AMSAT-DL Symposium
13. Oktober 2012

Mike Rupprecht, DK3WN

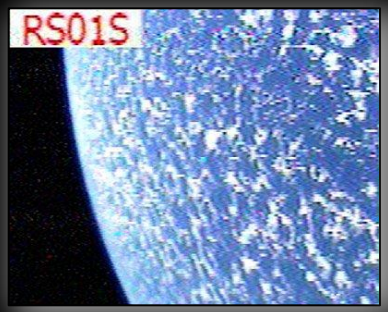
… Neues von den Kleinen

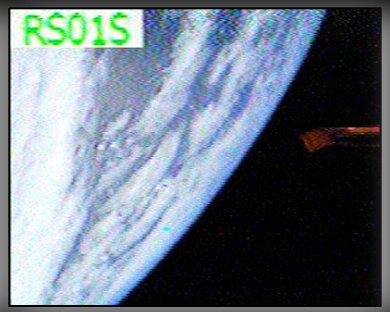
… Update

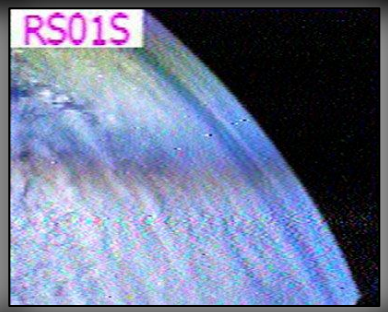
was ist seit Mai 2011 geschehen?

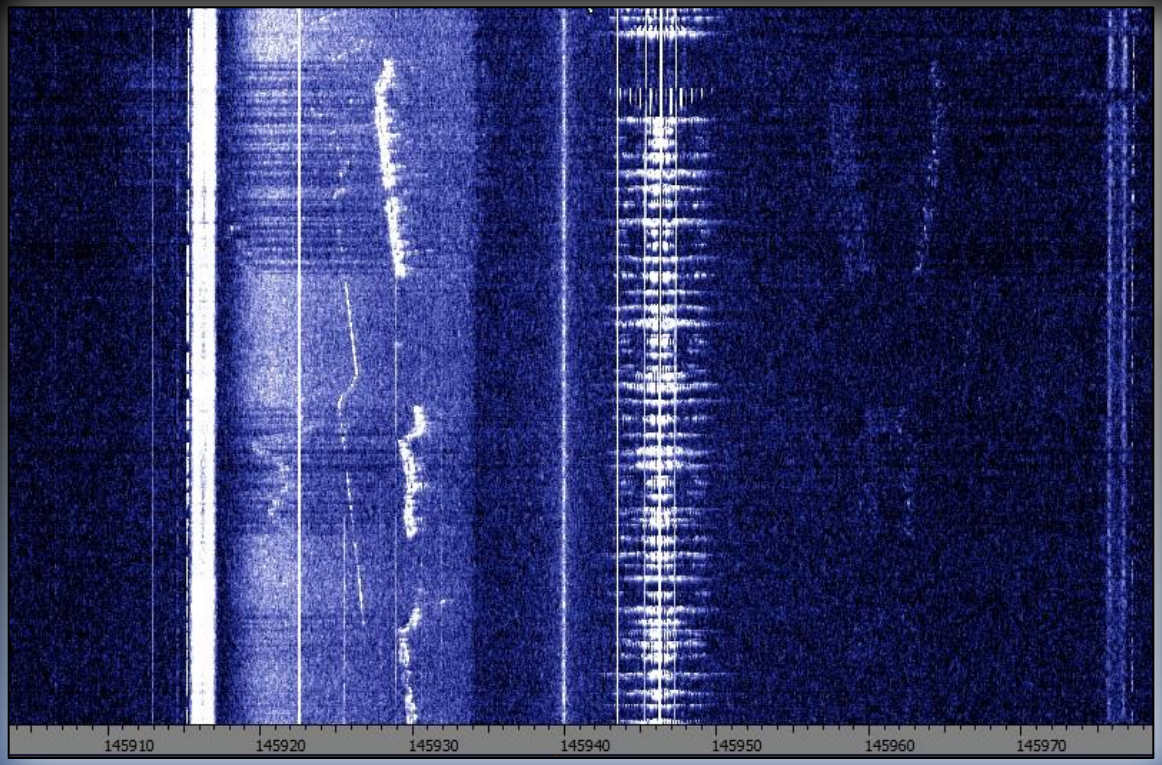
03.08.2011	ISS / EVA	ARISSAT-1
12.10.2011	PSLV-CA	SRMSAT, JUGNU
28.10.2011	NPP/Delta-II	E1P, AubieSat-1, RAX-2, M-Cubed
29.11.2011	End of Mission	AO-51
04.11.2012	Re-Entry	ARISSAT
13.02.2012	VEGA	MASAT, XatCobeo, AlmaSat-1 usw.
03.03.2012	End of Mission	COMPASS-1
17.05.2012	H-IIA	HORYU-2
09.09.2012	PSLV-CA	PROITERES
13.09.2012	Atlas V 401	CP-5, AENEAS, CXBN, CSSWE
04.10.2012	ISS / KIBO	We-Wish, F1, FITSAT, TechEdSat

ARISSAT-1









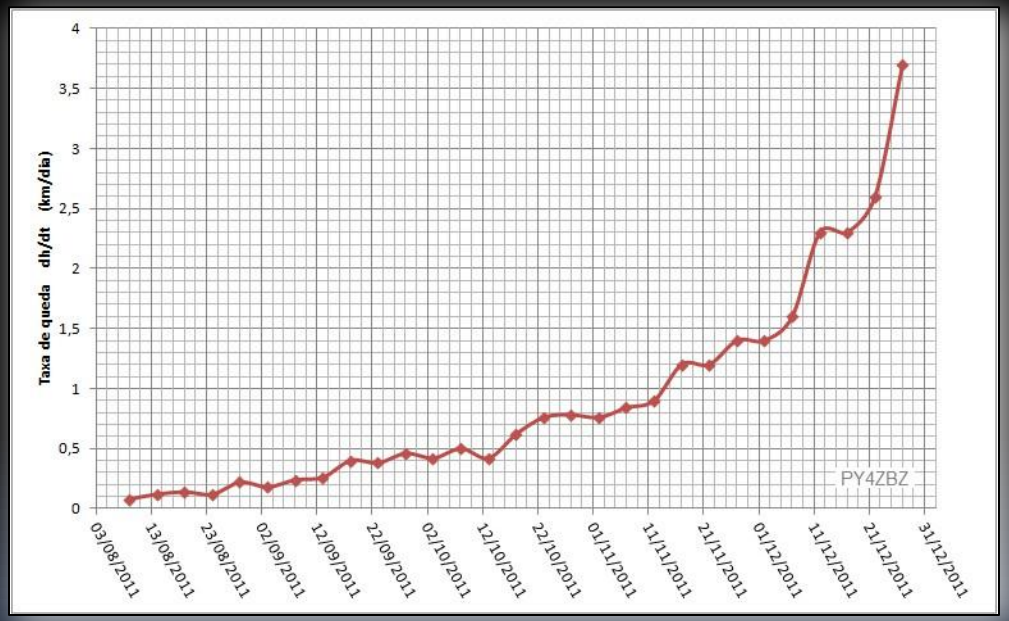
SSTV Bilder

Spectrum 145 MHz

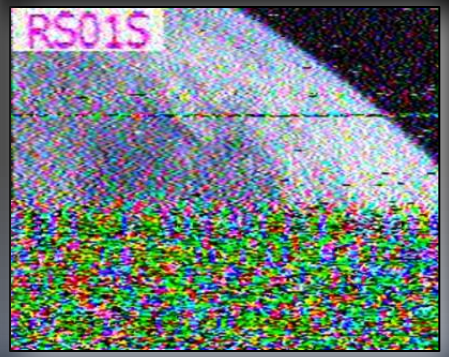
ARISSAT-1

Total submitters: 265
Telemetry records: 139.692 + 21 invalid
KURSK records: 125.551

KURSK Experiment



Fallrate (km/Tag)



06:02 UTC – SSTV image

04.08.2012, 05:59 UTC JA0CAW

```
hi this is arissat1 rs01s ct1zx pem met 47m ihu +68c cp +60c bat 36.01v ... rf 482ma
hi this is arissat1 rs01s dj4zc phi met 49m
```

NASA NPP Launch

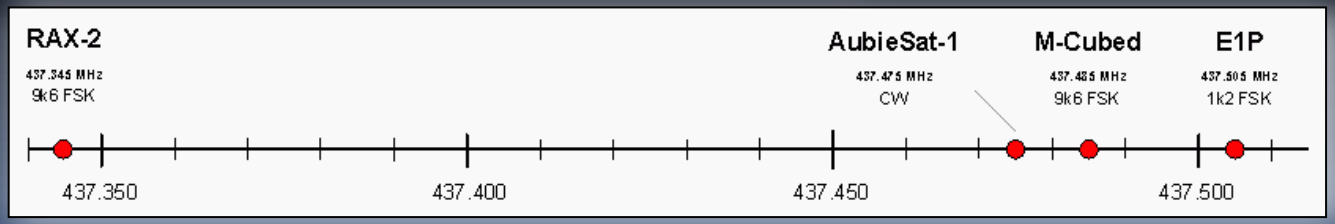
National Polar-Orbiting Operational Environmental Satellite System Preparatory Project

NASA Program Educational Launch of Nanosatellites ELaNa III

RAX-2 (3U)

AubieSat-1 (1U)
E1P (1U)
M-Cubed (1U)

DICE 1 (1.5U)
DICE 2 (1.5U)

