NIS-PQ (QUBIK-5) Satellite

What data the satellite provides and how to obtain it

Guide · based on SatNOGS DB and the Grafana dashboard · screenshots reflect the situation on 04.11.2026

What this document is about. The NIS-PQ satellite broadcasts telemetry (information about its own state) over the radio. Amateur radio stations around the world receive it and send it to the SatNOGS system, which decodes the data and displays it on the website. Below: brief information about the satellite, signal parameters, the data path, explanations of the SatNOGS DB and Grafana pages with screenshots, what data can be obtained and how to obtain it.

1. The satellite in brief

Name	NIS-PQ (alternative name — QUBIK-5)
Country	Kazakhstan
Customer	Nazarbayev Intellectual Schools and Kazakhstan Garysh Sapary, together with Libre Space Foundation
Type	PocketQube — a small satellite for amateur radio and experiments
Launch date	2026-10-01, 18:32 UTC
NORAD ID	98225 (temporary)
SatNOGS ID	ZKZZ-3777-2014-2860-9930
Status	Operational — the satellite is in orbit
Mission goal	Testing LEOP (launch and early orbit phase) operations and passive orbit determination from the radio signal
Orbit (TLE of 20.10.2026)	Inclination 97.44° (close to a polar orbit), about 15.17 revolutions per day, i.e. one revolution takes ~95 minutes. These TLE values date from 20.10.2026 and may have been updated since.

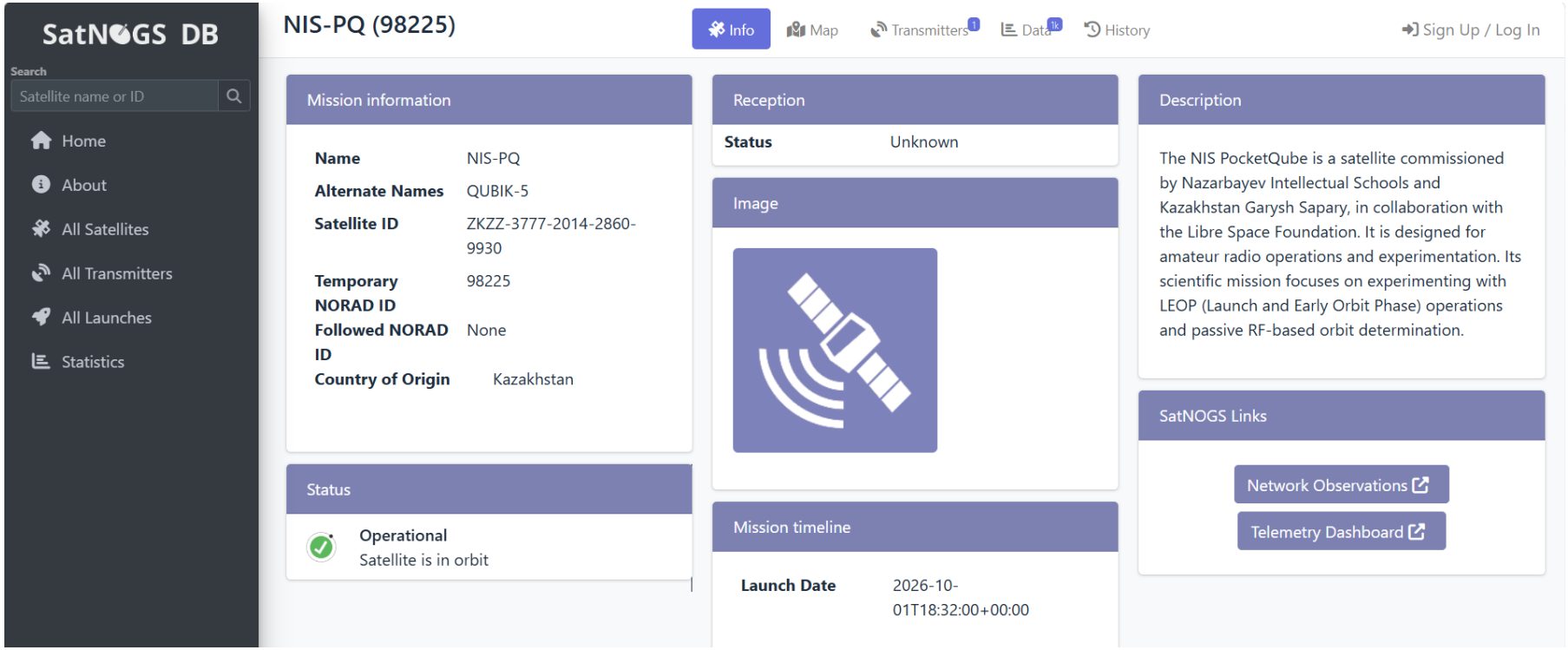


Figure 1 — SatNOGS DB, "Info" page: satellite passport

2. Signal parameters

The satellite is registered in SatNOGS DB as one transmitter. Its parameters:

