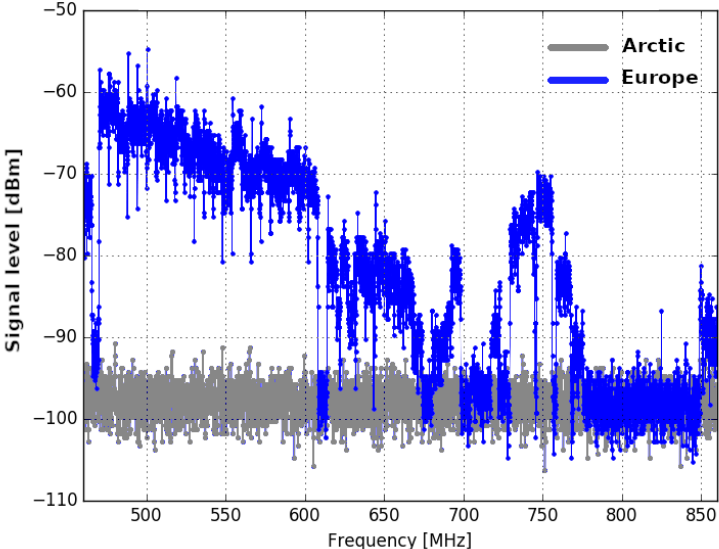
Primary Ground Station of SMOG-1, SMOG-P, ATL-1

- ▶ 4.5 m par. refl. type aperture ant
- ▶ 21 dBlin / 24 dBcir gain
- ▶ 1 kW RF transmit power
- ▶ HW and SDR

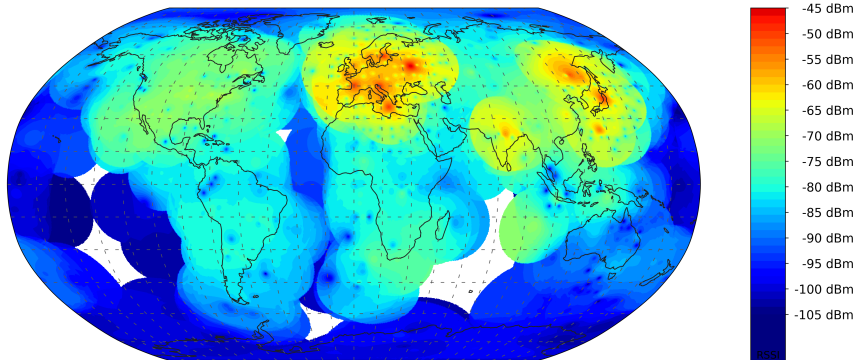


Automated satellite tracking and remote-control.

Measured DVB-T Spectrum



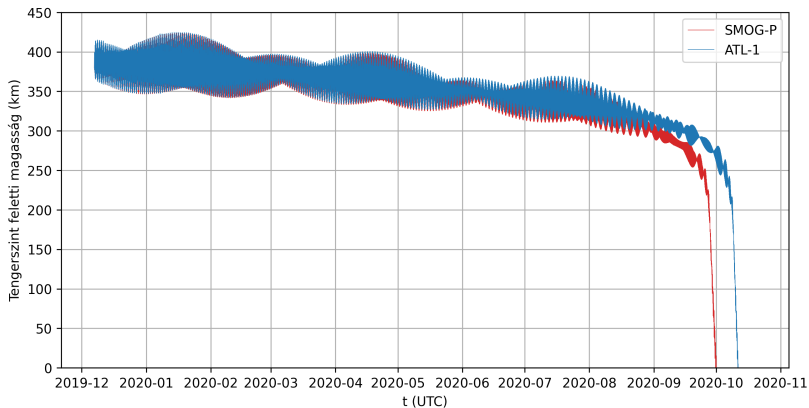
Global DVB-T Band Electromagnetic Pollution Map



Donát Takács, Boldizsár Markotics - BME VIK TDK 2020

Hungarian PocketQubes' Orbital Decay

SMOG-P: 28-09-2020, ATL-1: 09-10-2020



Donát Takács, Boldizsár Markotics - BME VIK TDK 2020

SMOG-1 - Soyuz Start 22-03-2021



SMOG-1 - first signals 25-03-2021 0:46

The screenshot displays the OpenWebRX web interface in a Mozilla Firefox browser. The browser's address bar shows the URL `152.66.80.46:8073`. The interface includes a header with the OpenWebRX logo, a user profile for 'ha7wen', and navigation links for 'Status', 'Log', and 'Receiver'. The main area features a waterfall plot with a frequency scale from 437.330 MHz to 437.360 MHz. A yellow bracket highlights a signal at 437.3435 MHz. A control panel on the right shows the selected frequency (437.343,5 MHz) and mode (USB). At the bottom, a status bar provides system metrics: 'Audio buffer [1.7 s]', 'Audio output [44.0 kbps]', 'Audio stream [65 kbps]', 'Server CPU [30%]', and 'Clients [2]'. The Windows taskbar at the bottom shows the time as 22:58 and lists several open applications.