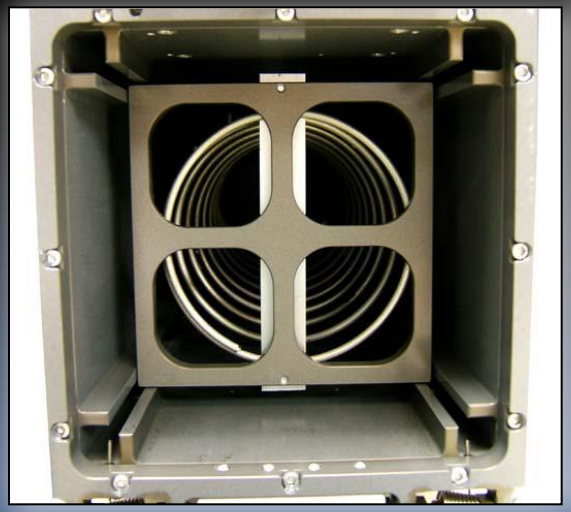


CalPoly P-POD

Poly Picosatellite Orbital Deployer

Aluminium 7075-T73
Teflon-Imprägnierung

V_0 = 1.6 m/s

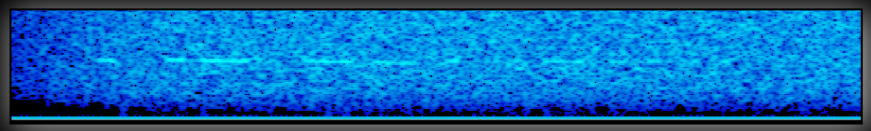


AubieSat-1 (AO-71)

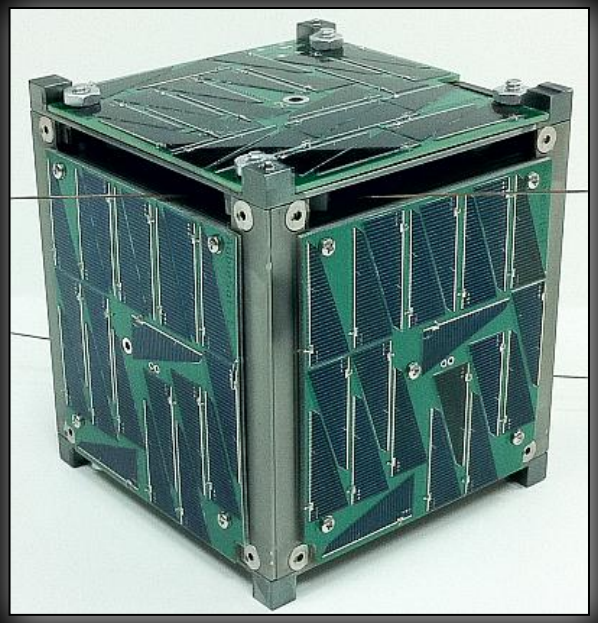
Auburn University Alabama

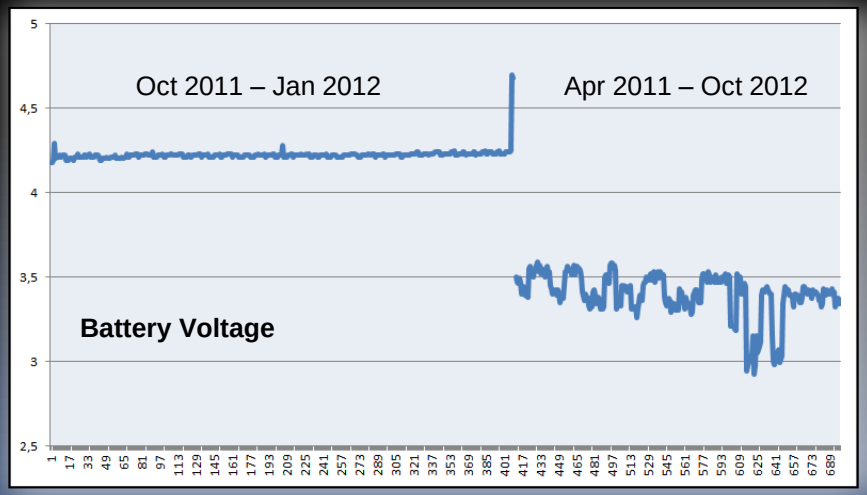
437.473 MHz, CW

```
02:32 UTC hihi de aubiesat 1 vb 4r23 bacon 111 sk
02:33 UTC hihi de ki4nqo aubiesat 1 vb 4r22 sk
02:34 UTC hihi de ki4nqo aubiesat 1 vb 4r22 sk
02:35 UTC hihi de aubiesat 1 vb 4r22 bacon 111 sk
02:36 UTC hihi de ki4nqo aubiesat 1 vb 4r21 sk
02:37 UTC hihi de aubiesat 1 vb 4r21 bacon 111 sk
02:38 UTC hihi de ki4nqo aubiesat 1 vb 4r21 sk
```

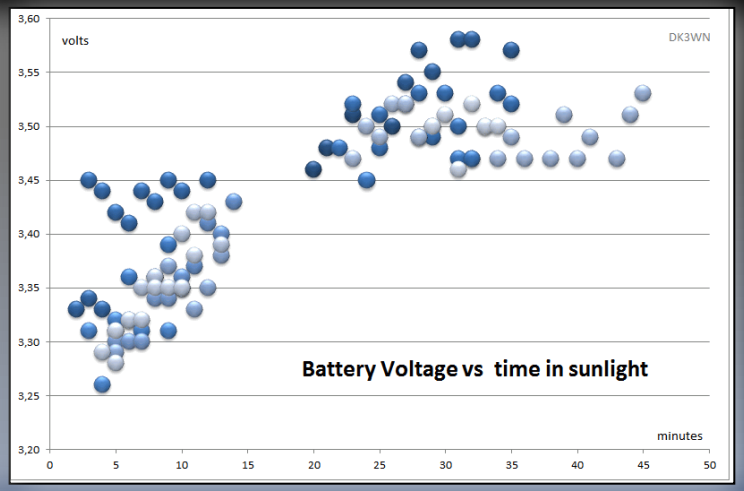


War Eagle Beacon Juni 2012





Batteriespannung



Juli 2012

AubieSat-1 - War Eagle

Auburn University Alabama

Explorer 1-Prime (HRBE)

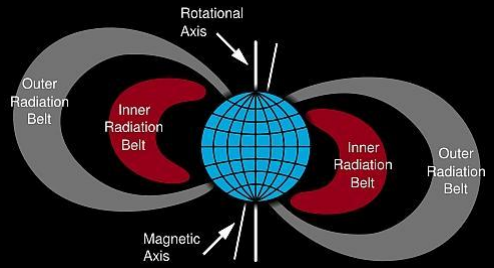
Montana State University
William A. Hiscock Radiation Belt Explorer

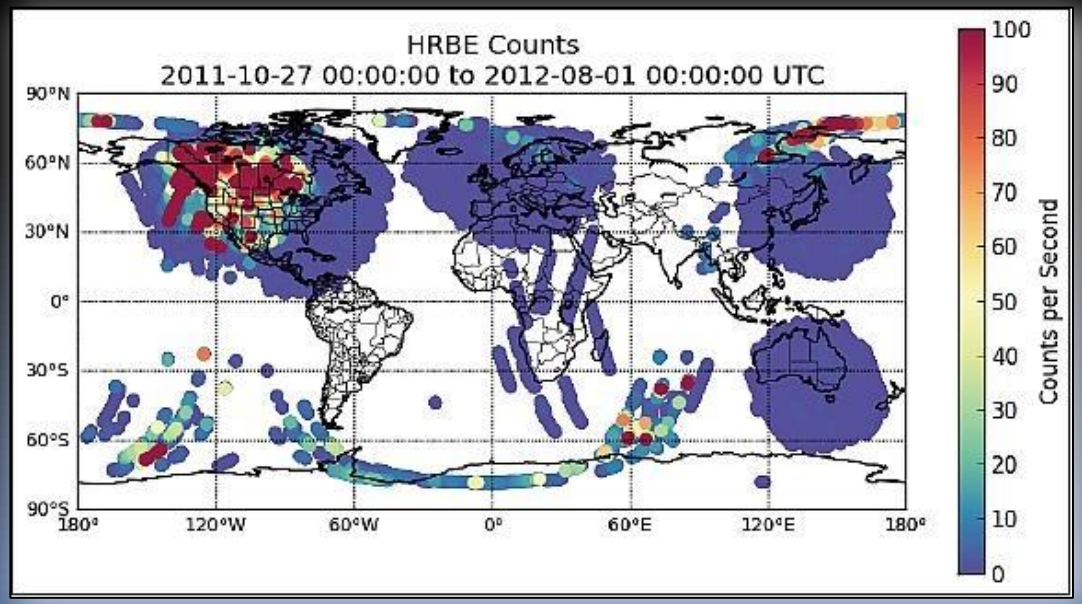
437.504 MHz, 1k2 AFSK AX.25, LSB

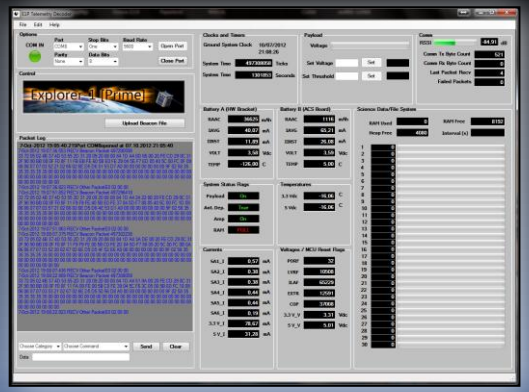
Mission: zu Ehren des 50. Jahrestag von Explorer-1
Nachweis des Van-Allan-Gürtel, Messung der Intensität
und Verteilung dieser Teilchen im niedrigen Erdorbit

Payload: Miniatur-Geiger-Zähler gestiftet von Dr. Van Allen
auch ohne Batterie im Sonnenlicht aktiv

August 2012: 47.000 Baken dekodiert (ca. 24.000 von Funkamateuren)