Parameter	Value
Frequency (downlink)	435.240 MHz — UHF, 70 cm amateur band
Modulation	FSK (called "FSK QUBIK" in SatNOGS)
Speed	9600 baud
Protocol	CCSDS (space telemetry packets)
Service type	Amateur (amateur radio)

Parameter	Value
Frequency coordination	IARU Coordinated
Transmitter status	Active
Decoder	NIS-PQ Telemetry, script name yamcs

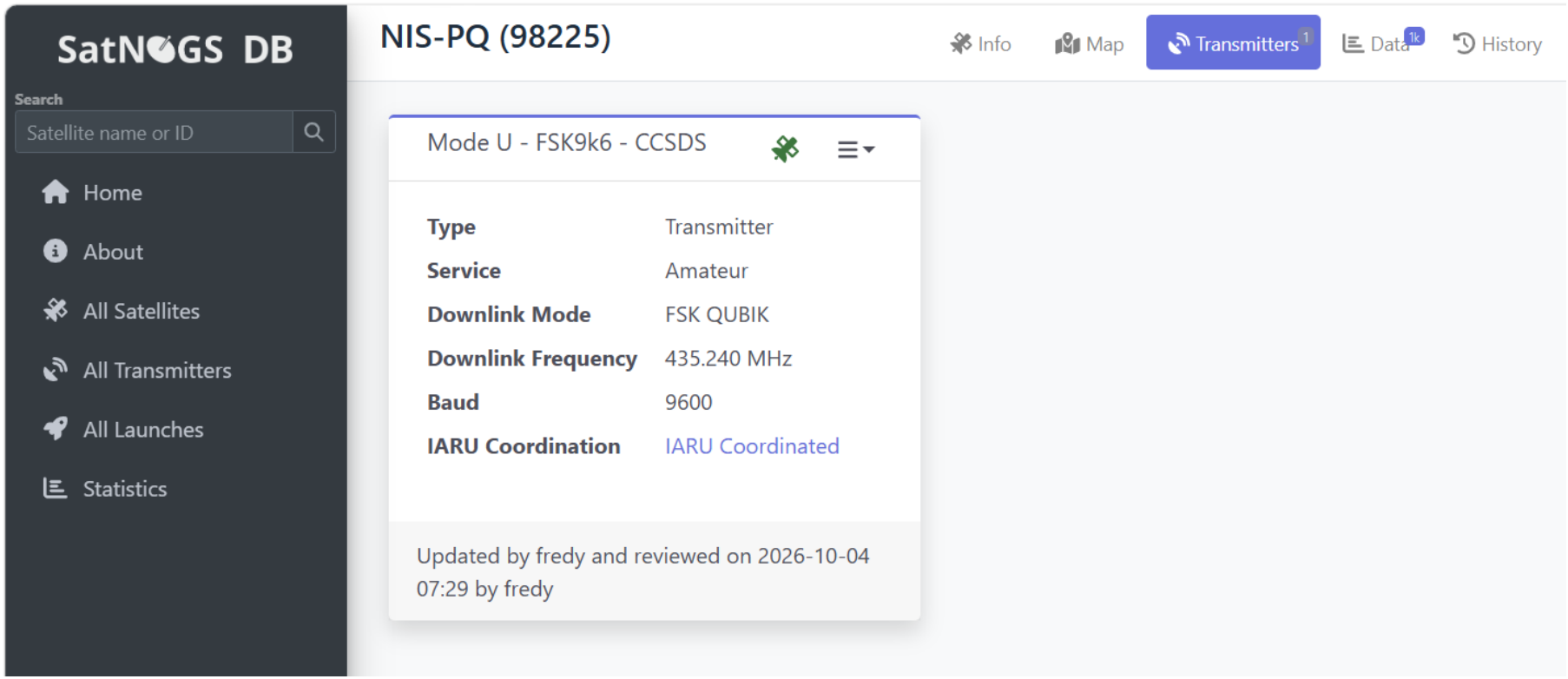


Figure 3 — SatNOGS DB, "Transmitters" page: transmitter parameters

> **Note:** The TX Count of valid frames rose from about 113 to 2975 in roughly 23 hours after the counter dropped on 3 November (see section 5.4). This corresponds, on average, to one frame every 30 seconds (my own estimate based on the numbers on the dashboard).

3. How the data arrives

1. **The satellite** transmits an FSK signal on 435.240 MHz.
2. **Ground stations** (radio amateurs and universities) receive the signal with an SDR receiver. Because the satellite flies in low orbit, a single pass is visible to one station for only about 5–10 minutes.
3. **SatNOGS** demodulates the signal, decodes it with the NIS-PQ decoder and stores the telemetry frames in a database.
4. **The result** is visible in two places: SatNOGS DB (general information and the number of frames) and the Grafana dashboard (full telemetry graphs).

