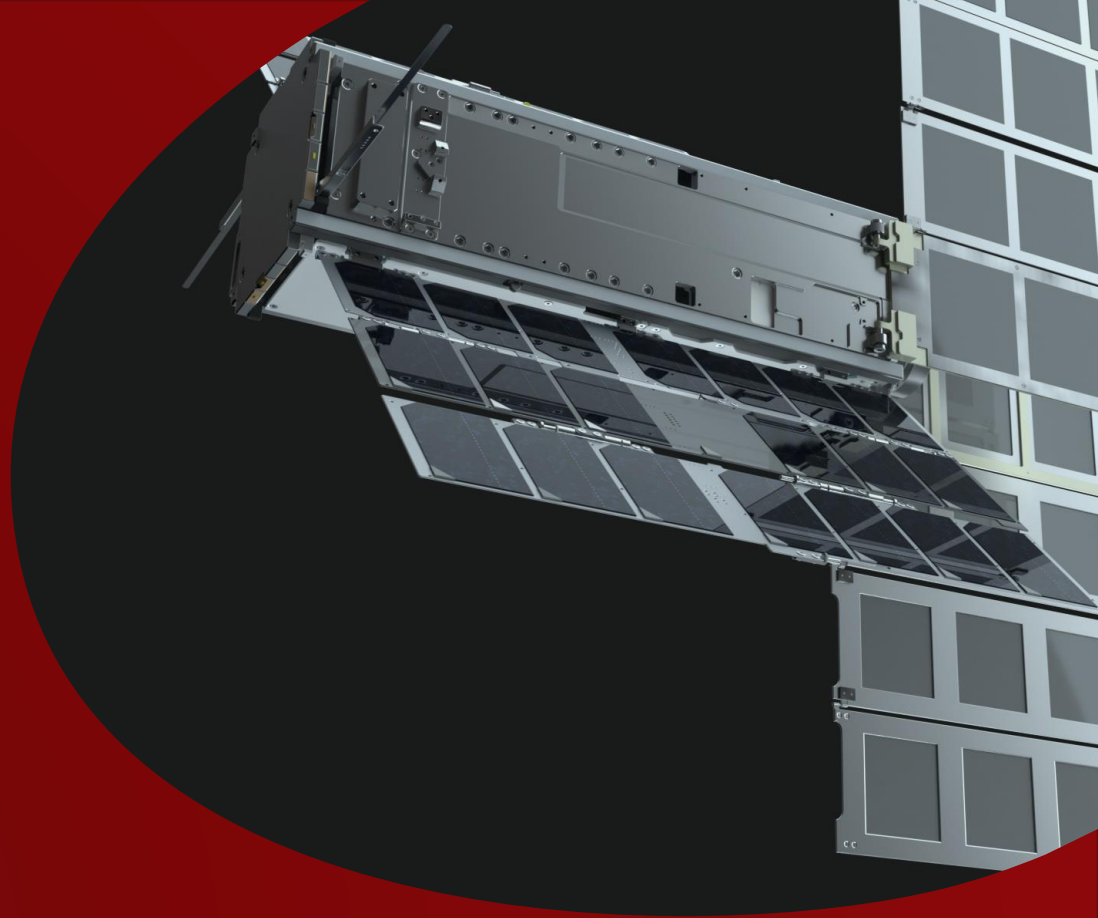


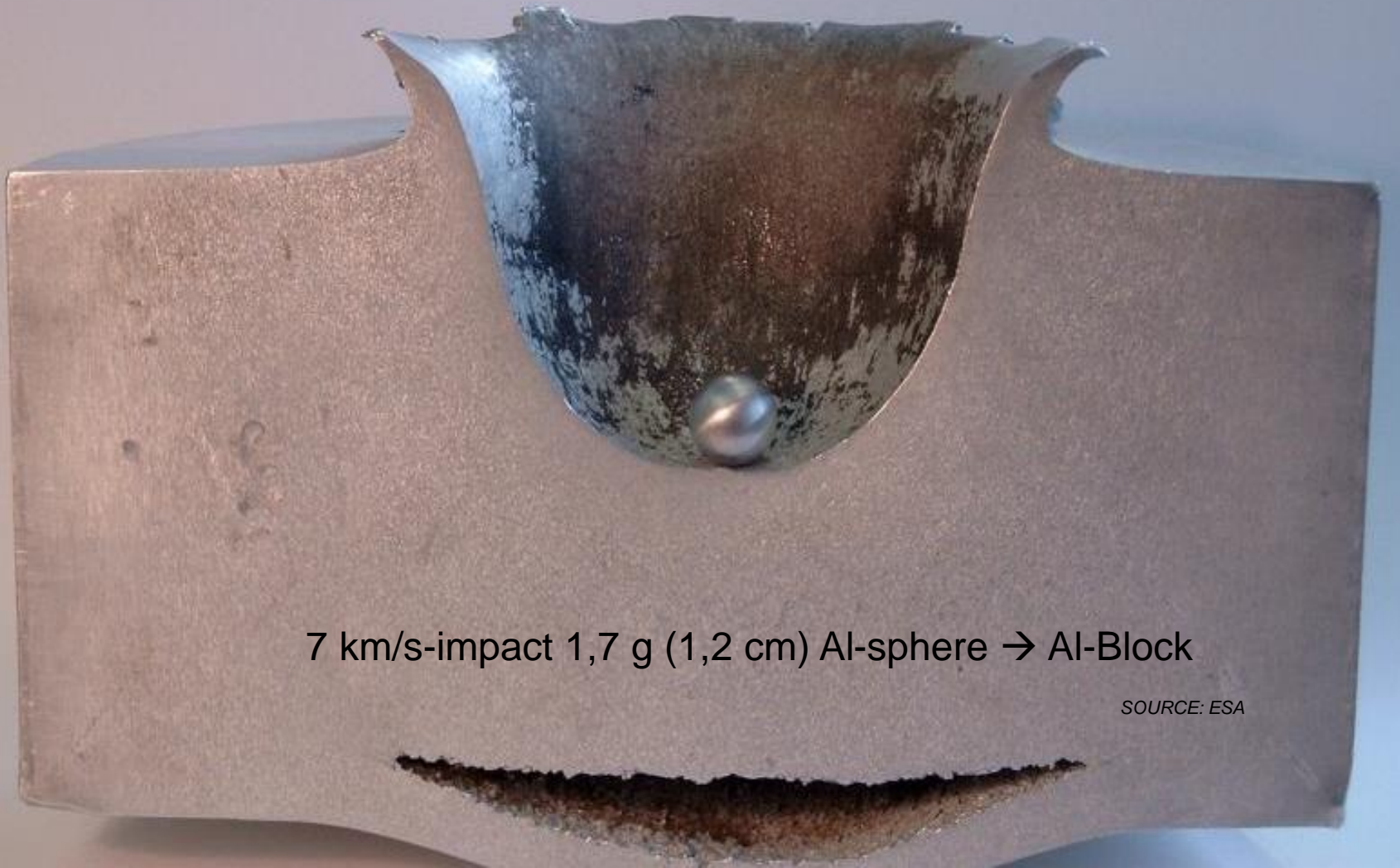


Space Debris Detection with ADLER-1

Dr. Gernot Grömer, Director

ÖSTERREICHISCHES WELTRAUM FORUM
AUSTRIAN SPACE FORUM





7 km/s-impact 1,7 g (1,2 cm) Al-sphere → Al-Block

SOURCE: ESA



ADLER-1 Mission

- 3U (30x10x10cm) cubesat IOD
 - Funded by: Findus Venture; Austria
 - Scientific lead and payloads: Austrian Space Forum
 - Satellite Bus & Ground station network: SPIRE Global US/UK/LUX
 - Registered in Luxembourg as LEMUR-2 KRYWE, launched in US
- Mass: 6 kg (payload: 1,5 kg)
- Capacity building for the Austrian Space Forum & SSA
- Launched in Jan2022 (ca 15 months from idea to orbit)
- Orbit: LEO/SSO @ 480 km
- **2 Instruments**
 - APID/Austrian Particle Impact Detector
 - PL2/CW Radar







