

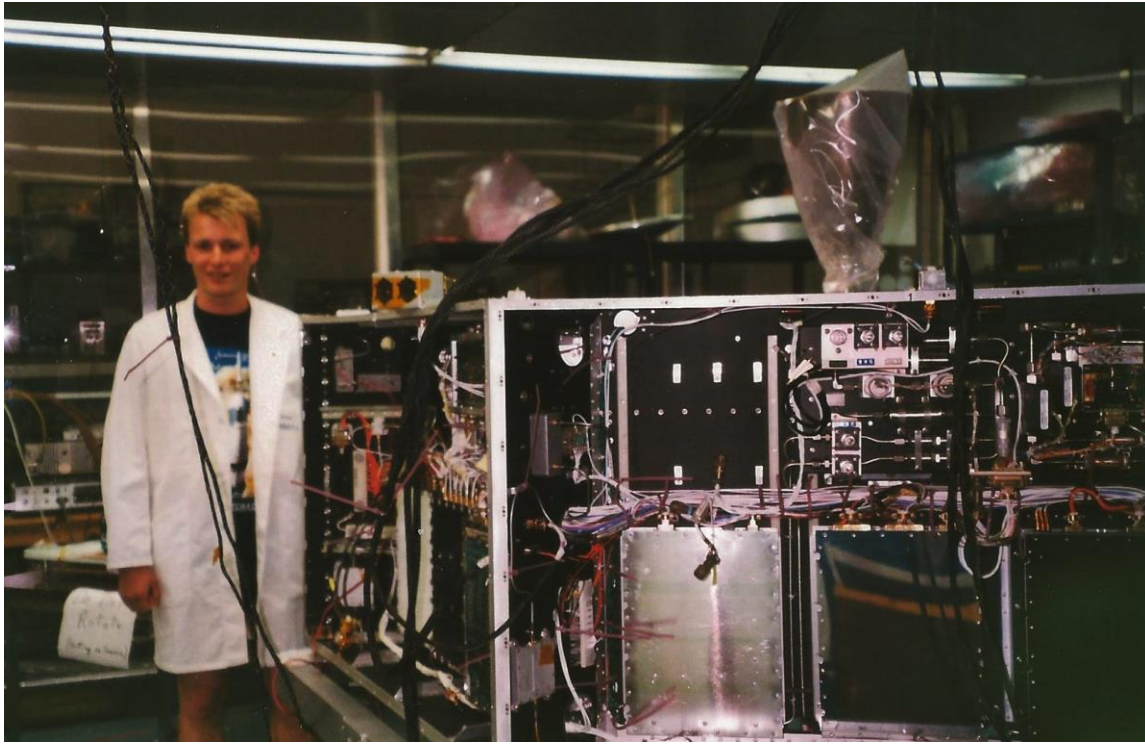


Praxistipps Satellitenfunk

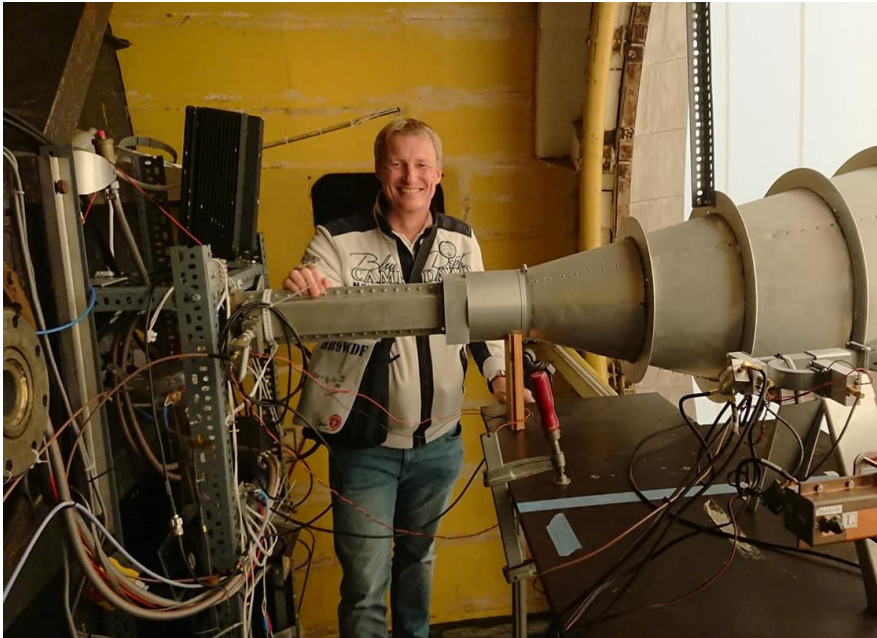
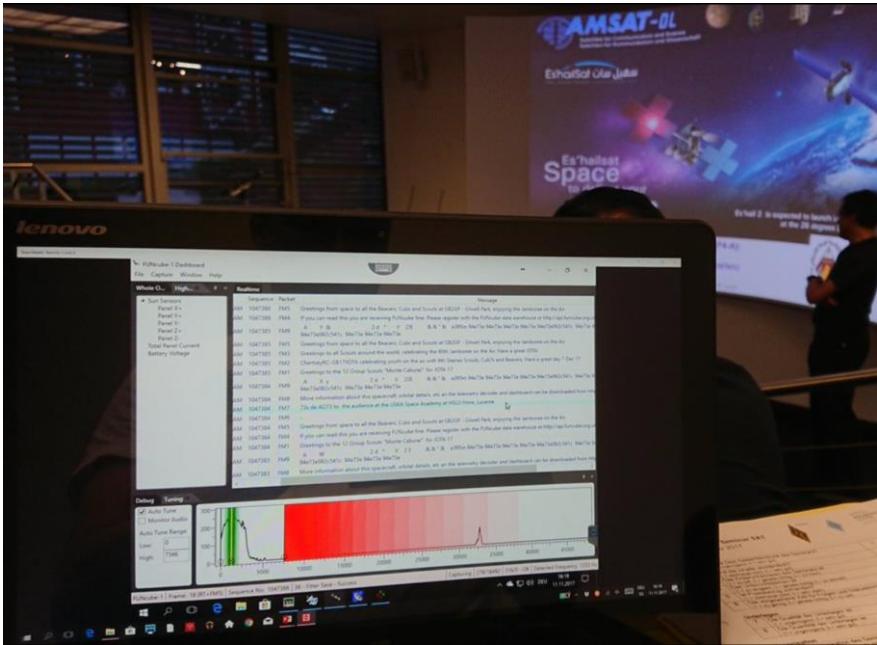
Michael Lipp, HB9WDF – Radio Club Sursee Juni 2019



Über mich – Space Nerd

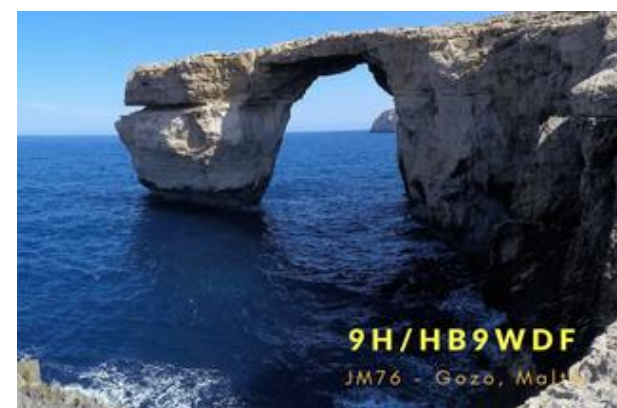
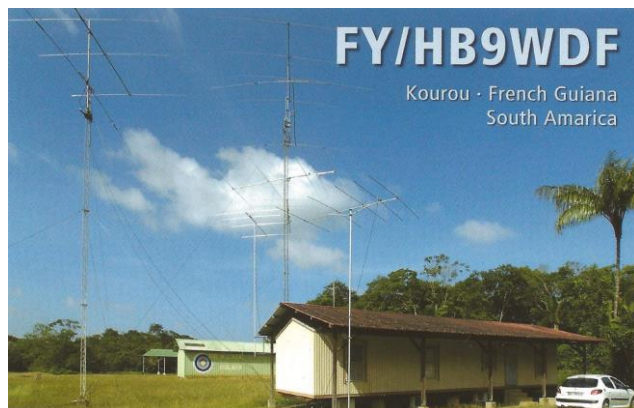