4. The SatNOGS DB page

Address: db.satnogs.org/satellite/ZKZZ-3777-2014-2860-9930

4.1. Map

The “Map” page shows the satellite’s current position (icon), its predicted ground track (black lines) and the area where the signal can be received (dark circle). This helps estimate when the satellite will be visible from the station’s location.

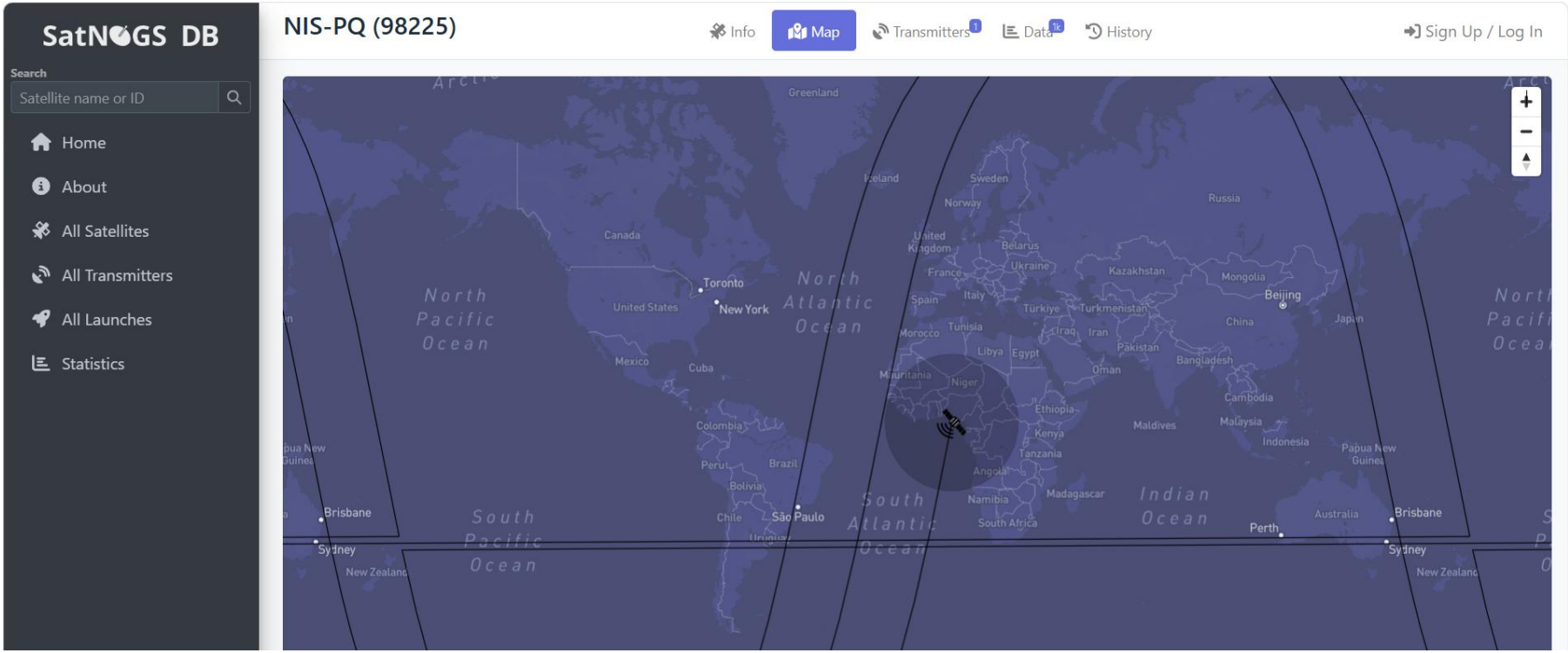


Figure 2 — Map: satellite position and reception area

4.2. Data

Two things matter on this page:

- **Most Recent Observers (last 24h):** a list of stations that recently received the satellite’s signal. Time is given in UTC (add 5 hours for Astana). On the screenshot: OE6ISP_High_Gain_LimeSDR, EU1XX and OE6ISP_High_Gain_Zynq-7010, all with frames received on 2026-11-04 at about 09:46–09:47 UTC.

- **Data Frames Decoded — 30 Days:** the graph shows that frames have been decoded every day since the beginning of October, typically from about 10 to about 100 frames per day (the vertical axis is logarithmic). This is a sign that the decoder is working. At the bottom of the page the decoder name (NIS-PQ Telemetry, script yamcs) and the Orbital Elements (TLE) are shown.