Plan: SMOG-2 - 5 x 5 x 15 cm

▶ Electrical Power System

- ▶ MPPT
- ▶ SDC
- ▶ LimSW

▶ On-Board Computer

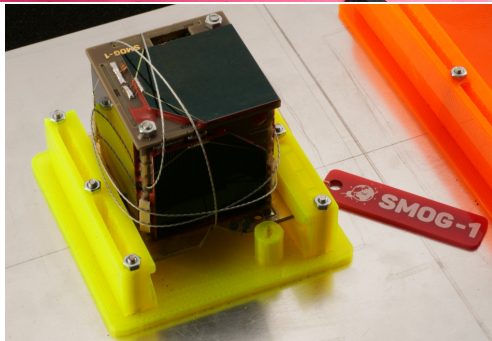
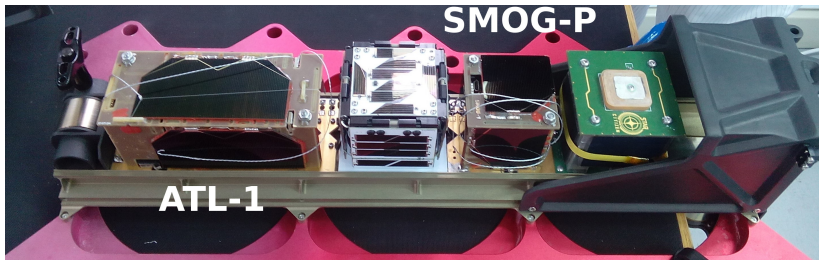
- ▶ Motion Sensor
- ▶ Flash Memory
- ▶ Real-Time-Clock and Calendar

▶ Communication System

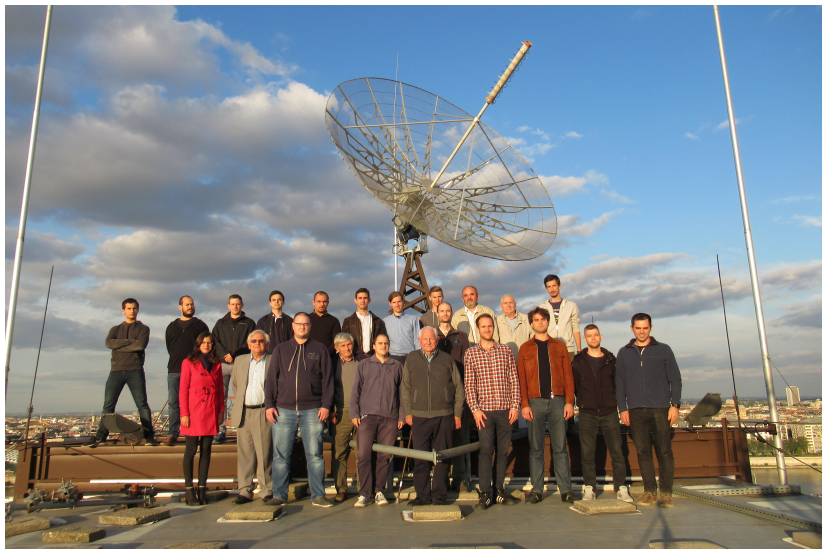
- ▶ 437.150 MHz UHF
- ▶ 12.5 kHz up-link
- ▶ 20 kHz down-link

Payloads:

1. Spectrum Analyzer
 - ▶ 30-120 MHz
 - ▶ 120-960 MHz
 - ▶ 960-1800 MHz
 - ▶ 1800-2600 MHz
2. Active Magnetic Attitude Control - 3 axis
3. ESA-RILDOS - DSSS BPSK + GPS
4. S-band QPSK down-link
5. Total Ionizing Dose Measurement - 27G



Decayed: Masat-1, SMOG-P, ATL-1; Operational: SMOG-1



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<https://gnd.bme.hu/>

<http://152.66.80.46/smog1>