Funkamateur seit 1995



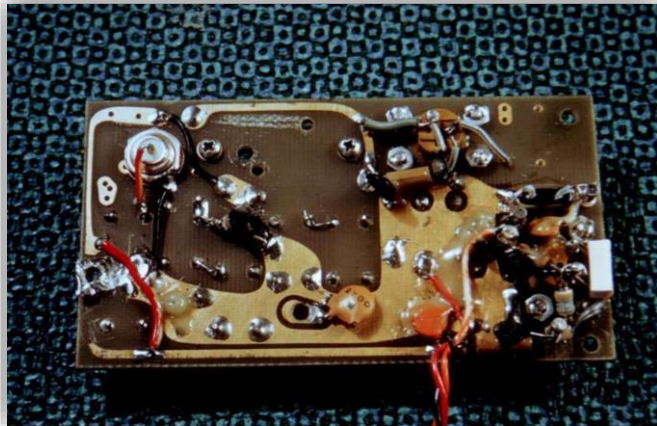
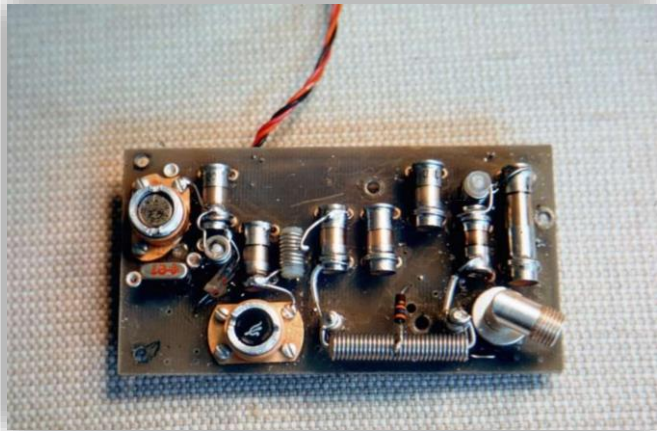
Engagement
AMSAT-HB, USKA Academy, USKA
Tecdays