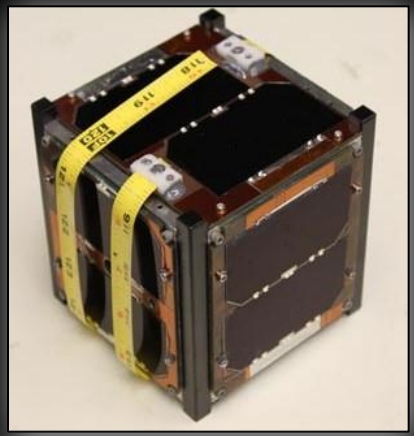




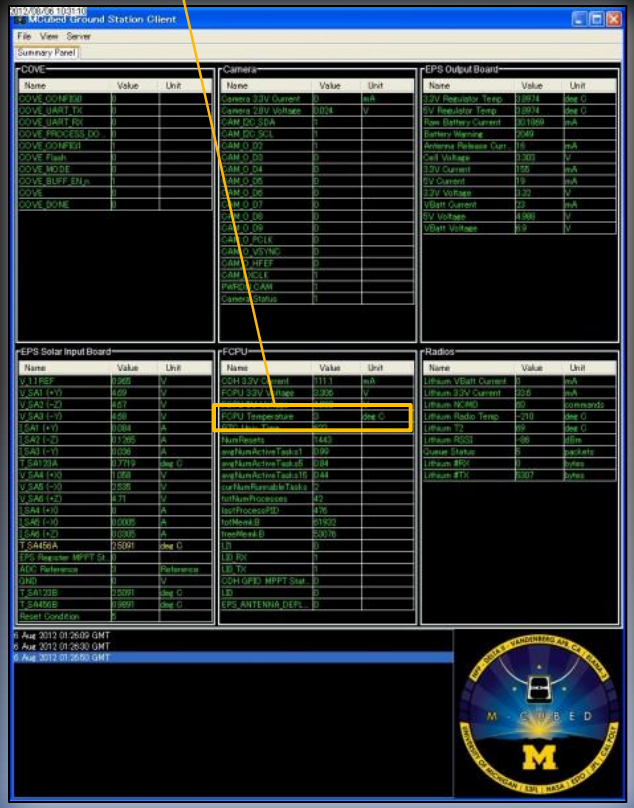
M-Cubed

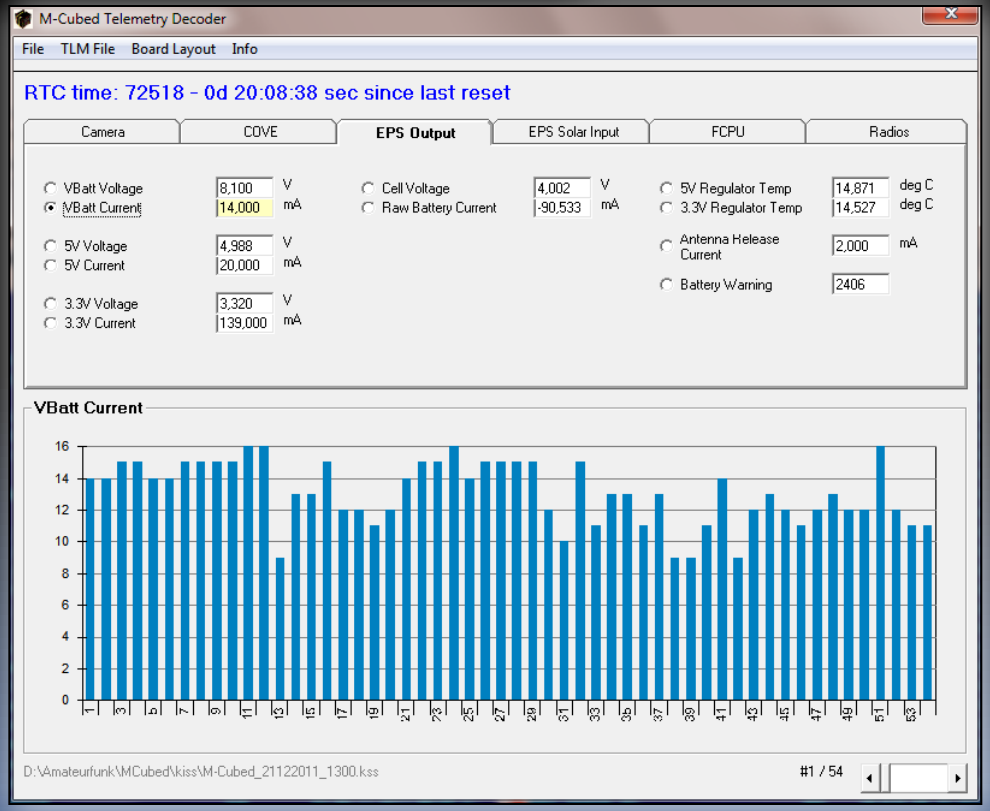
Michigan Multipurpose Minisat

437.480 MHz, 9k6 FSK AX.25, FM

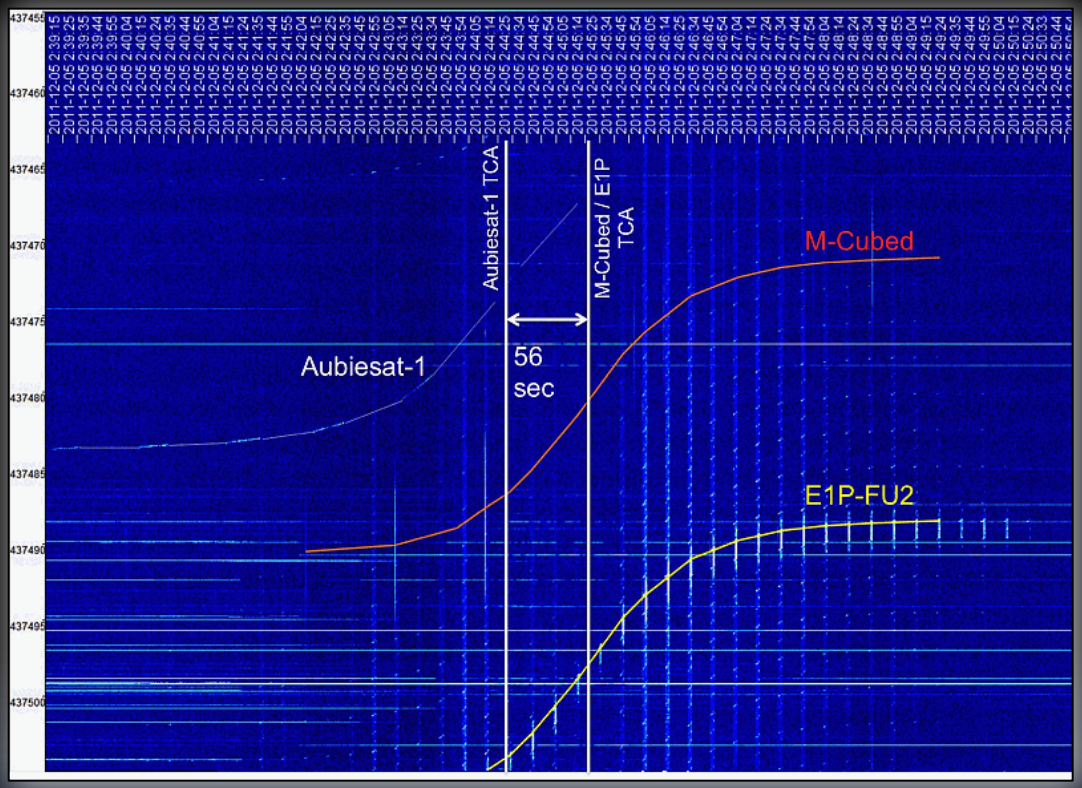


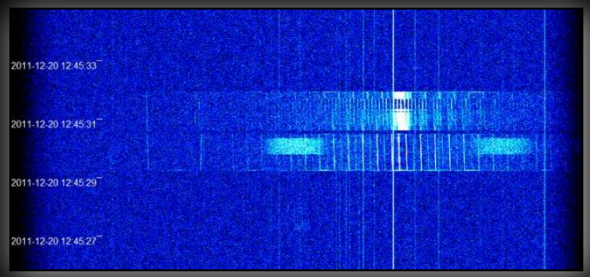
FCPU - EPS_ANTENNA_DEPLOY = 0





M-Cubed & Explorer-1*



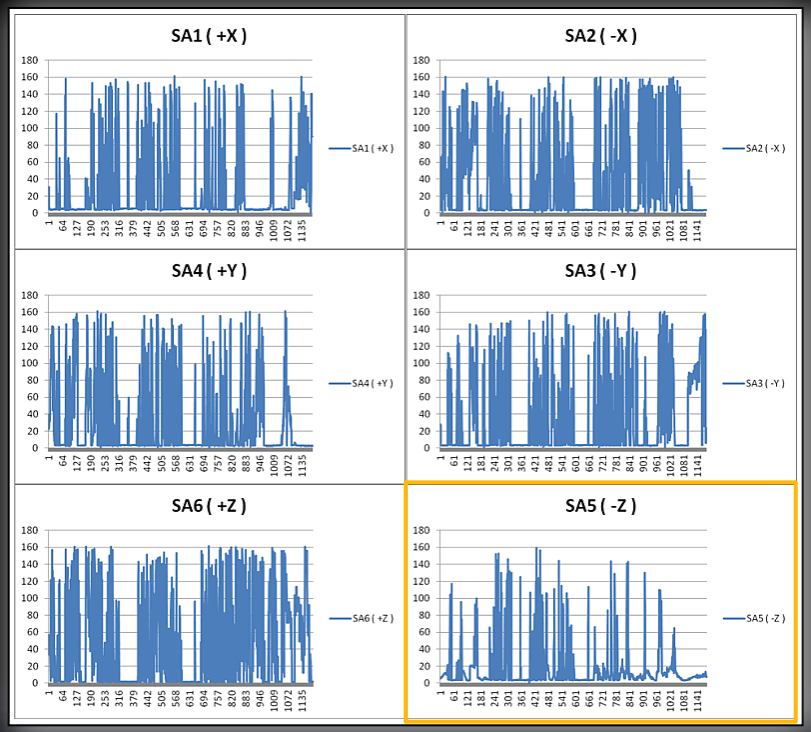


Die Signale von M-Cubed sind extrem schwach, die Telemetrie zeigt an, dass sich auch hier die Antennen nicht entfaltet haben. Es ist unheimlich schwer, ein Paket zu dekodieren, meist gelingt es nur, wenn die M-Cubed Bake mit einer E1P-Bake zusammen gesendet wird. Beide Satelliten haben ein ähnliches Sendeintervall und durch die räumliche Nähe überlagern sich beide Baken ständig.