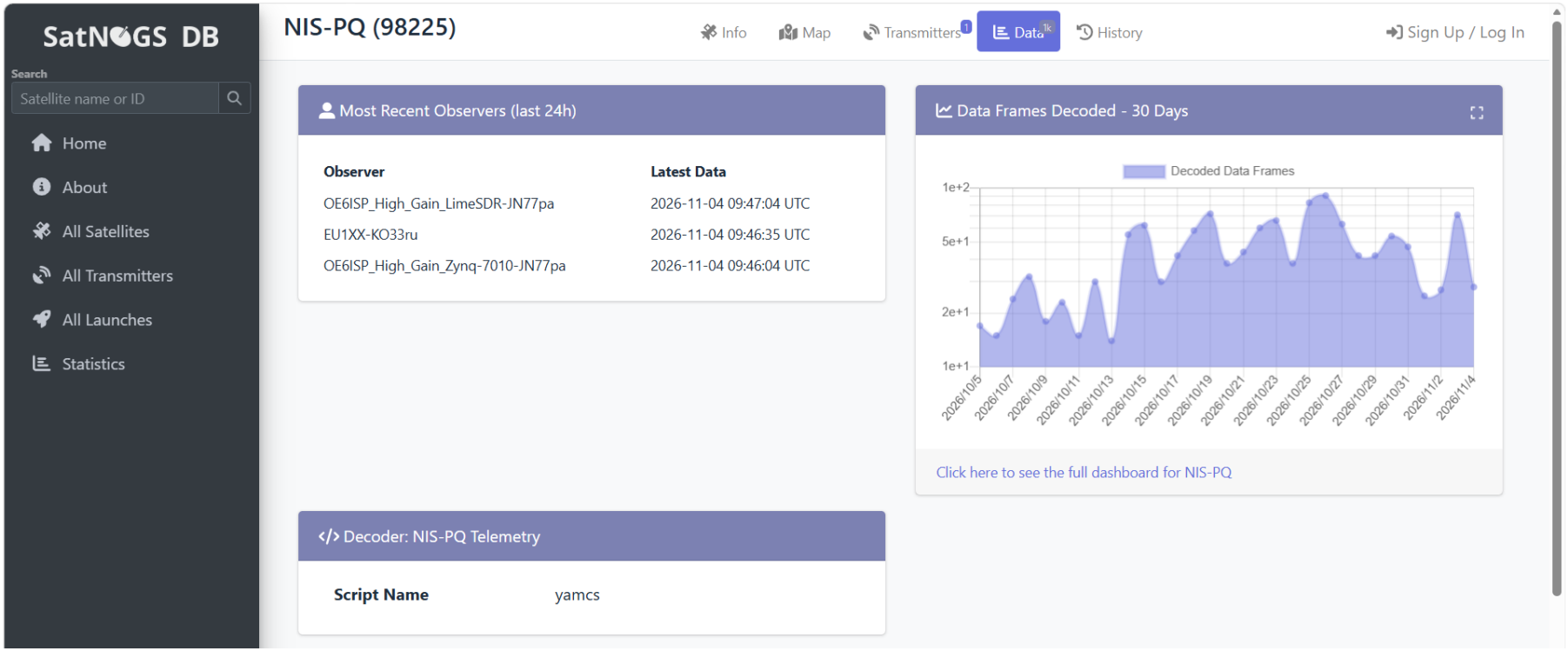


Figure 4 — Data page: observers and graph of decoded frames

4.3. History

This page records who changed the satellite and transmitter information, and when. The transmitter parameters were entered on 3–4 October and approved. This page is not required for a data user; it is useful only for checking where the information comes from.