DX-Peditionen





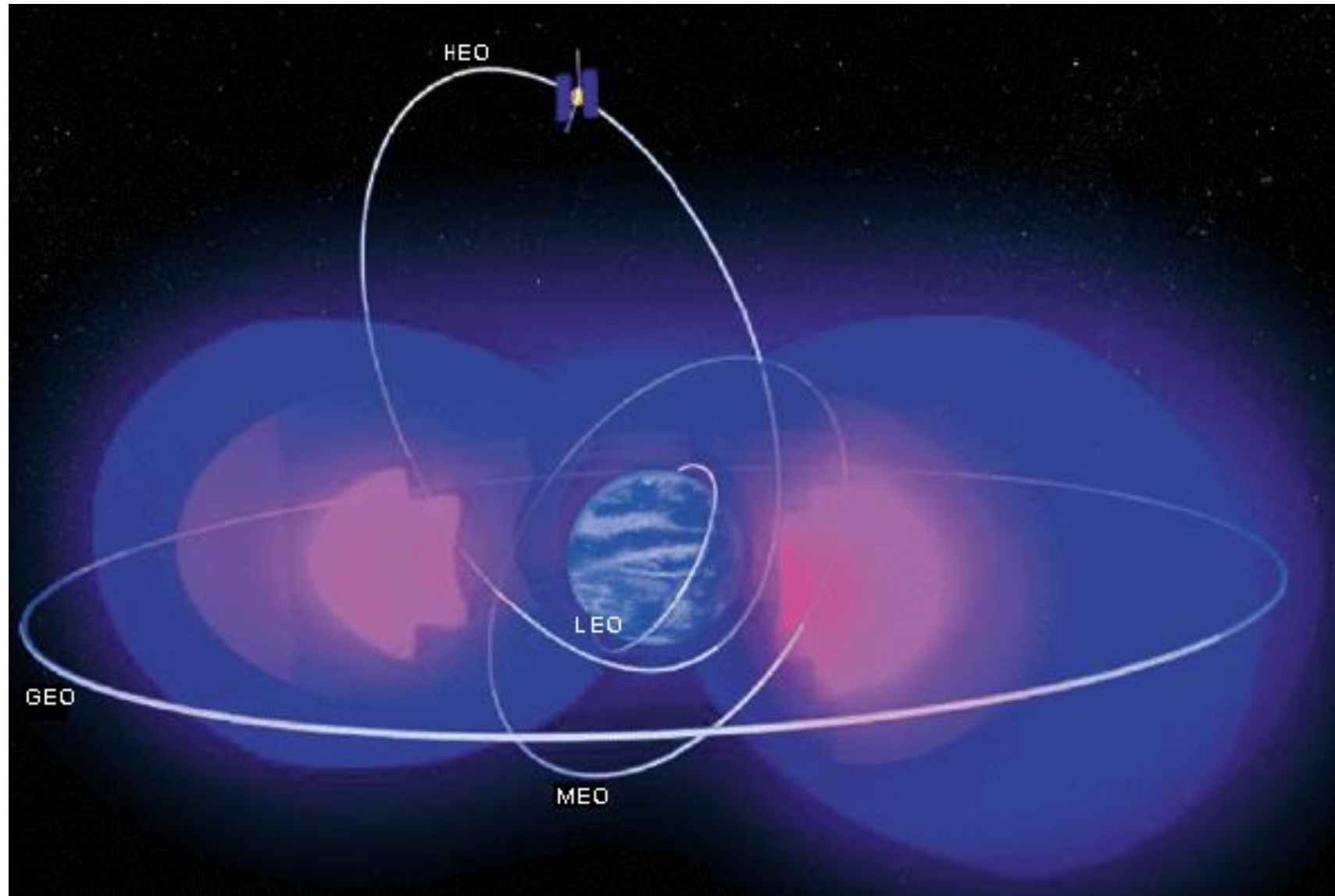
Lance Ginner, K6GSJ und OSCAR I

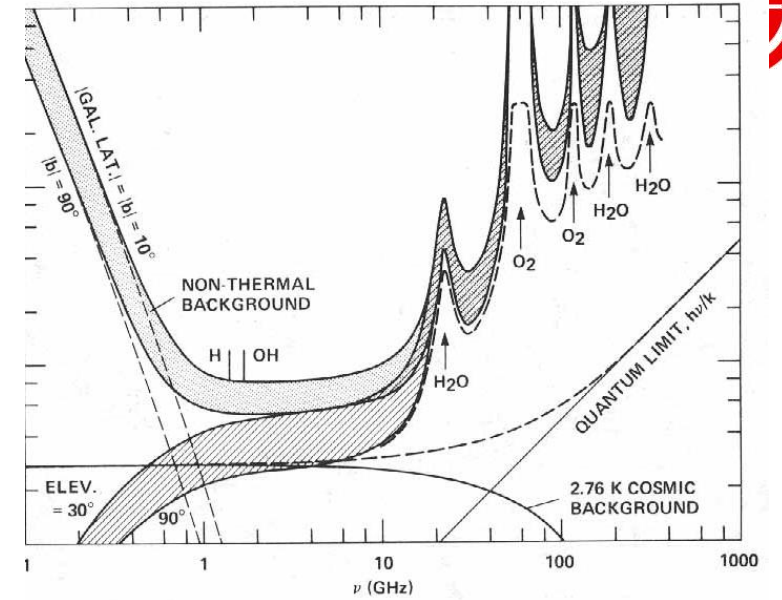
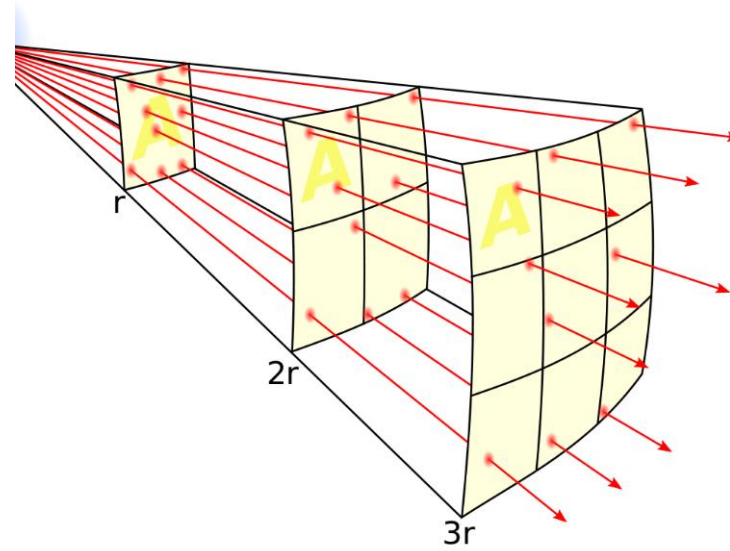
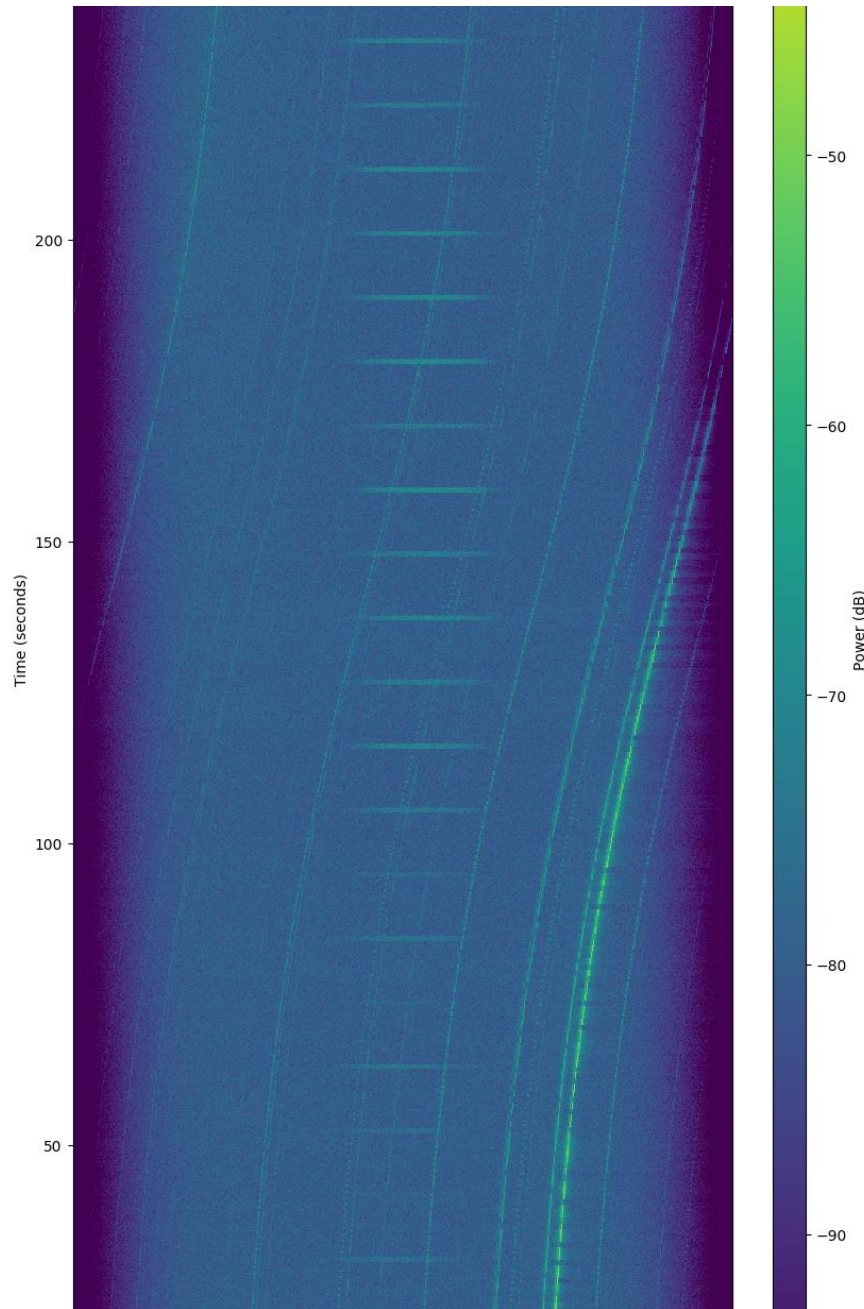


Bevor wir zu den Praxistipps kommen...