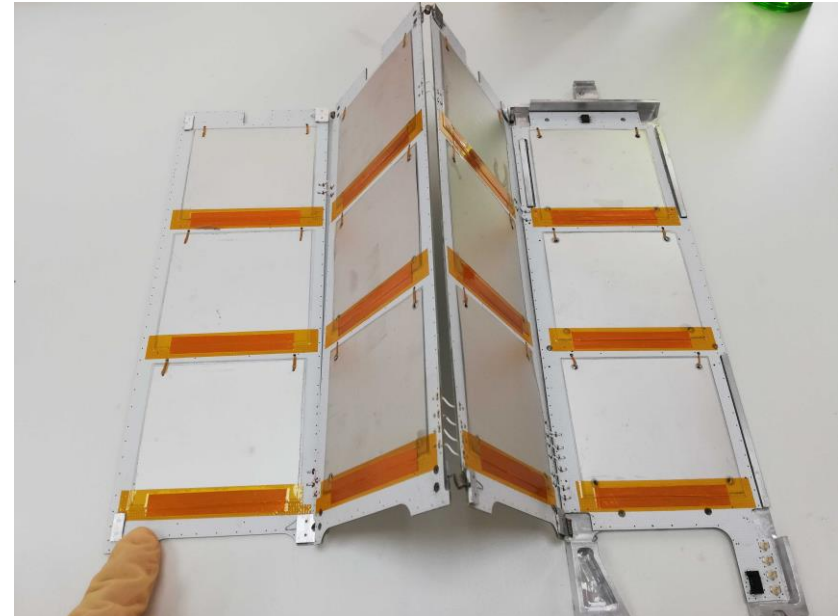
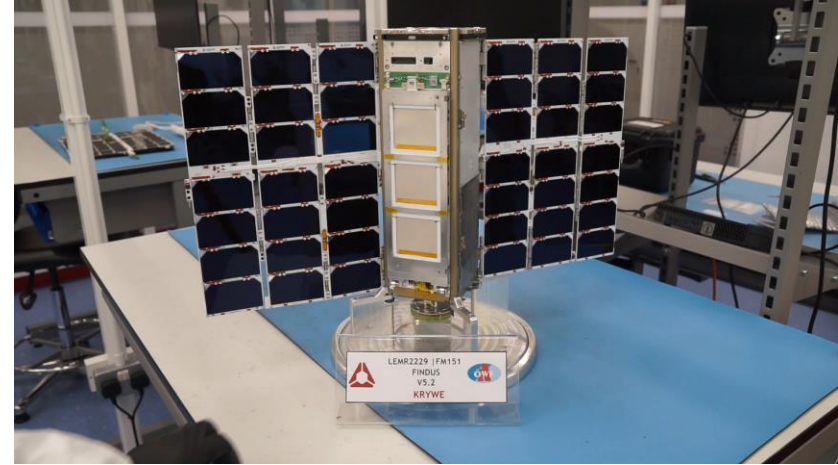
ADLER-1/APID

Piezoelectric Sensors

- Mech-electrical conversion:
12 mV/microstrain, 400 mV/ μm
- particle: <100 μm @ 10 km/s