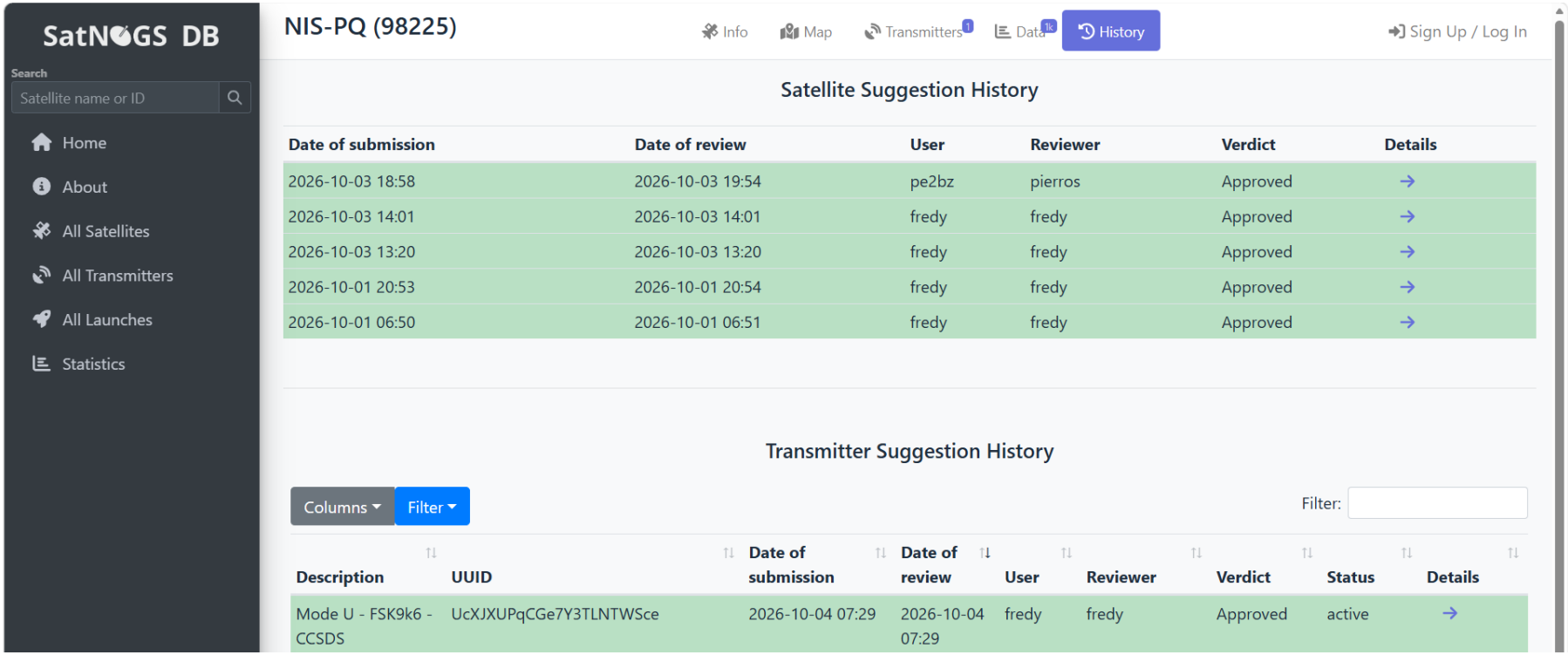


Figure 5 — History page: change history

5. Grafana dashboard: full telemetry

Address: dashboard.satnogs.org/d/eg04ajqcp7bpcc/nis-pq. To open the dashboard, it is enough to click the “Telemetry Dashboard” button on the Info page of DB (or the link “Click here to see the full dashboard for NIS-PQ” on the Data page). The time range is changed in the “Last 2 days” list at the top right, and the page refreshes automatically every 2 minutes. Time is shown in the browser’s local time.

5.1. Quick Stats

The first screen of the dashboard shows the satellite’s overall state at a glance.