Minimalste Theorie für das Verständnis

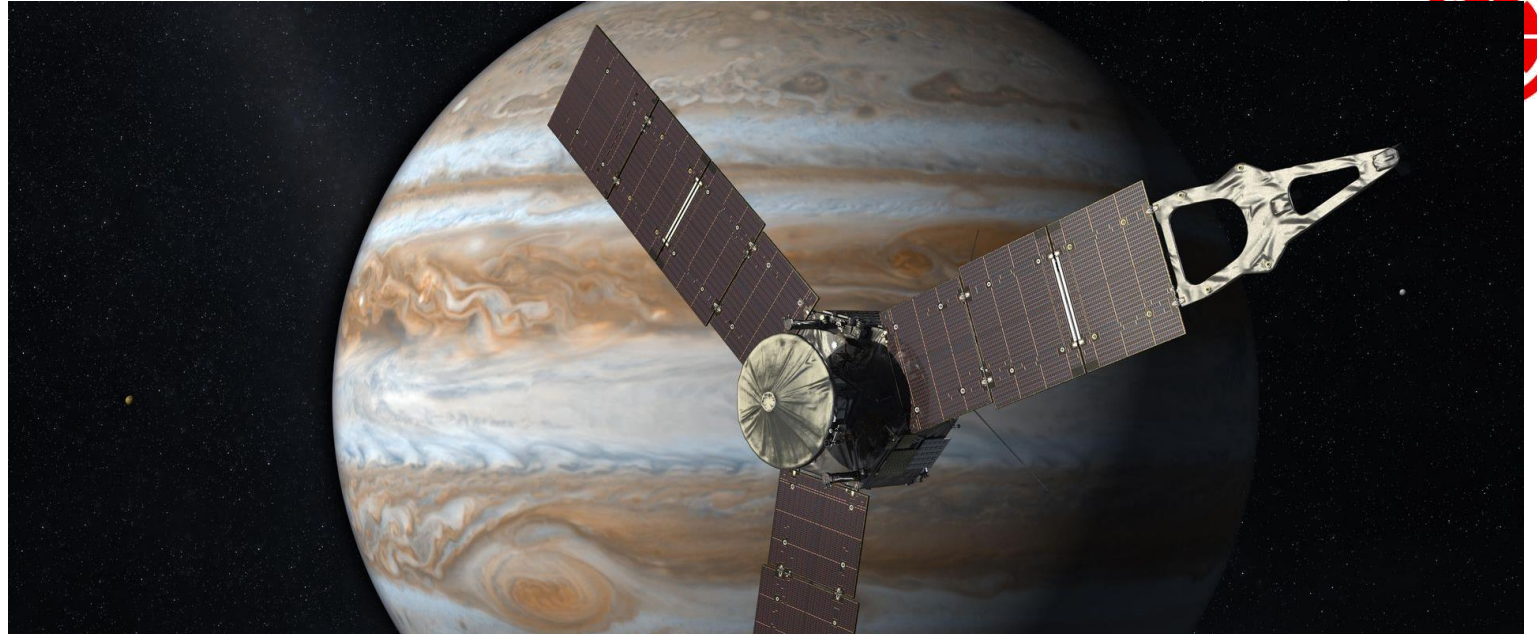
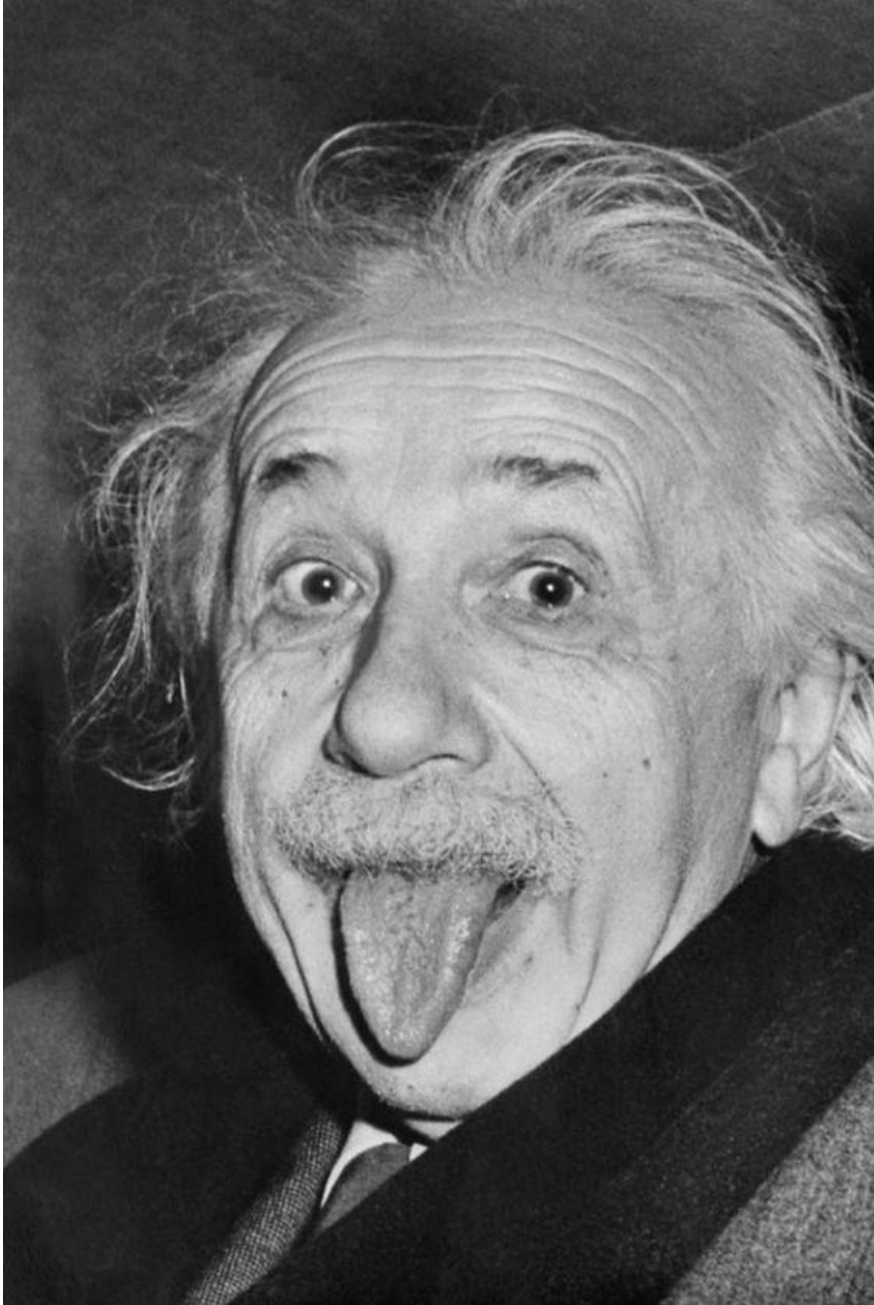
Satellitenorbits



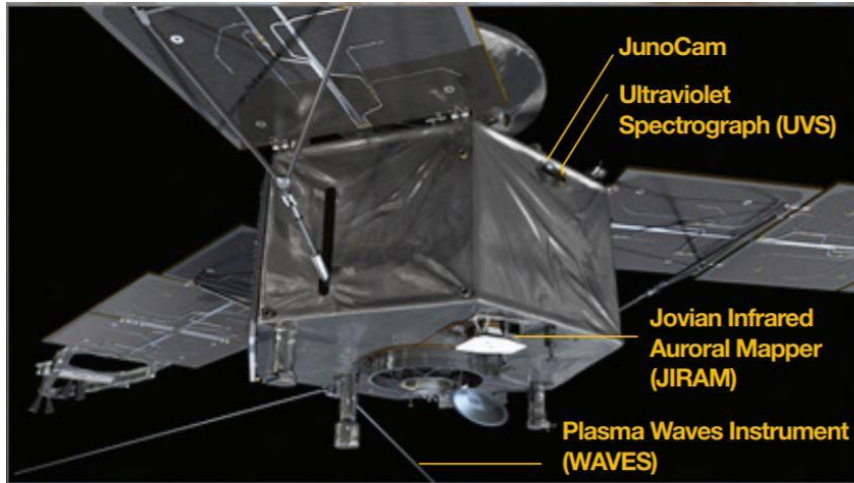


Signaleffekte und Wellenausbreitung

Satelliten Praxistipps für...