Configuration

- 2 wings with 12 sensors @ 60 x 65 mm
- Total surface: ca **865 cm²**





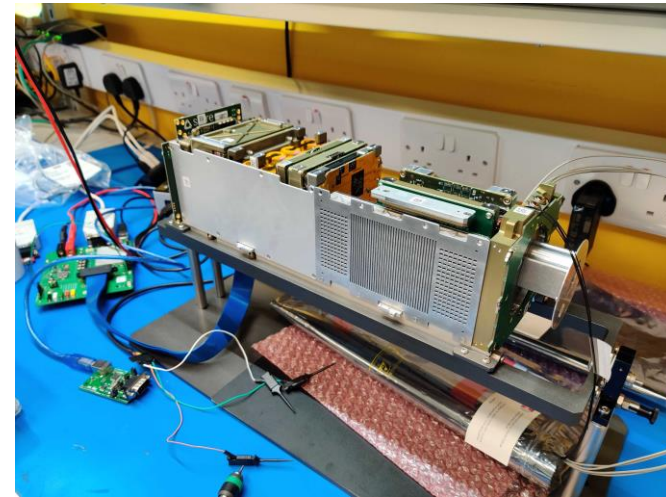
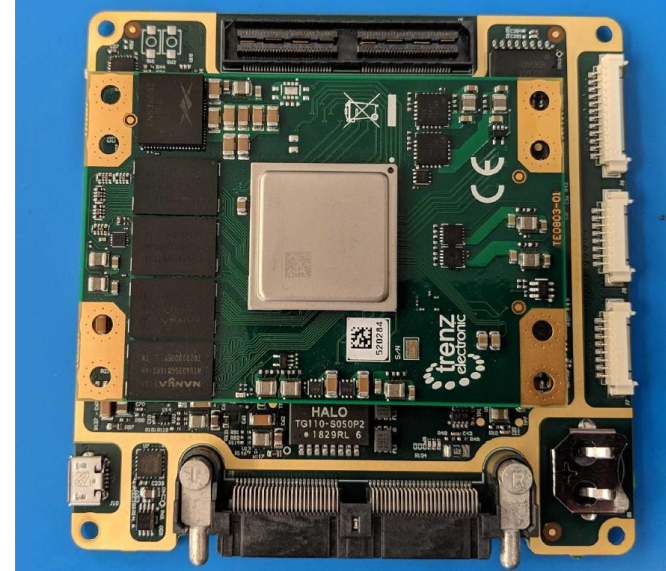
ADLER-1/RADAR