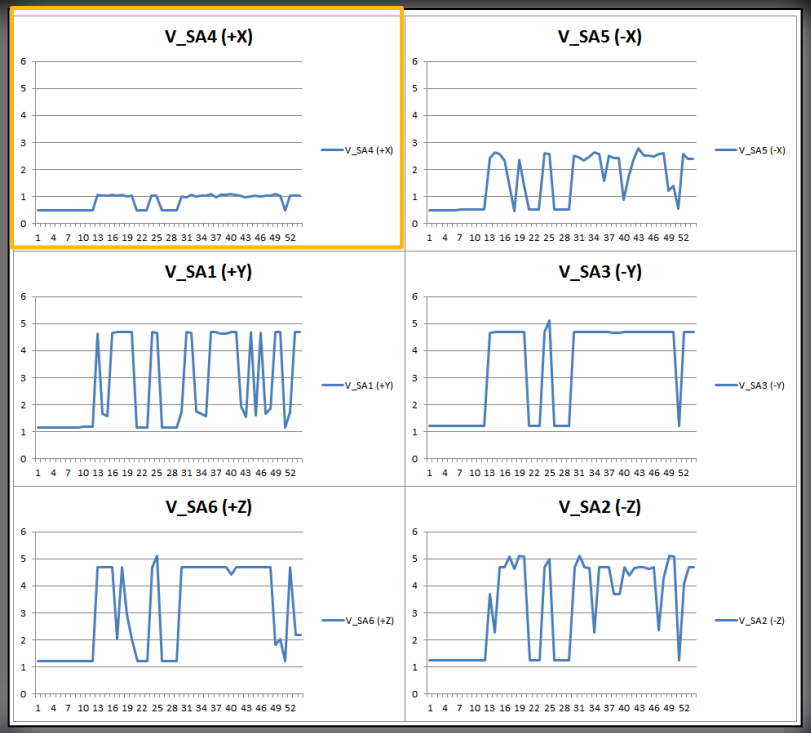
Aus den wenigen Telemetriedaten kann man allerdings erkennen, dass die Solararrays X+ und X- sehr wenig oder gar keinen Strom liefern. Also könnten es diese Seiten sein, die durch E1P verdeckt sind. Leider ist das durch die E1P Daten nicht verifizierbar.
Die Orientierung im P-POD ist, dass die Z+ Seite nach oben zeigt. Und da M-Cubed der letzte Satellit im P-POD war, müsste es genau diese Seite sein, die von E1P verdeckt sein würde. Aus der Telemetrie ist aber zu erkennen, dass dieses Array Spannung produziert. Genauso die Z- Seite. Hier sind die Antennen montiert. Eigentlich sollten sie frei sein, aber sie scheinen sich nicht entfaltet zu haben.

Beide Satelliten haben Permanentmagneten zur Lagestabilisierung – bei M-Cubed genau in X+/X- Richtung.

M-Cubed & Explorer-1*



E1P

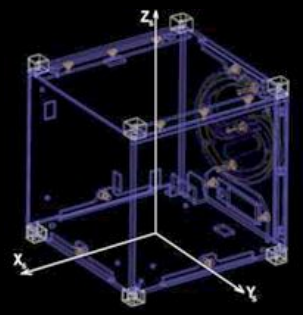


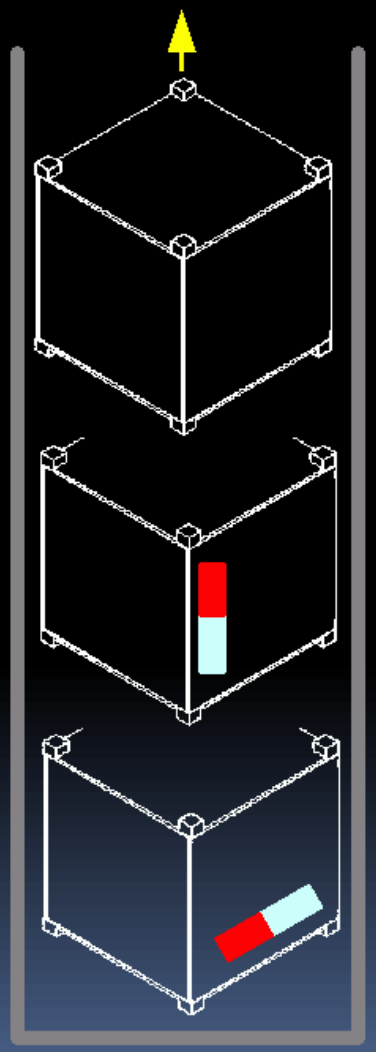
M-Cubed

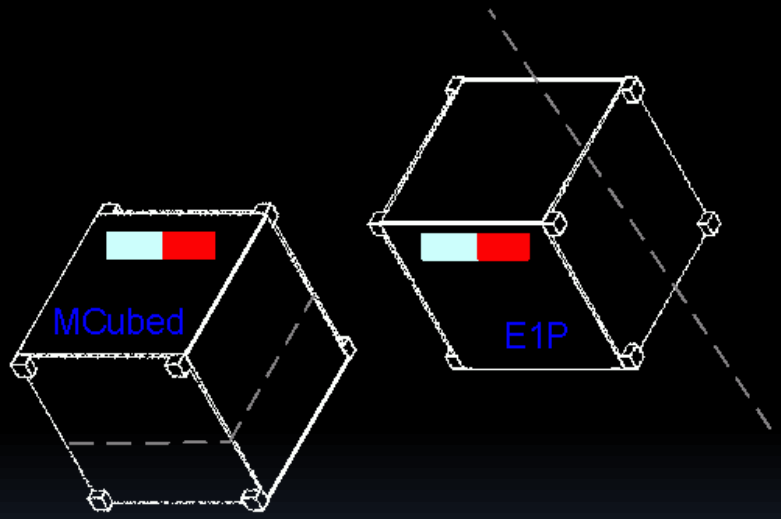
Beide Unis gehen wirklich davon aus, dass die Satelliten sich in einem späteren Orbit wieder angenähert haben müssen. Sie haben sich auf jeden Fall gedreht, weil sie nicht mit den Seiten aneinander liegen, wie sie sich im P-POD befanden. Wir konnten jetzt anhand der gesammelten Telemetriedaten nachweisen, dass bei E1P die-Z Seite weniger Energie produziert (die Arrays sind nicht dunkel, zeigen aber im Gegensatz zu allen anderen weniger Strom auf). Bei E1P befindet sich der Permanentmagnet in Z-Achse mit dem Südpol in Richtung Z-.

Bei M-Cubed zeigt die wenige Telemetrie an, dass X+ "tot" ist und X- ganz wenig Strom liefert. Hier ist der Stabmagnet in X-Achsenrichtung montiert und der Nordpol zeigt in Richtung +X.

M-Cubed & Explorer-1*

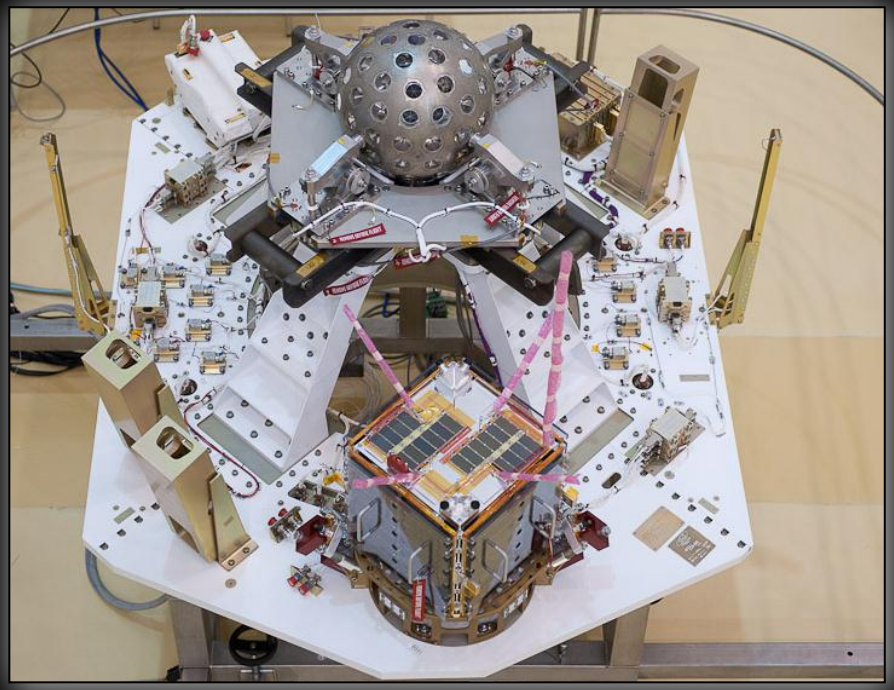






Also liegt es nahe, dass MCubed X+ and E1P Z- klebt. Die M-Cubed Antenne ist somit eingeklemmt und kann sich nicht entfalten.