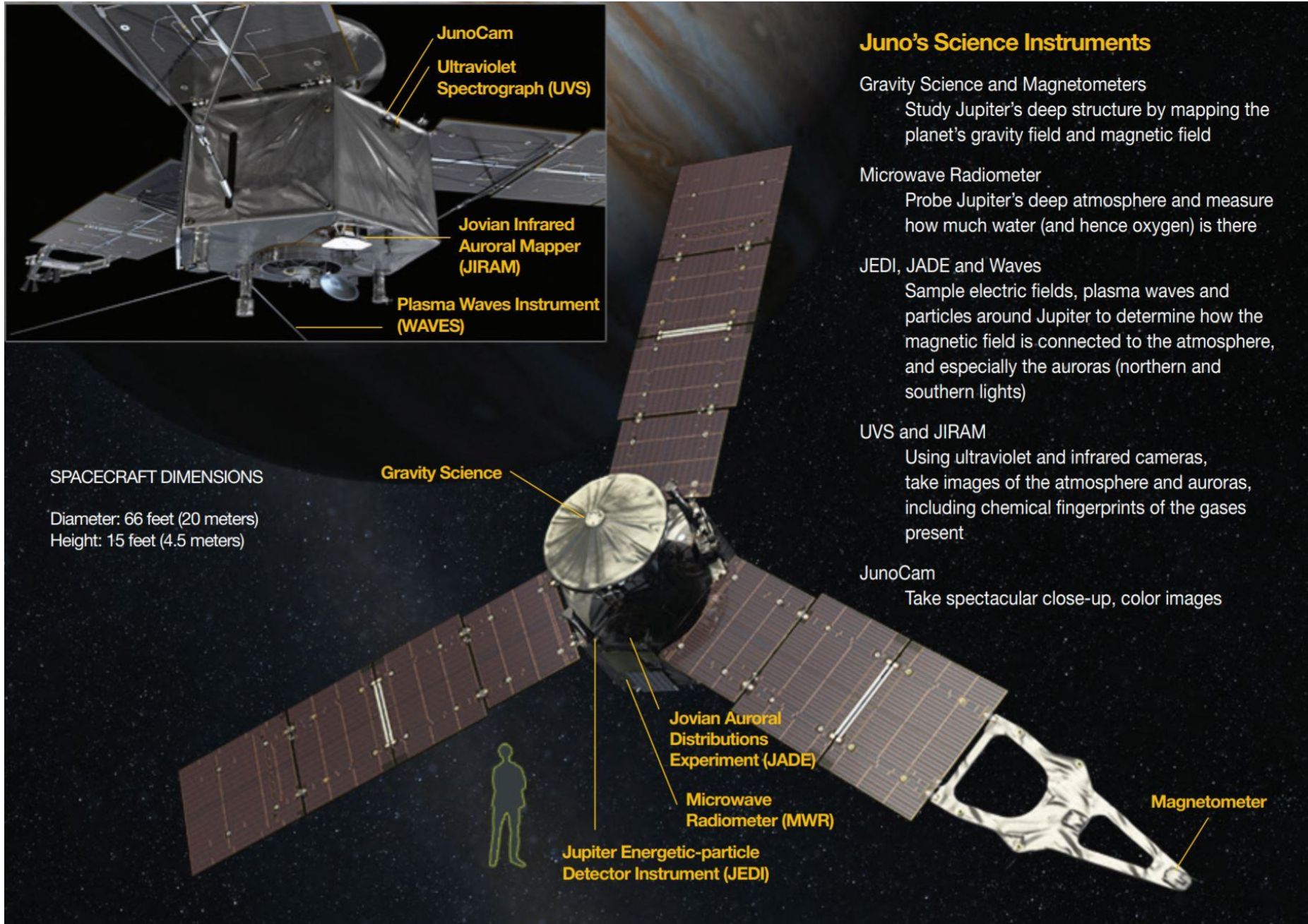


...die Wissenschaftler
unter uns



SPACECRAFT DIMENSIONS

Diameter: 66 feet (20 meters)
Height: 15 feet (4.5 meters)



Juno's Science Instruments

Gravity Science and Magnetometers

Study Jupiter's deep structure by mapping the planet's gravity field and magnetic field

Microwave Radiometer

Probe Jupiter's deep atmosphere and measure how much water (and hence oxygen) is there

JEDI, JADE and Waves

Sample electric fields, plasma waves and particles around Jupiter to determine how the magnetic field is connected to the atmosphere, and especially the auroras (northern and southern lights)

UVS and JIRAM

Using ultraviolet and infrared cameras, take images of the atmosphere and auroras, including chemical fingerprints of the gases present

JunoCam

Take spectacular close-up, color images

Youtube Video «Hi JUNO»

<https://www.youtube.com/watch?v=QOmu227V34Q>

Telemetryempfang

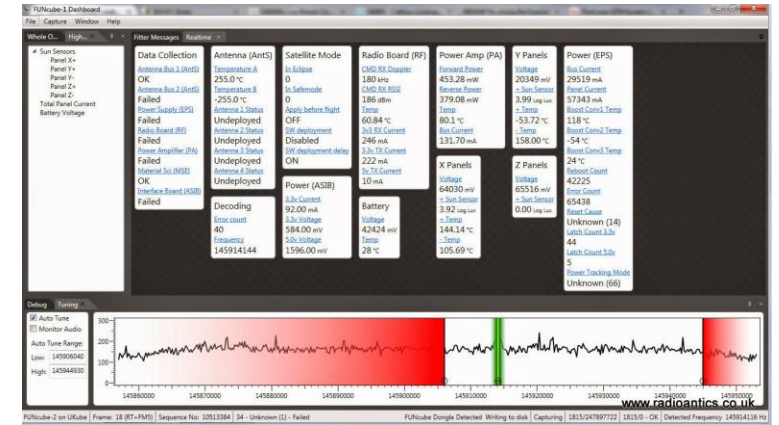
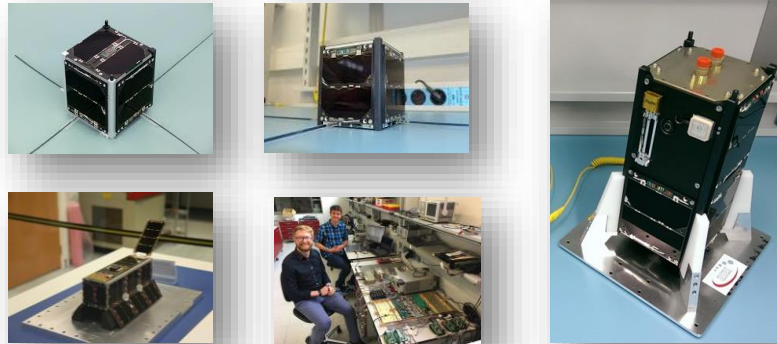
Einfaches Stationskonzept



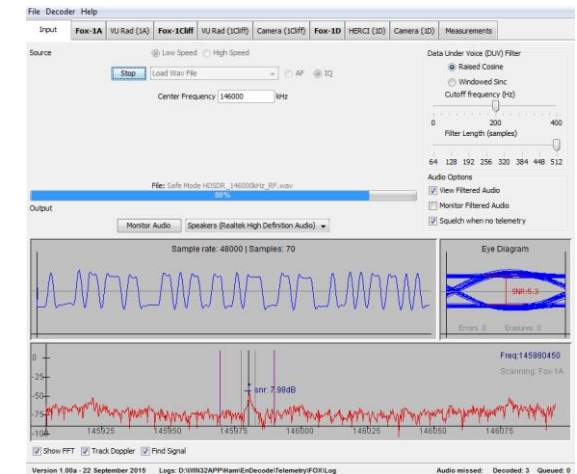
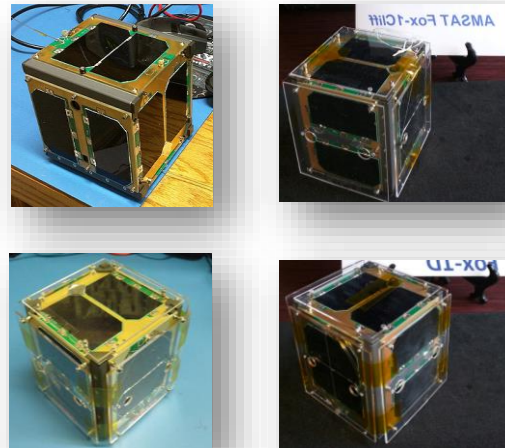
Alternativ



Satelliten für Telemetrieempfang



www.funcube.org.uk



www.amsat.org

... und sehr umfangreich bei Mike DK3WN



www.dk3wn.info

Satelliten Praxistipps für...