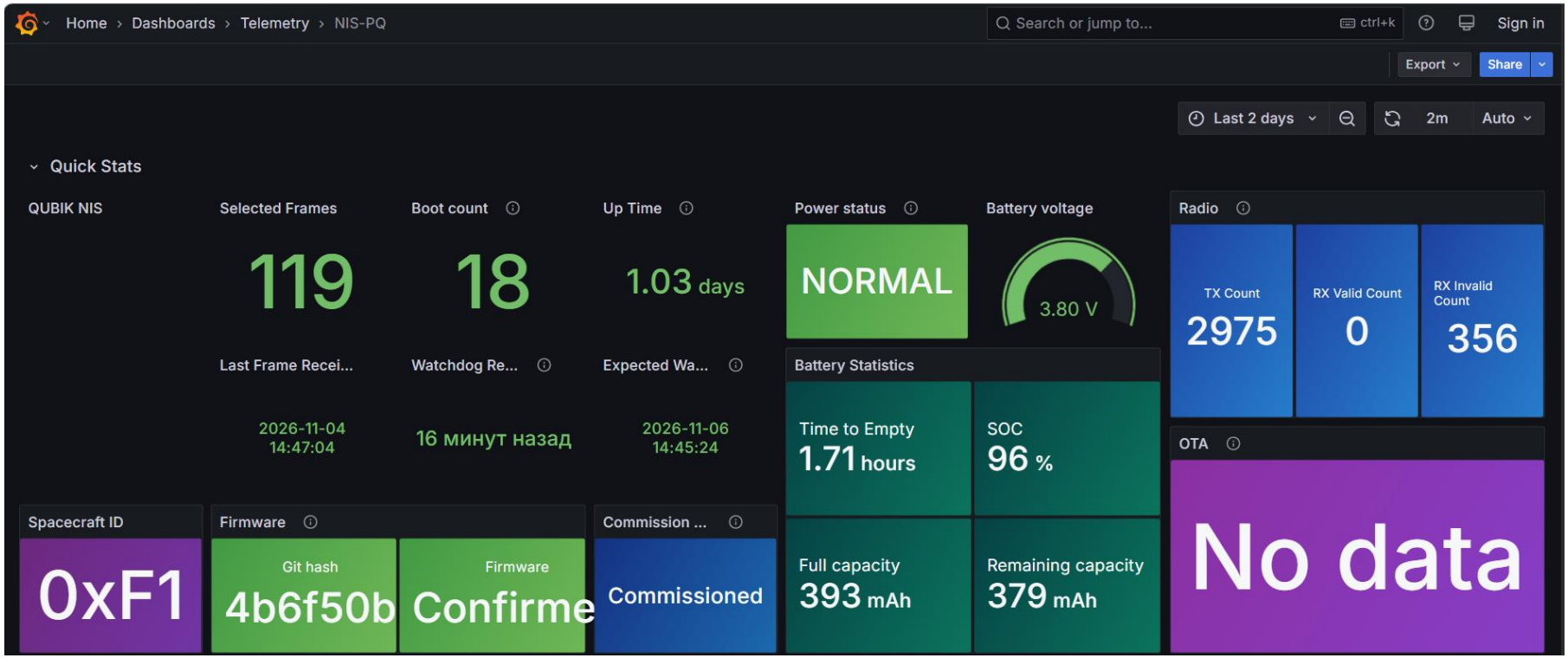


Figure 6 — Grafana: “Quick Stats” section

Panel	Value (04.11.2026)	Meaning
Power status	NORMAL	The overall state according to the satellite’s own telemetry is normal
Battery voltage	3.80 V	Battery voltage (the last reading)

Panel	Value (04.11.2026)	Meaning
SOC	96 %	Battery charge level
Full capacity / Remaining capacity	393 / 379 mAh	Full and remaining battery capacity
Time to Empty	1.71 hours	An estimate of how long the battery will last at the current consumption (provided by the charge meter)
Up Time	1.03 days	Time since the satellite last started (an assumption based on the panel name)
Boot count	18	Number of satellite starts/reboots (an assumption based on the panel name)
Selected Frames	119	Number of frames decoded in the selected time range (it equals the sum of the pie chart in section 5.6)
Last Frame Recei...	2026-11-04 14:47:04	Time the last frame was received (local time)
Watchdog Re...	16 минут назад (16 minutes ago)	Probably the time of the last watchdog reset (not confirmed)
Expected Wa...	2026-11-06 14:45:24	Probably the expected time of the next watchdog event (not confirmed)
Spacecraft ID	0xF1	Identifier of the on-board device
Firmware	Git hash 4b6f50b; “Confirme…”	Version of the on-board software (the second tile is cut off on the screenshot, probably “Confirmed”)
Commission...	Commissioned	The satellite has been put into operation
Radio: TX Count	2975	Number of frames transmitted by the satellite
Radio: RX Valid Count	0	Correct frames received by the satellite from the ground
Radio: RX Invalid Count	356	Frames that the satellite received but that failed validation
OTA	No data	No attempts to update the software over the air have been registered yet

5.2. Battery Stats: voltage and current



Figure 7 — Grafana: "Battery Stats" — battery voltage and battery current

- **Voltage:** over the last 2 days it ranged from 3.76 to 4.37 V, with a median of 4.19 V. The last value is 3.80 V: the graph shows a sharp drop at its very end. The reason is not confirmed.
- **Current:** last value −0.005 A, range from −0.031 to +0.082 A. A minus sign usually means discharge (the sign convention is best checked in the decoder documentation).
- **Lines on the graph:** the reading itself (Voltage / Current), the average, the highest (Max) and the lowest (Min) values. The table below the graph gives, for each line, the first, last, min, max, mean and median values.

5.3. Temperature and power

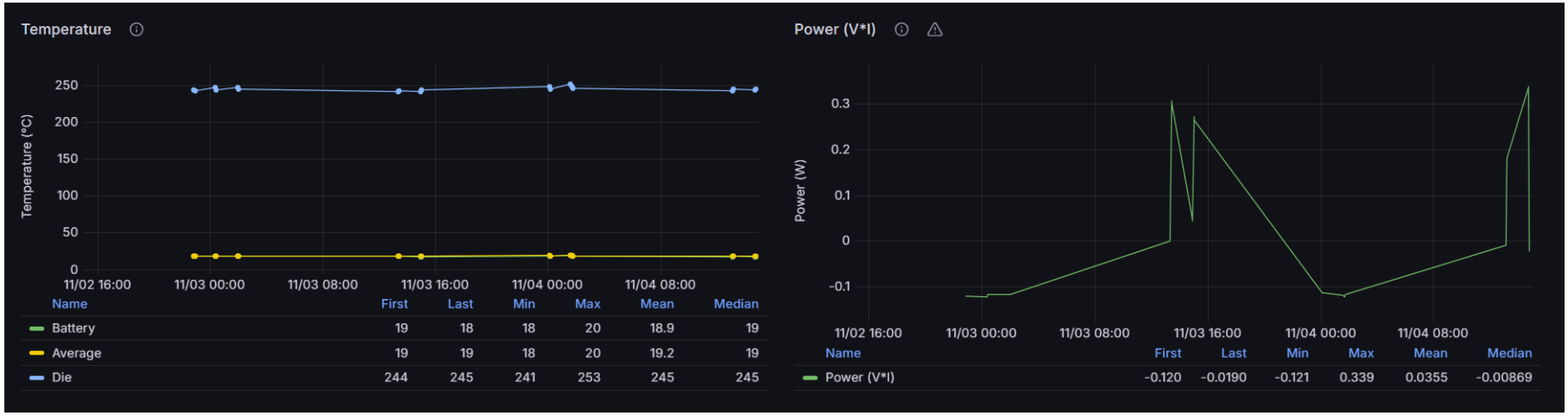


*Figure 8 — Grafana: temperature and power (V*I)*

- **Battery temperature:** 18–20 °C, normal.
- **The “Die” line:** 241–253 °C, median 245 °C. This cannot be a real temperature, so I suspect a scaling error in the decoder (an unverified assumption).
- **Power (V*I):** the product of voltage and current, in watts. Over the last 2 days it ranged from −0.121 to +0.339 W; the last value is −0.019 W. The panel has a warning icon (⚠); its text should be checked on the dashboard.