Jungfernflug VEGA

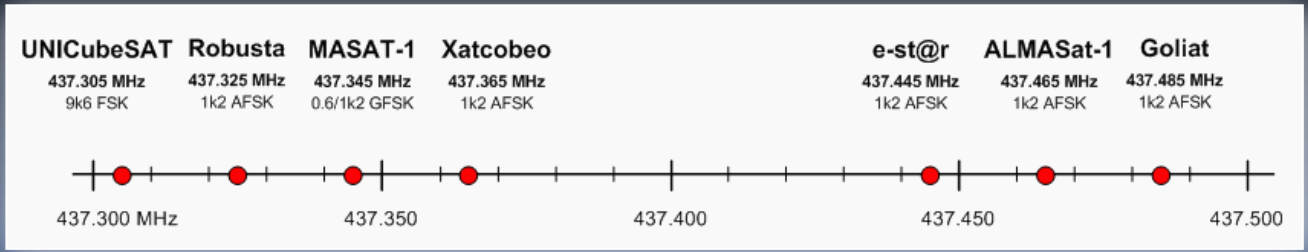


4 stufige Trägerrakete VEGA (2.5t)

UniCubeSat GG (1U)

XatCobeo (1U)
e-st@r (1U)
Goliat (1U)

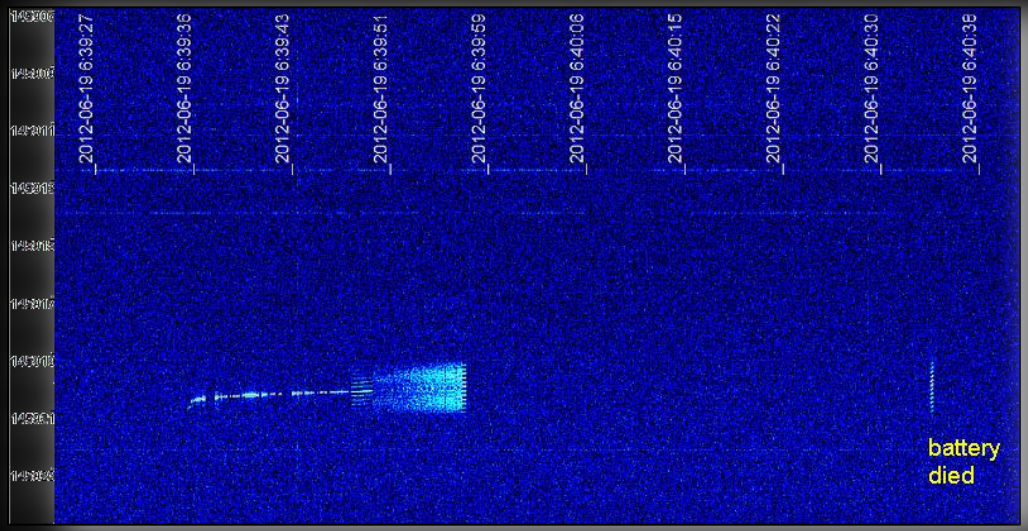
Robusta (1U)
MaSat-1 (1U)
PW-Sat (1U)

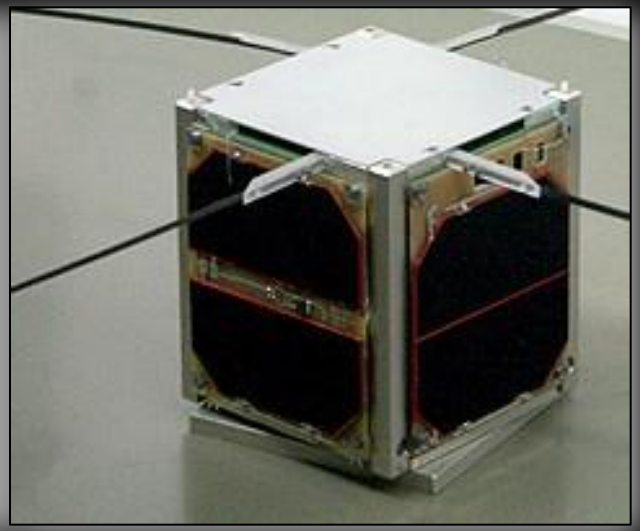


PWSat-1

Warsaw University of Technology

145.900 MHz, 1k2 BPSK AX.25, LSB

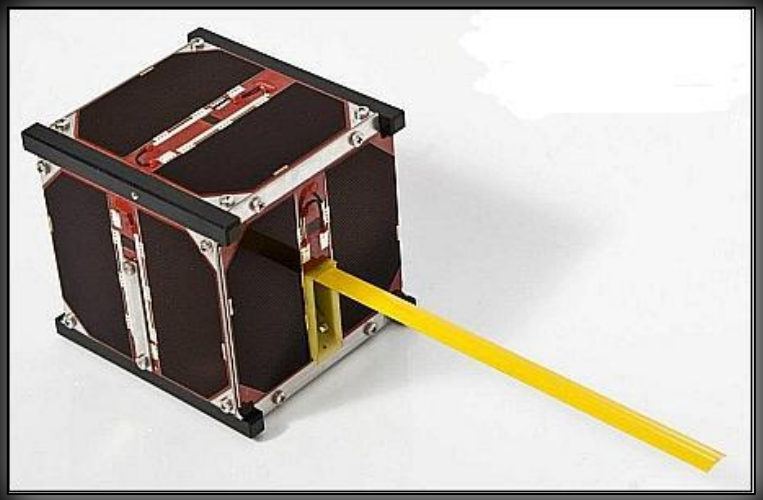




```
TED BY SKIK SKA AND CBK WARNING MULTIPLE ALIEN CONTACTS DETECTED PROTOSS MOTHERSHIP PRESENT ATMOSPHERE
INCINERATION IMMINENT RESISTANCE IS FUTILE LONG LIVE DR KUREK
DATA 0xFFFD 0xFFFE 0xFFFD 0xFFFE E -1 END
LASH E -1 END
DATA 0xFFFF 0xFFFD 0xFFFE 0xFFFD E -1 END
DATA D 394 RSS 958 TRP 6 TFP 5 TC 0 RC 72 AT 228 PB 400 E -1 END
DATA TRANSMITTER STATE 0x01 E -1 END
DATA RUT 1 0 0 TUT 1 0 0 RE -1 TE -1 END
DATA X AXIS ADCS VX 0x02D0 E -1 CX+ 0x03F8 E -1 CX- 0x03FF E -1 TX+ 0x02AC E -1 TX- 0x0012 E -1 END
DATA Y AXIS ADCS VY 0x0296 E -1 CY+ 0x0313 E -1 CY- 0x03FF E -1 TY+ 0x02F3 E -1 TY- 0x02F0 E -1 END
DATA Z AXIS ADCS VZ 0x03FA E -1 CZ+ 0x03FF E -1 CZ- 0x03FF E -1 TZ+ 0x0012 E -1 TZ- 0x0012 E -1 END
DATA ADCS BATT1C 0x0362 E -1 BATT1DIR 0x03FF E -1 BATT1FV 0x016C E -1 BATT1T 0x02C1 E -1 END
DATA ADCS 5V 0x03FF E -1 3V3 0x03FC E -1 END
```

MASAT-1

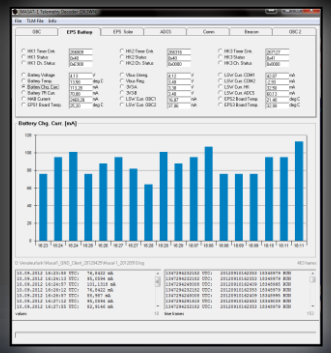
Budapest University of Technology and Economics

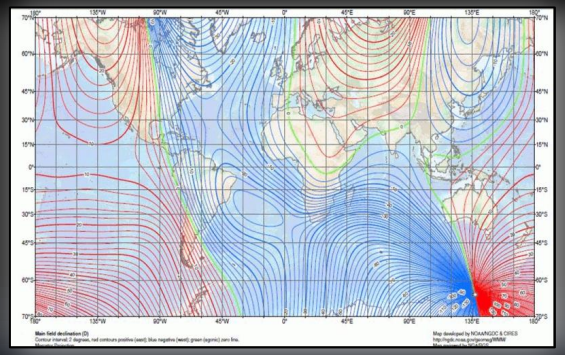


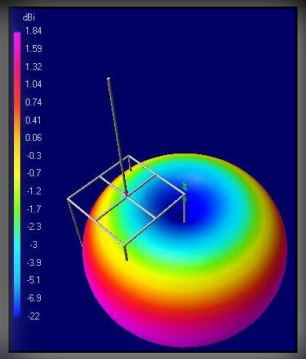
437.345 MHz, 2-FSK (GFSK), USB

Lagestabilisierung: Permanentmagnet

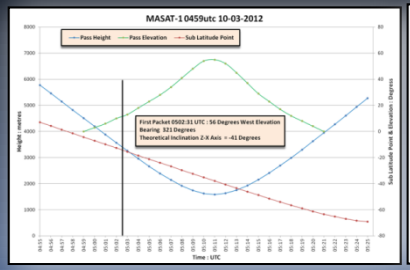
3–Axis Gyroscope
3-Axis Acceloratormeter
3-Axis-Magnetometer
Sun Sensor