...jene unter uns, die gerne mal easy ein QSO führen wollen

Easy über SO-50



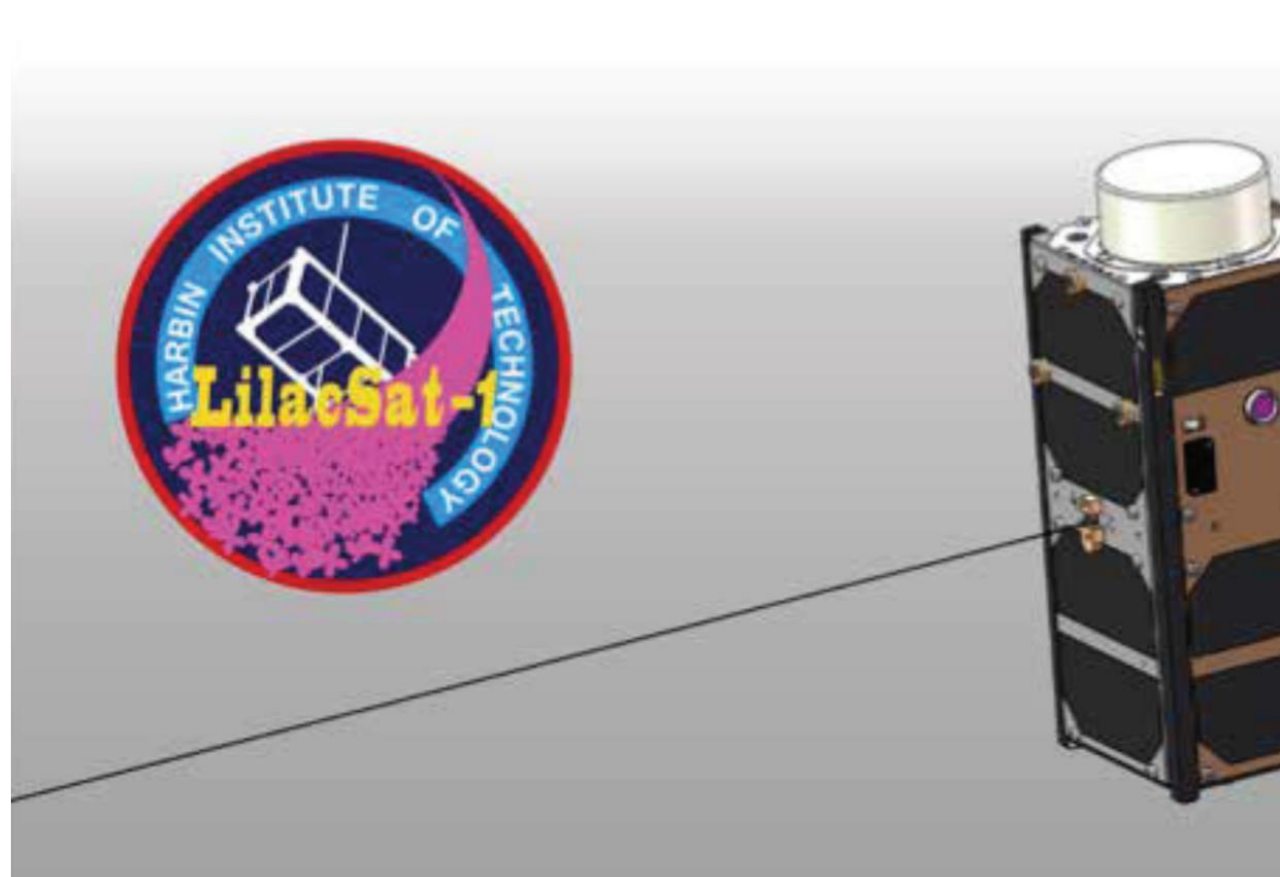
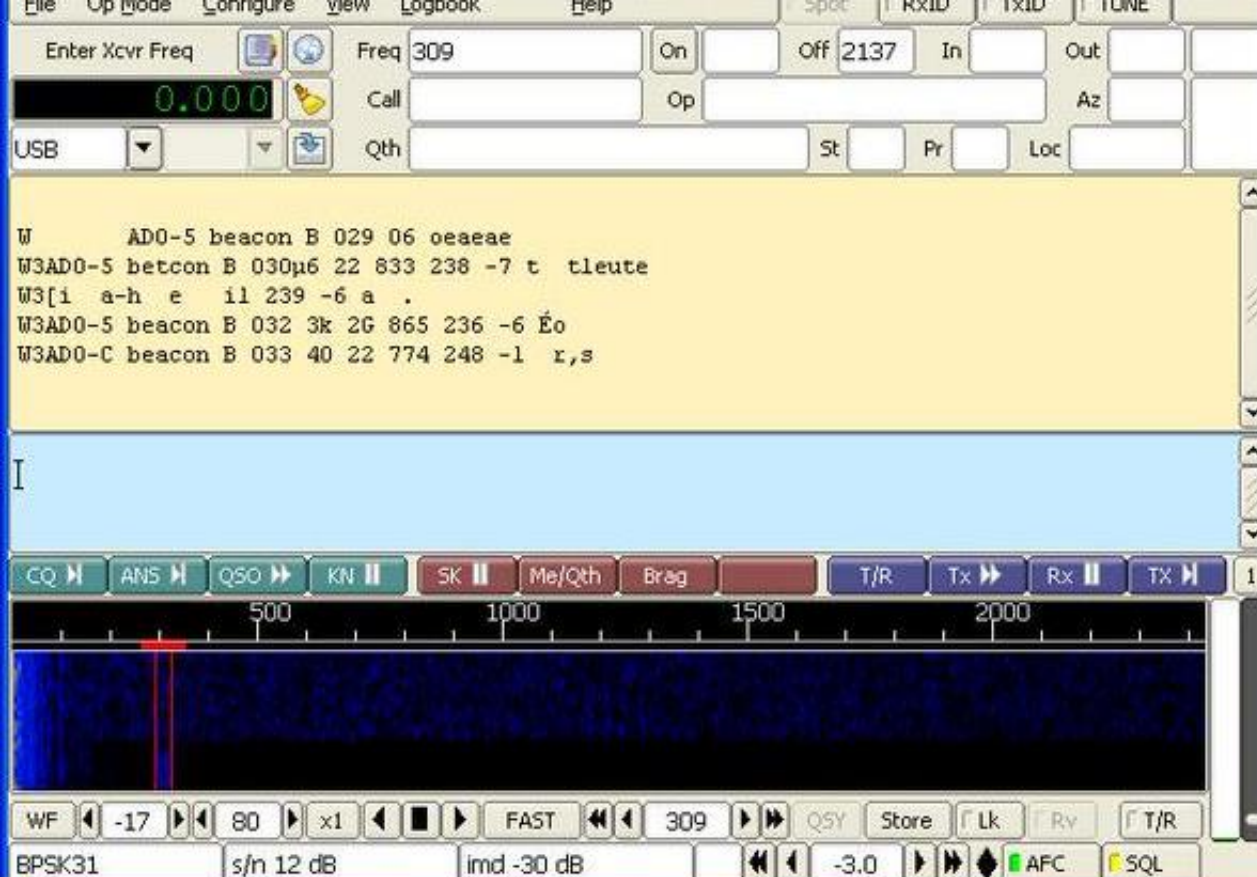
Satellit	SO-50	Bake:	keine	
Ch #	Name	TX Freq	CTCSS (TX)	RX Freq
101*	SO50ON	145.845	74.4	436.810
102	SO50-AS1	145.850	67.0	436.810
103	SO50-AS2	145.850	67.0	436.805
102	SO50-TC1	145.850	67.0	436.800
104	SO50-TC2	145.850	67.0	436.795
105	SO50-TC3	145.850	67.0	436.790
106	SO50-LS1	145.850	67.0	436.785
107	SO50-LS2	145.855	67.0	436.780

Tipps zu SO-50



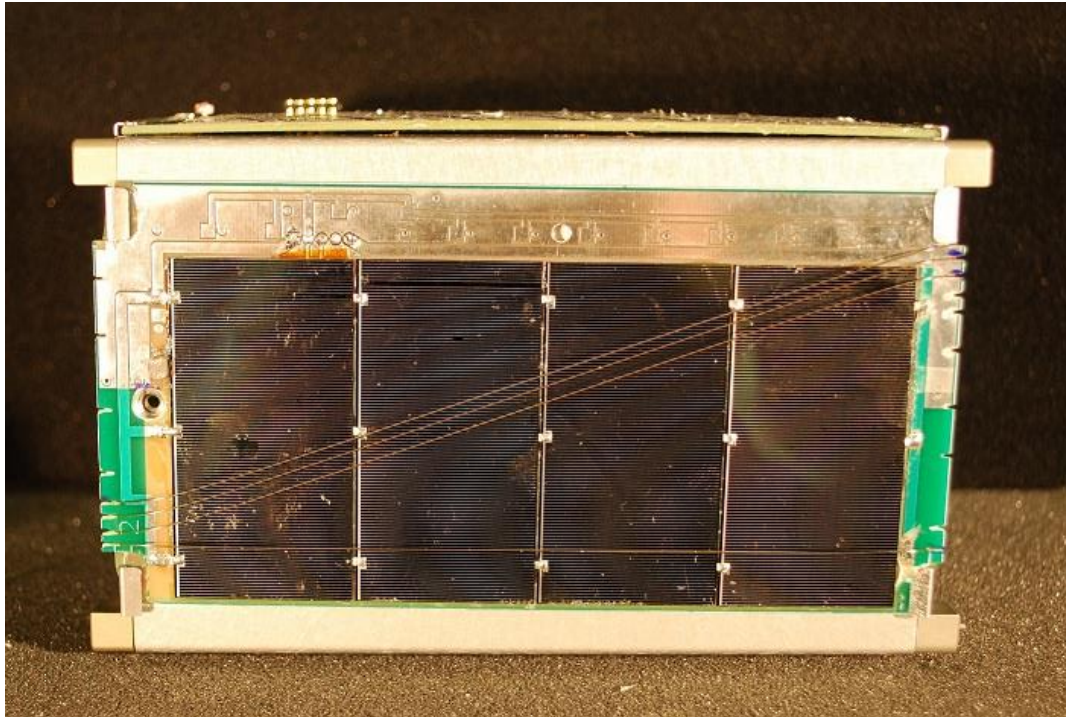
- Versucht es gar nicht erst am Wochenende...
- Auch nicht, wenn Halb-Europa wach ist
- Nutzt die Randzeiten unter der Woche in den frühen Morgen oder Abendstunden
- Wer mal weit weg in den Ferien ist... - einfach mal mit dem Handfunkgerät probieren

Satelliten Praxistipps für...