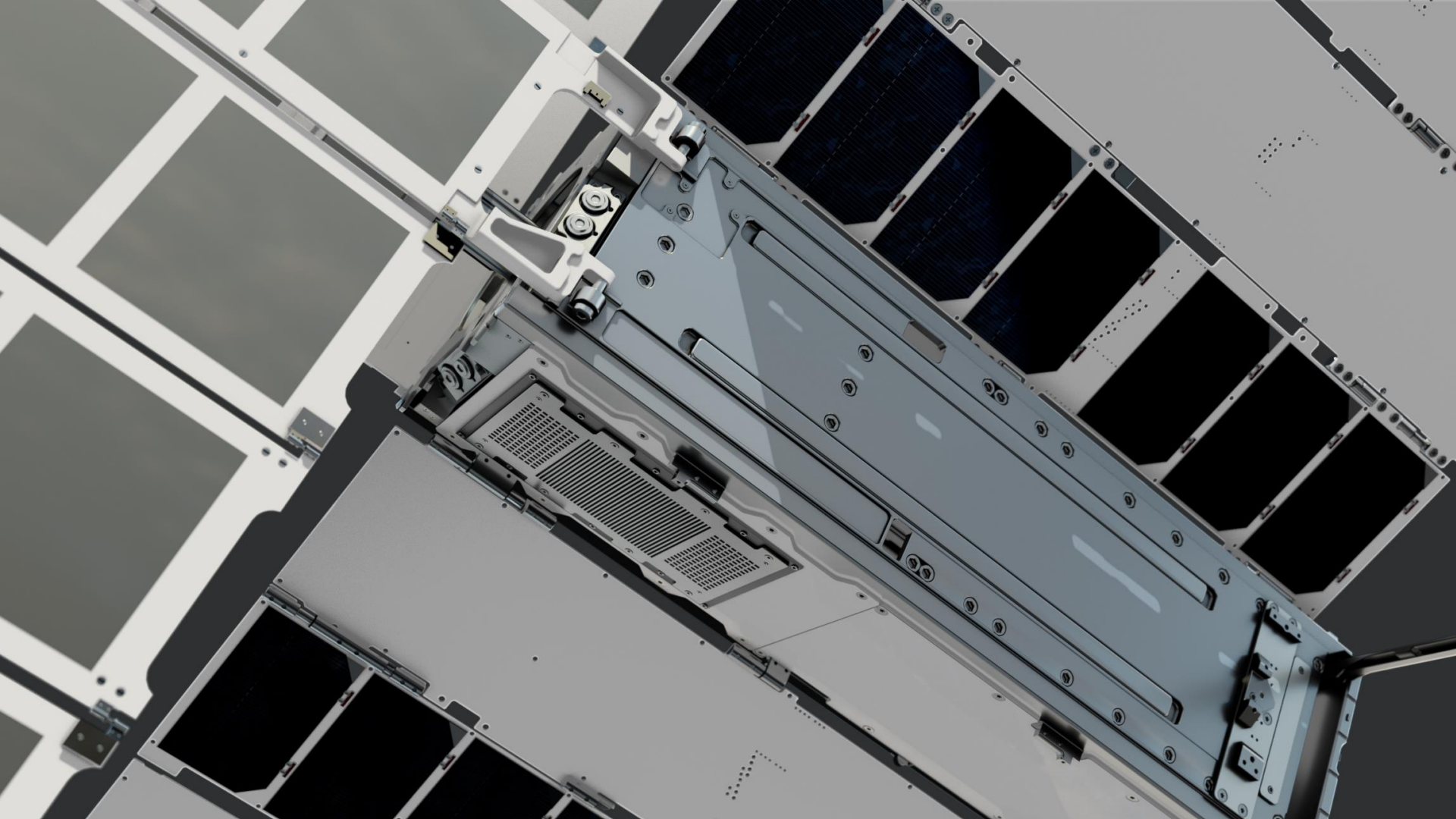
Configuration

- **1 Watt CW Radar @ 78 GHz,**
- Processor Xilinx Zynq FPGA Architecture
- 1,6mm thick antenna, 3d printed

Particles

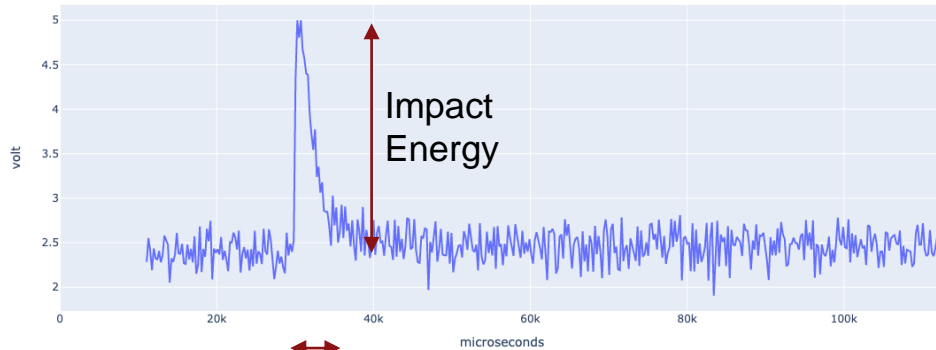
- Size: >1mm @ 15 km/s
- Range: ca 50m (α RCS) for Radar-echo & Doppler
- Effective cross section: 150 m²