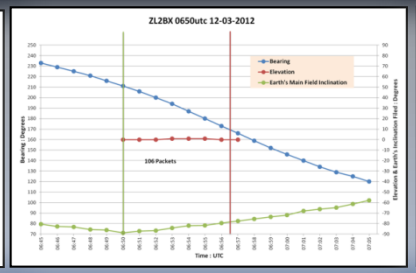


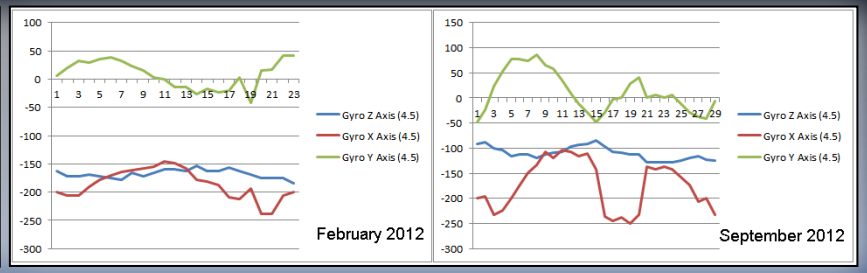




Telemetrie Decoder Software

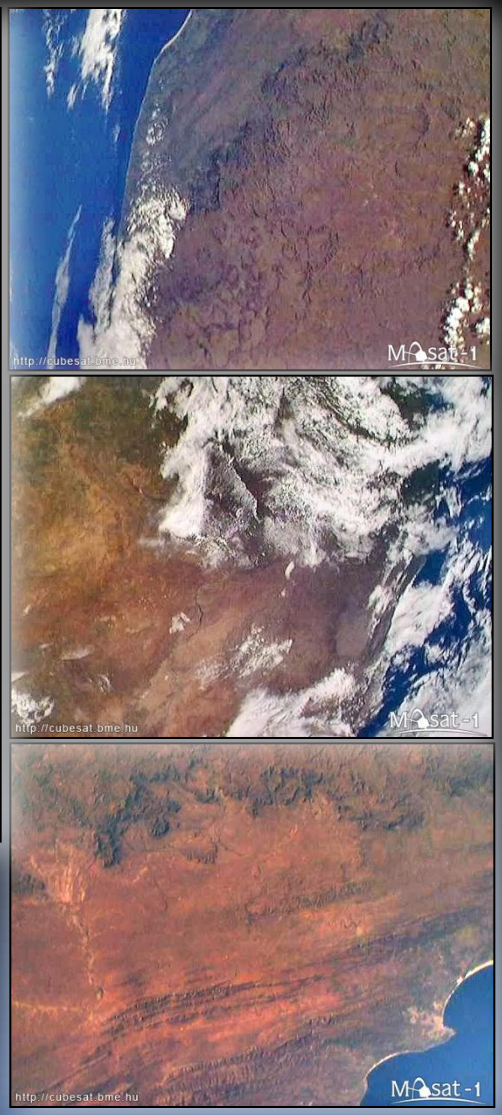






Untersuchungen der Deklination des Erdmagnetfeldes (NOAA World Magnetic Model 2010)

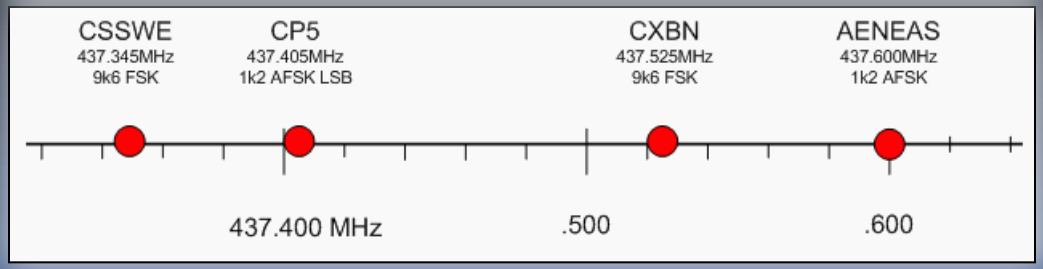
MASAT-1



Kamera Auflösung 640×480 pixel

NROL-36

National Reconnaissance Office Launch No. 36



NASA Program Educational Launch of Nanosatellites ELaNa IV

CINEMA (3U)
CSSWE (3U)
CP5 (1U)
CXBN (2U)

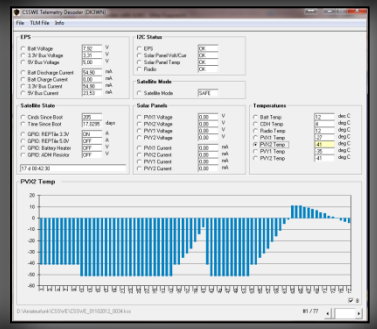
US Gov

AENEAS (3U)
SMDC ONE 1.1 (3U)
SMDC ONE 1.2 (3U)
AeroCube 4 (1U)
AeroCube 4.5A (1U)
AeroCube 4.4B (1U)
RE (3U)

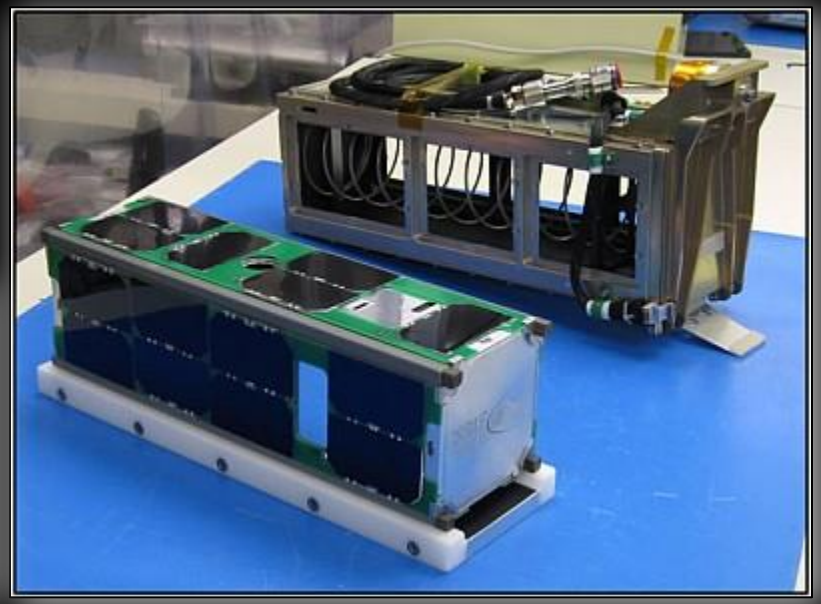
CSSWE

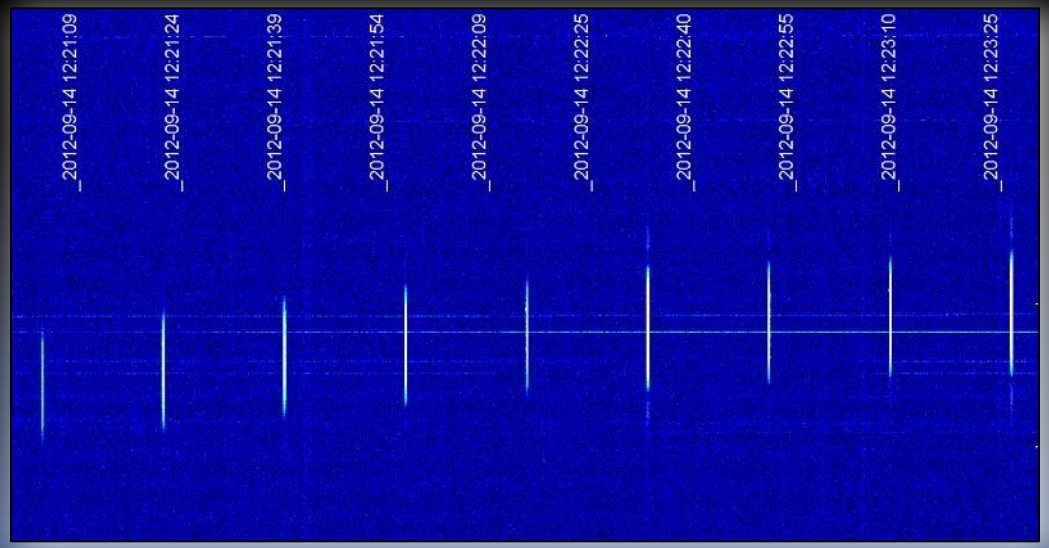
Colorado Student Space Weather Experiment