5.4. TX/RX Stats

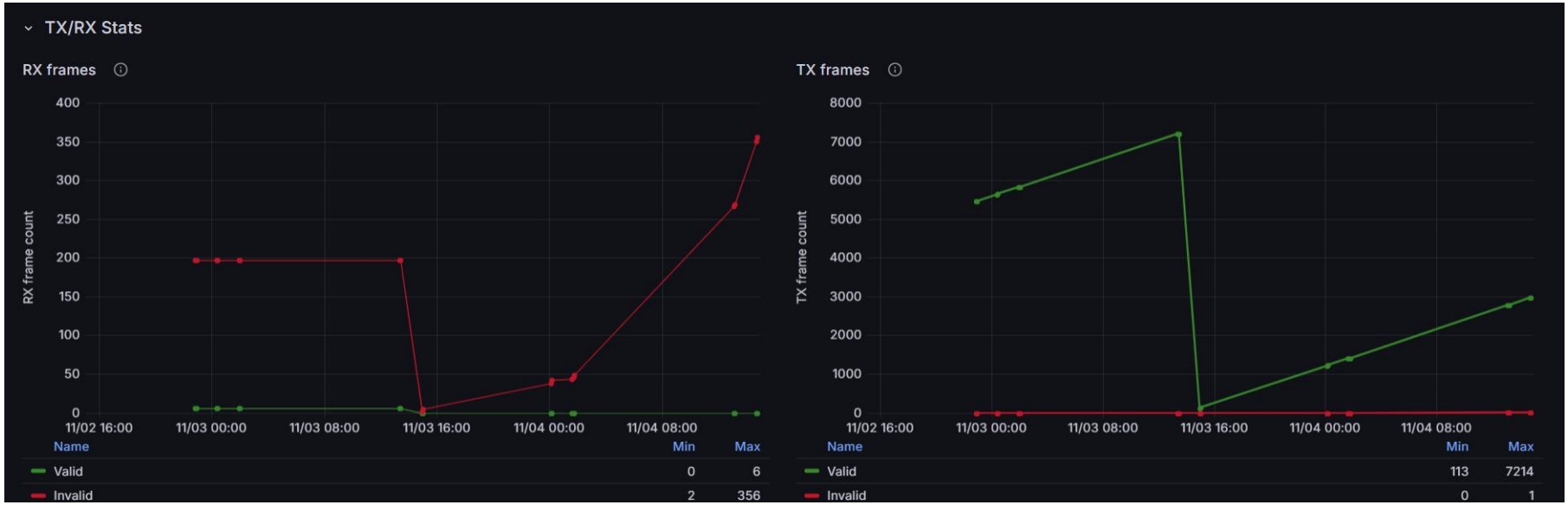


Figure 9 — Grafana: RX frames and TX frames graphs

- **TX frames:** frames transmitted by the satellite. Valid frames grow steadily (113 to 7214 over the period), with one sharp drop on 3 November: the counter fell and then began to grow again from a small value. At most 1 invalid TX frame is shown.
- **RX frames:** frames received by the satellite from the ground. Valid — 0–6, invalid — 2–356. The RX counters fell at the same moment as the TX counter on 3 November. Together with Boot count 18 and Up Time of about one day, this apparently means that the satellite restarted and its counters were reset (an assumption). A large number of invalid frames may mean that the satellite's receiver hears noise or foreign signals; I cannot confirm the exact cause.

5.5. RSSI and OTA ACKs



Figure 10 — Grafana: RSSI and OTA ACKs

- **RSSI:** the power of the signal received by the satellite, in dBm. Over the last 2 days it ranged from −128 to −88 dBm, with a median of −114 dBm, i.e. close to the noise level.
- **OTA ACKs:** “No data”. There are no confirmations of over-the-air updates.