... Fans der Digitalen Betriebsart

NO-84 Parkinson SAT

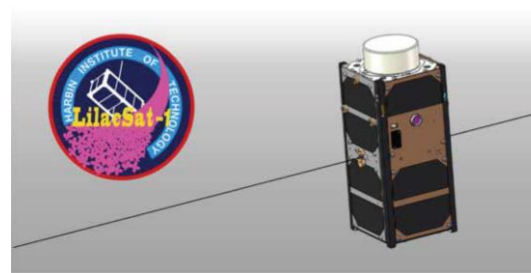


Uplink: 28.120 SSB

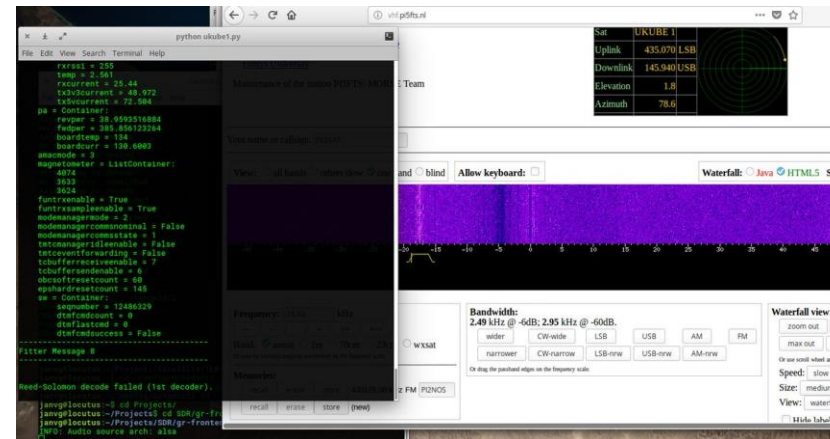
Downlink: 435.350 SSB

PSK-31

DV via LO-90



FM Analog Uplink
Digital Voice Downlink





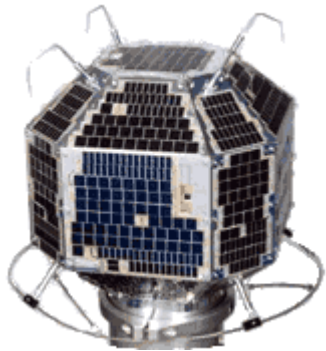
D-STAR-One

Satelliten Praxistipps für...