437.345 MHz 9k6 FSK AX.25, FM

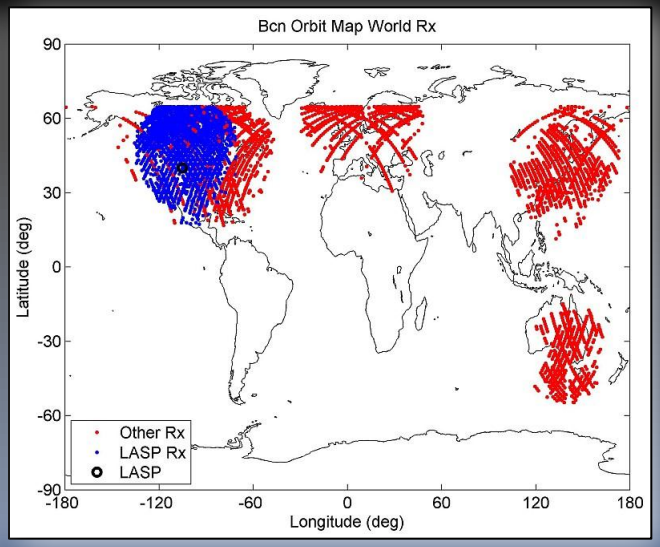


Telemetrie Decoder Software

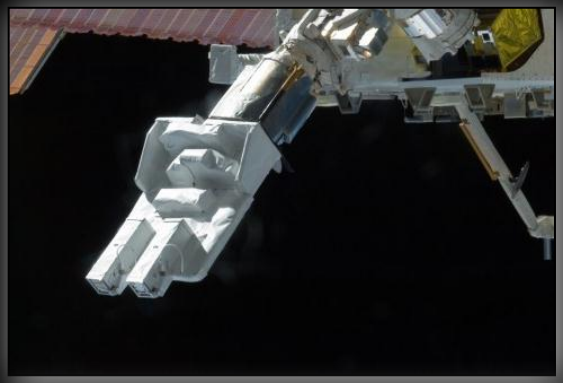


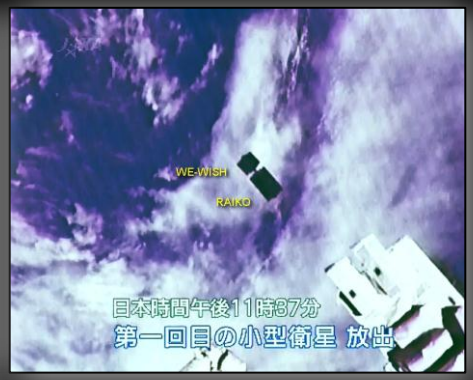


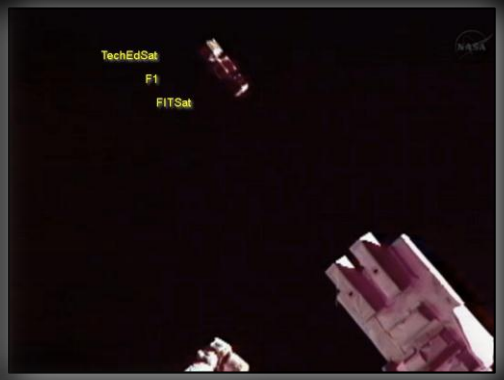
Bake aller 18 sec



JAXA KIBO Launch

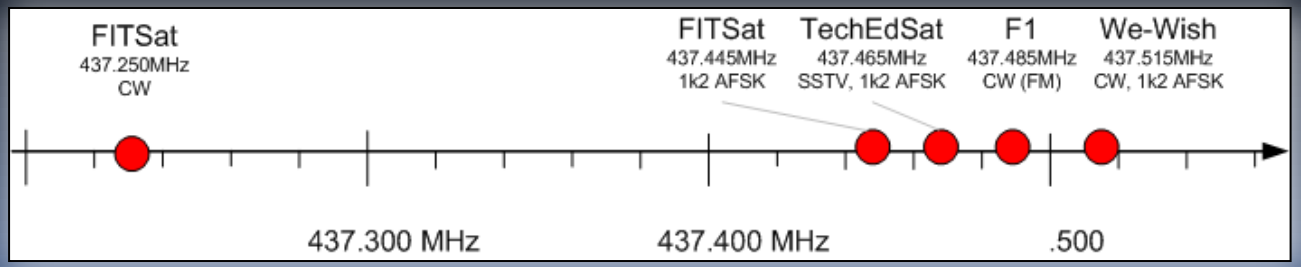


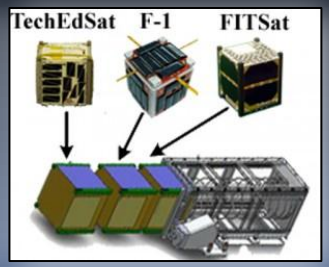




We-Wish (1U)
RAIKO (2U)

TechEdSat (1U)
F1 (1U)
FITSAT (1U)

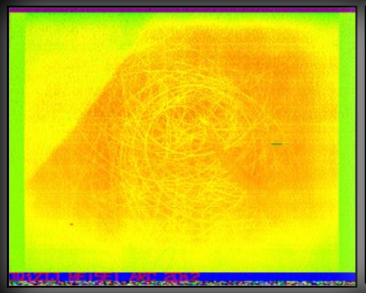




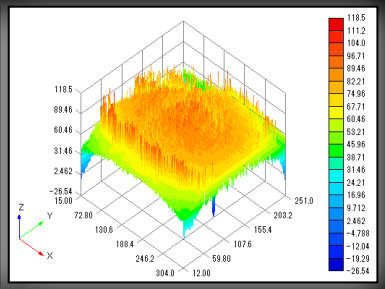
WE-WISH

Meisei Electric Amateur Radio Club
World Enviromental Watching and Investigation from Space Height

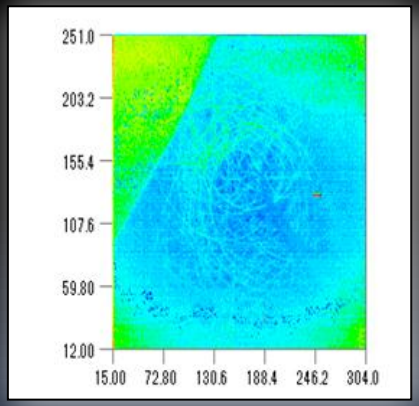
437.505 MHz, SSTV (Data, CW) FM



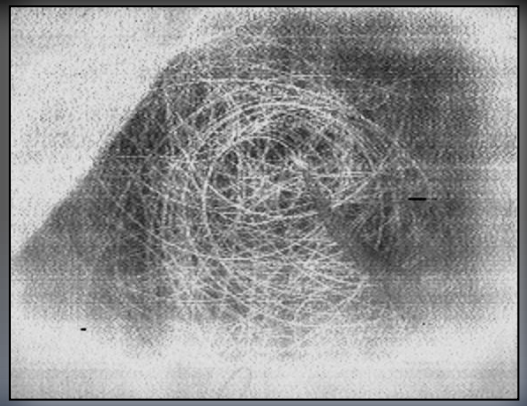
SSTV Bild



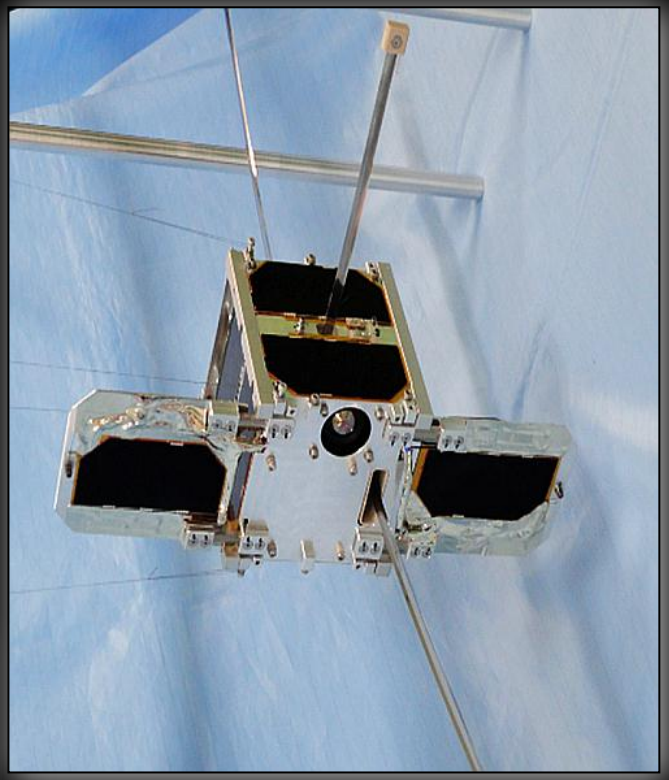
3D-Verteilung



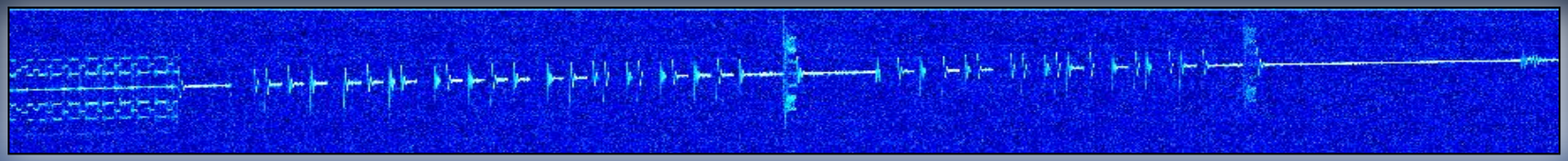
kalibriertes Sichtfeld (XY)



gradient boom



Mission: Infrarotbild der Erdoberfläche und Übertragung in Realtime via SSTV
Telemetrie in Datenburst (RS-232)



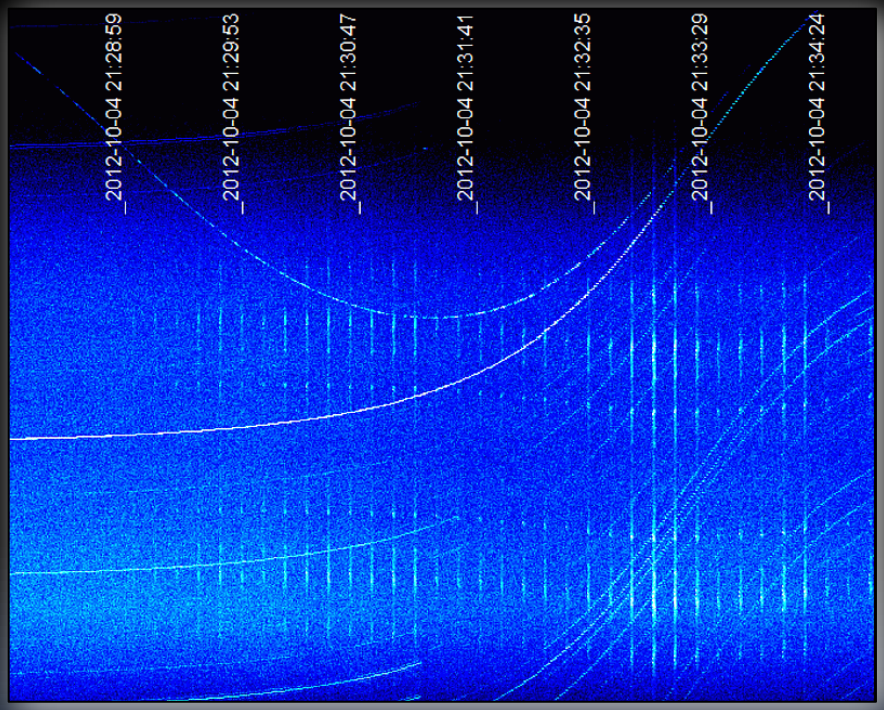
JQ1ZIJ k

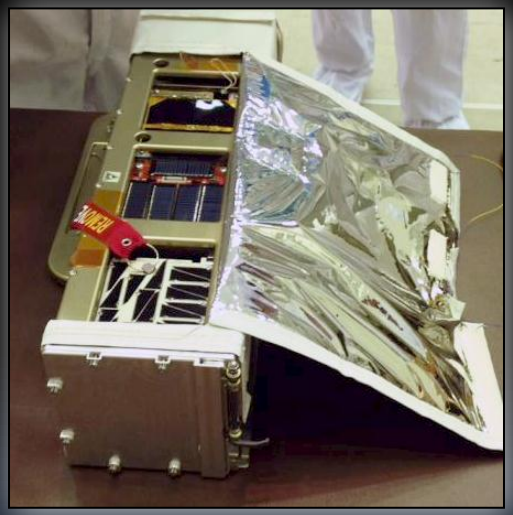
NKIFDA

TechEdSat

Technical and Educational Satellite
San Jose State University + AAC Microtec + NASA