5.6. Station statistics

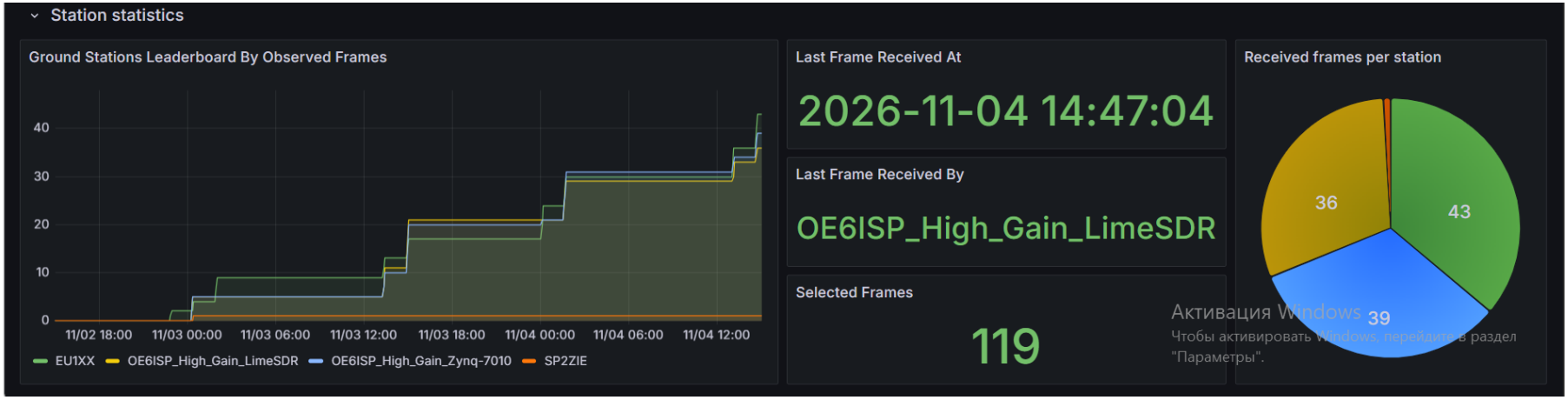


Figure 11 — Grafana: “Station statistics” section

- Stations that received frames over the last 2 days: EU1XX, OE6ISP_High_Gain_LimeSDR, OE6ISP_High_Gain_Zynq-7010 and SP2ZIE.
- The pie chart “Received frames per station” shows the number of frames received by each station: 43, 39 and 36 for the three leading stations (the fourth slice is very small). Together with Selected Frames this gives 119 frames.
- The last frame arrived on 2026-11-04 at 14:47:04 (local time) from OE6ISP_High_Gain_LimeSDR.

6. Summary: what data we get

Group	Parameters	Where it is shown
Power supply	Battery voltage, current, power (V*I), SOC, remaining/full capacity, time to empty	Grafana: Quick Stats, Battery Stats
Temperature	Temperature of the battery and other sensors	Grafana: Temperature
General state	Power status, up time, boot count, spacecraft ID, firmware, commissioning state	Grafana: Quick Stats
Radio link	Number of TX/RX frames (valid/invalid), RSSI, OTA	Grafana: Radio, TX/RX Stats
Reception statistics	Stations, number of frames, time of the last frame	Grafana: Station statistics; DB: Data
Orbit	TLE, current position, pass area	DB: Map, Data (Orbital Elements)

7. How we obtain the data

Method A. Through a ready-made dashboard (no equipment)

1. Open the SatNOGS DB page: db.satnogs.org/satellite/ZKZZ-3777-2014-2860-9930.
2. Go to the “Data” tab and click the link “Click here to see the full dashboard for NIS-PQ”, or use the “Telemetry Dashboard” button on the “Info” page.
3. In Grafana, select a time range (for example, the last 2 days or 7 days). The page refreshes automatically.
4. First look at the “Last Frame Recei...” time: it shows when the satellite was last heard.
5. Check the power status, voltage, SOC and temperature. If necessary, data can be obtained through the “Export” menu at the top right.

Method B. Reception with your own station

This section is based on general radio amateur experience, not on a special guide for NIS-PQ.

1. Check the satellite's pass times in the Gpredict or N2YO application (NORAD 98225).
2. Prepare an antenna: a Yagi or a turnstile/QFH antenna for the 70 cm (UHF) band.
3. Receiver: an RTL-SDR (V3/V4) is enough; to boost the signal it is advisable to add an LNA (low-noise amplifier).
4. Tune to 435.240 MHz and correct the Doppler shift (about ±10 kHz in low orbit).
5. The easiest way is to install the SatNOGS client and register the station on network.satnogs.org. It manages the pass schedule, Doppler, recording and uploading by itself.
6. Received frames go to SatNOGS and are shown in DB and Grafana.

> **Note:** Listening to the air is free for radio amateurs. Transmitting to the satellite's command channel (uplink) usually requires an amateur radio licence and permission to use the command protocol. The DB page lists only the downlink, so first check the specific legal requirements in your country.

8. Links

- SatNOGS DB, NIS-PQ: https://db.satnogs.org/satellite/ZKZZ-3777-2014-2860-9930
- Grafana dashboard: https://dashboard.satnogs.org/d/eg04ajqcp7bpcc/nis-pq
- SatNOGS Network (observations): https://network.satnogs.org/observations/?sat_id=ZKZZ-3777-2014-2860-9930
- QUBIK project (documentation of the previous twins): https://qubik.libre.space