ADLER-1 APID Signals



velocity

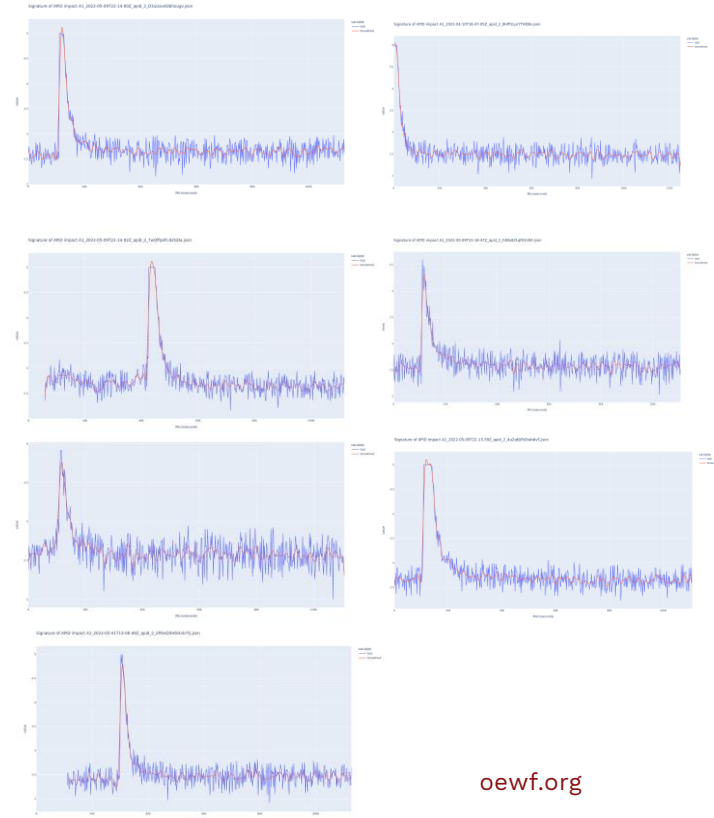
Polarity → which hemisphere

Time of impact: 01May2022, 13:06:42.625786066 UTC

- Velocity of the satellite: 7627.583 m/s
- Corresponds to 479 km, Mid-Atlantic between Guinea & French Guiana.

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- Ca 550.000 data packages received so far (01Jun2022)
- 9 suspected impacts so far

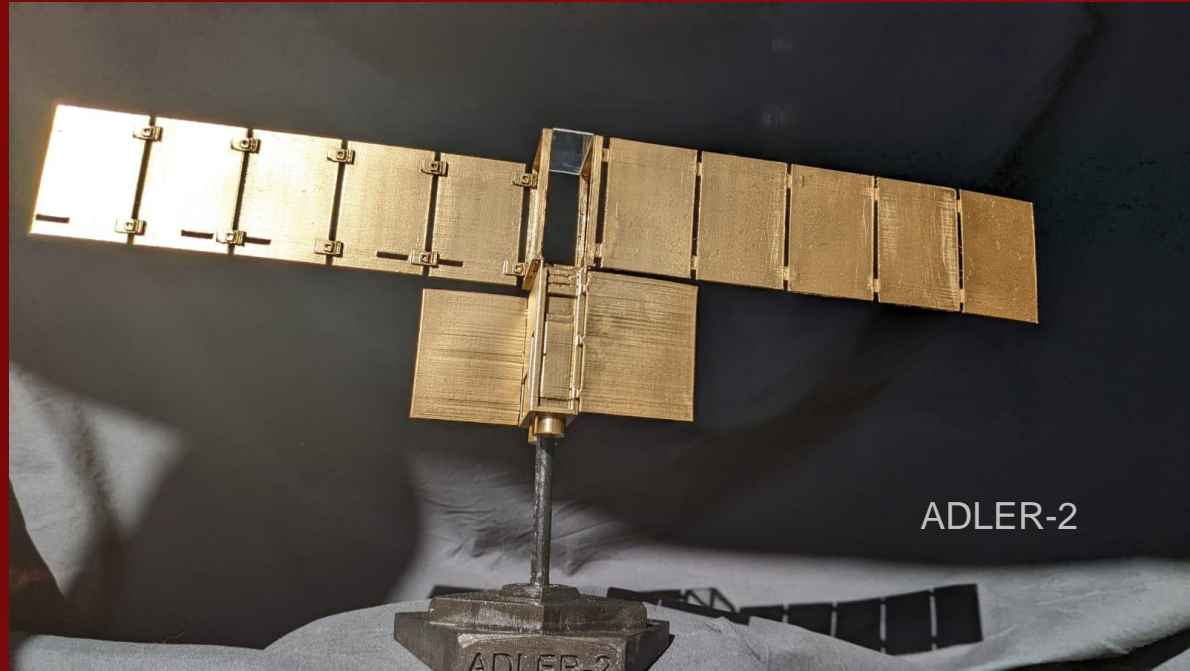


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We enable to
live the passion for space.

Dr. Gernot Grömer
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ADLER-2