437.465 MHz, 1k2 AFSK AX.25, FM





Mission: Qualifizierung der AAC Microtec Komponenten
Kommunikation mit Iridium / Orbcomm Satelliten (1600 MHz)

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KJ6TVO/TELEM>CQ>UI,?,F0 (1199 baud):
ncasst.org000051aacb1cb1cb1cb186b86b86b86bb8cb8eb8db8c86a86b86a86bd9fd9fd9fd9f7ec80c7fe807842843842843030133000000000001e209
KJ6TVO/TELEM>CQ>UI,?,F0 (1199 baud):
ncasst.org000051b4cb1cb2cb1cb286b86b86b86bb8cb8eb8cb8c86a86b86a86bd9fd9fd9fd9f7f880c80480c843843843843030133000000000176b6
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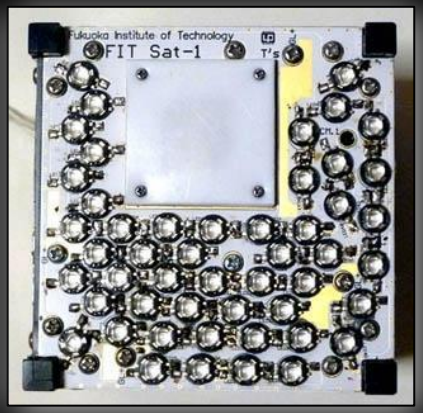
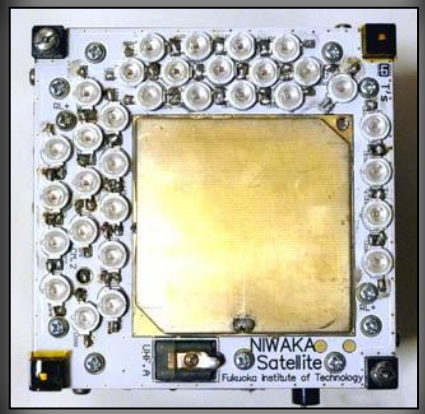
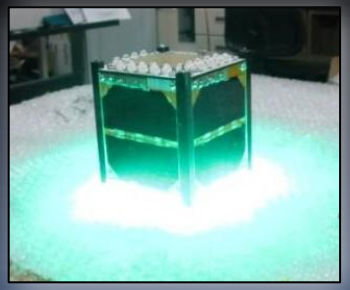
FITSat-1

Fukuoka Institute of Technology

437.250 MHz, CW
437.445 MHz, 1k2 AFSK AX.25, FM
5.84 GHz, 115k2 FSK

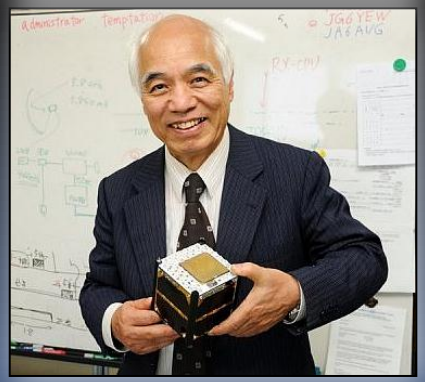






Z+ : 50 grüne high power LED
Z- : 32 rote high power LED
Flash Mode ca. 200W

Lagestabilisierung Permanentmagnet
nördliche Hemisphäre sieht grün



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hi de niwaka japan s1 ef 03 00 ba s2 88 da 81 81 s3 01 00 01 00 s4 1f 21 1c 1b s5 1a 00 3b 0e
hi de niwaka japan s1 f0 02 00 ba s2 89 da 81 81 s3 01 00 01 00 s4 1e 20 1b 1a s5 1f 00 3b ab
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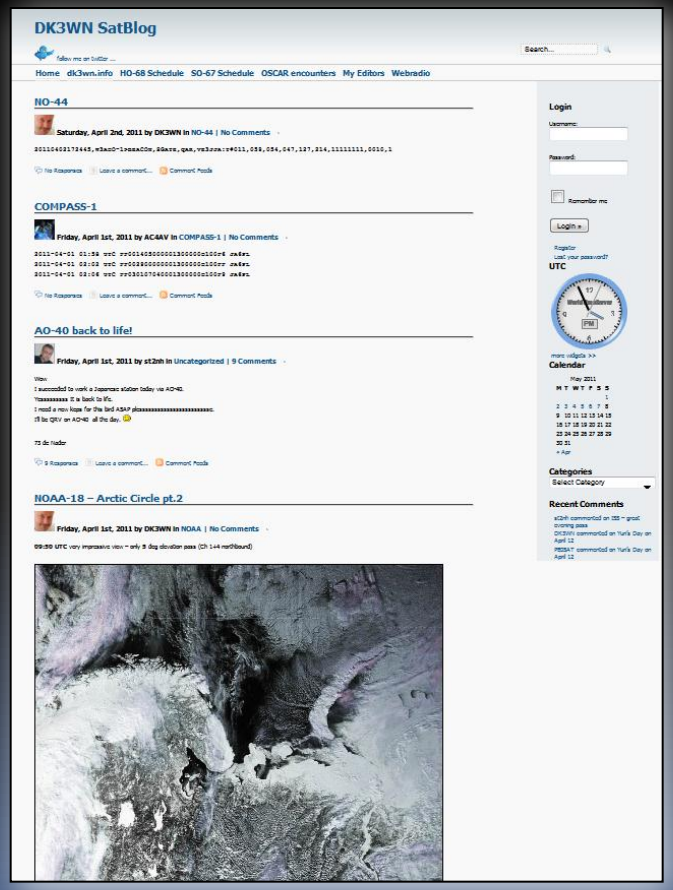
JA6AVG

DK3WN SatBlog

seit April 2008 – ca. 7600 Beiträge, 220 registrierte User



http://www.dk3wn.info/p

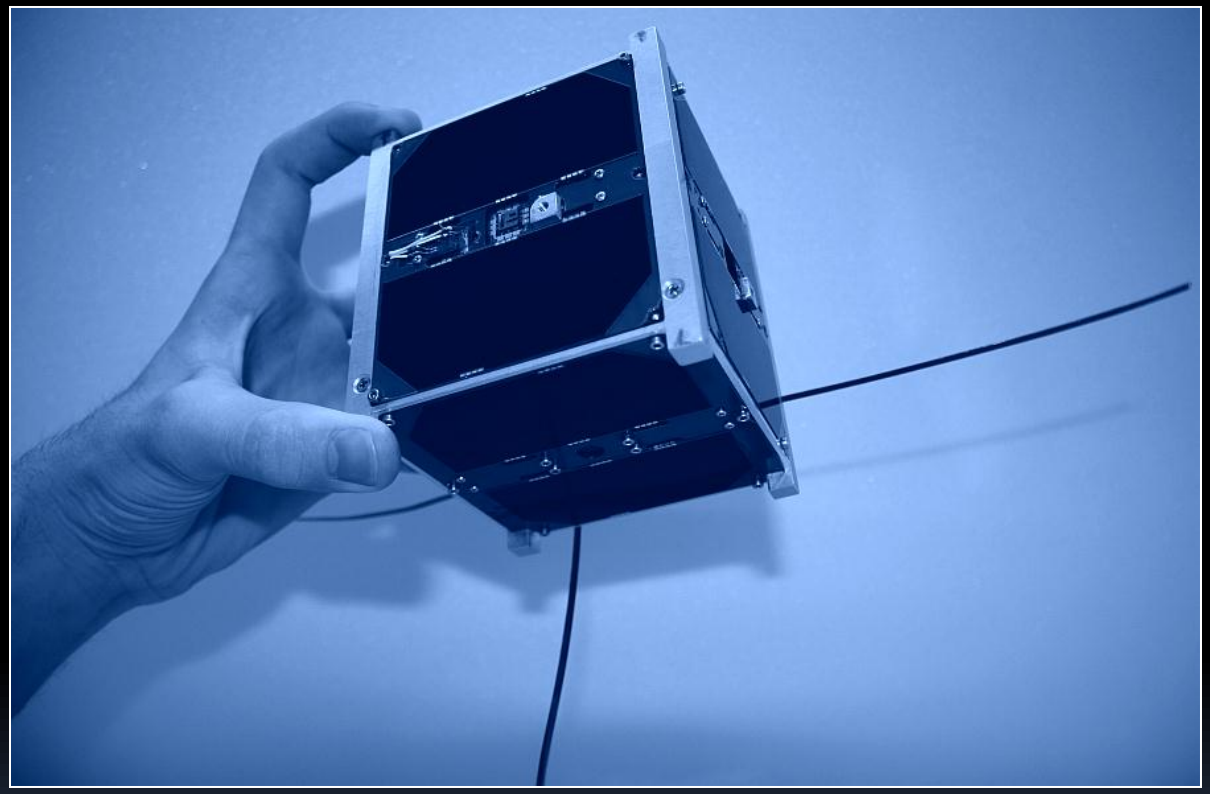
Autoren:

Tetsu, JA0CAW
Jim, AC4AV
Colin, VK5HI
Mineo, JE9PEL
Nader, ST2NH
Mike, DK3WN

regelmäßige Reporte:

ZL2BX, NH7WN, W1ICW,
N8MH, JA6PL, JA1GDE,
PA3GUO, PE0SAT
…

Vielen Dank für die Aufmerksamkeit !



73' de Mike