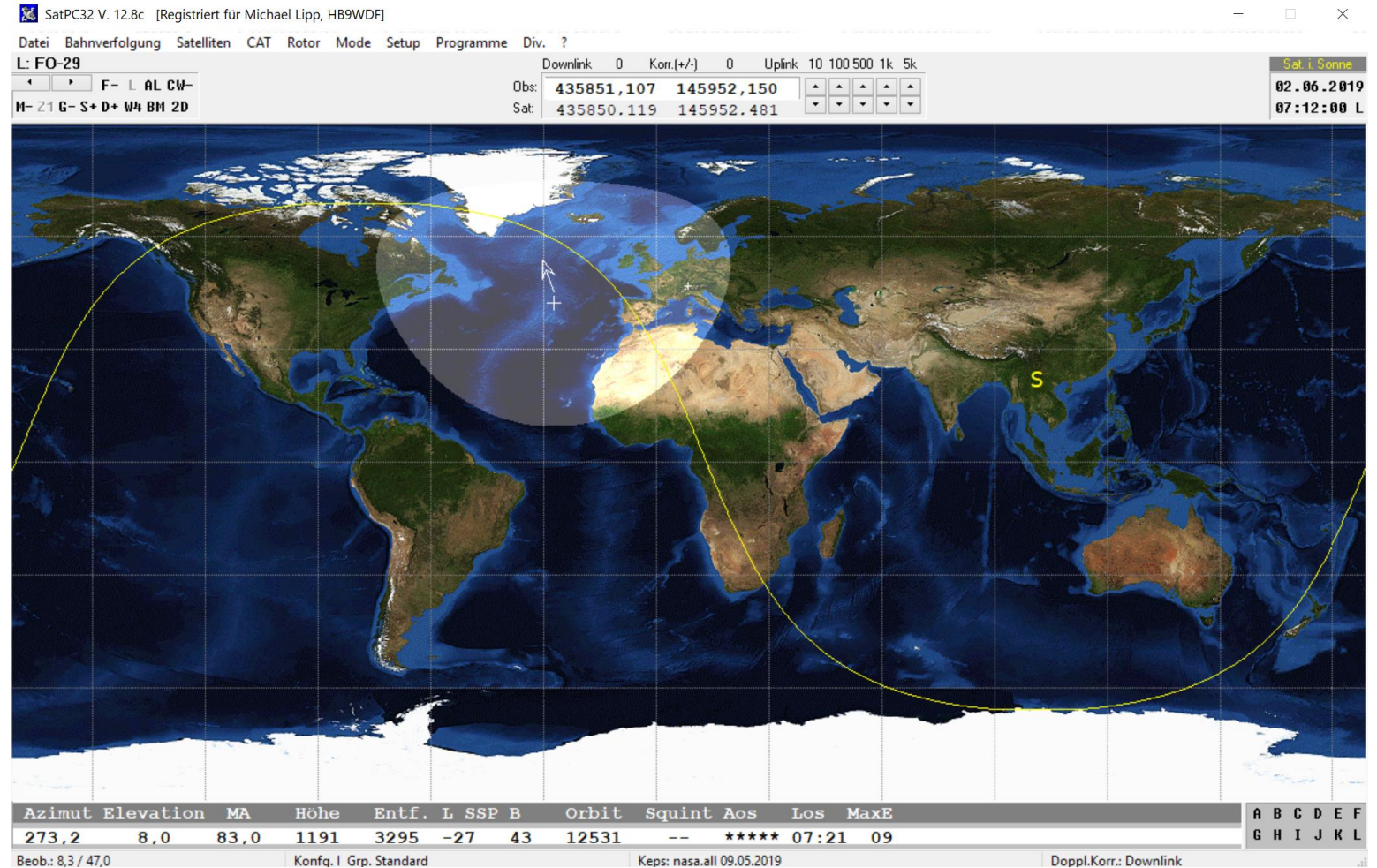


... die DXer unter uns

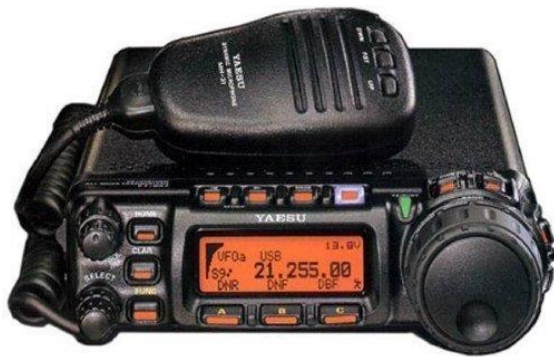
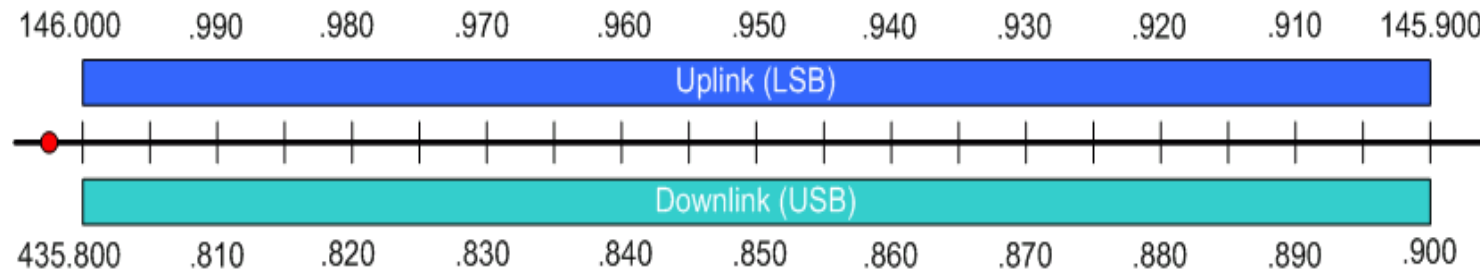
DXen über FO-29 (und AO-7)



HB9 ist in Nordamerika und Karibik gesucht...

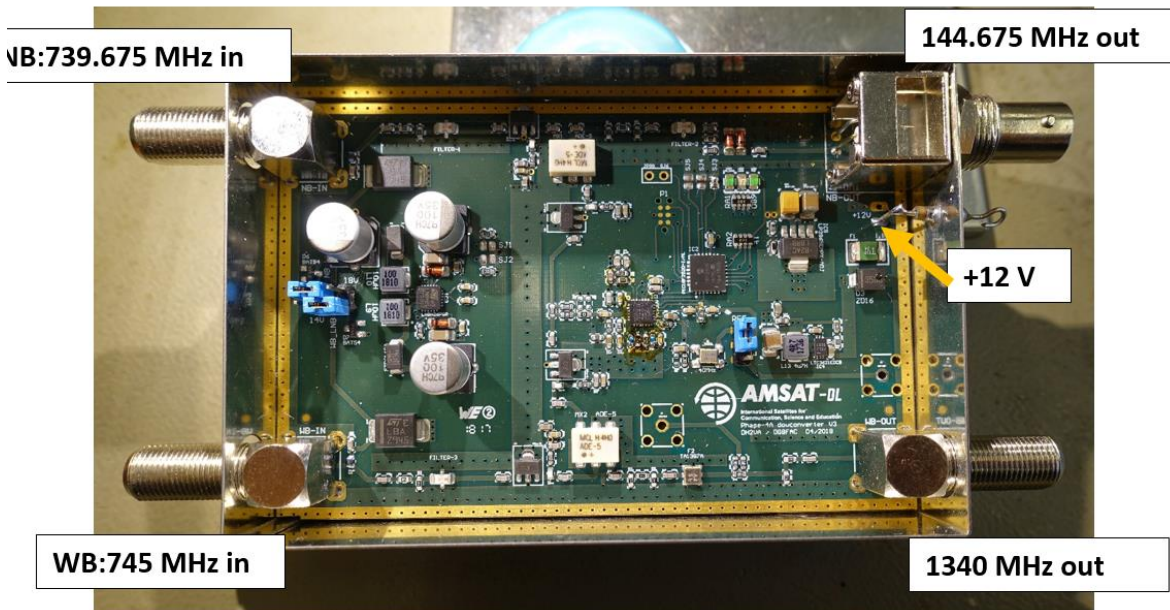


Flache Überflüge nutzen



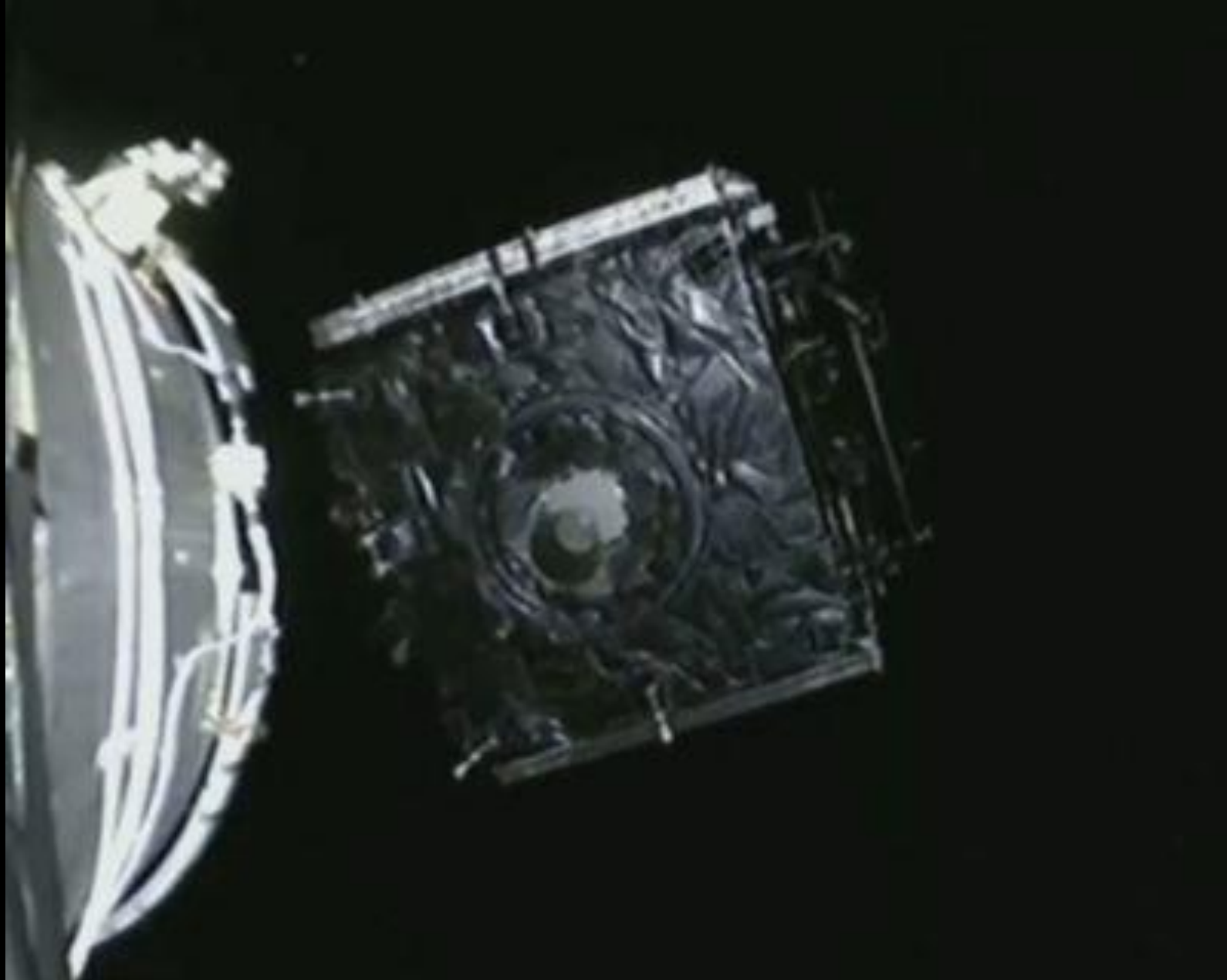
Satelliten Praxistipps für...

...Technikbegeisterte, DXer

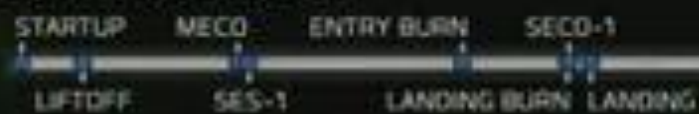


Note: kit comes without tin box (111x74mm), photo only for illustration



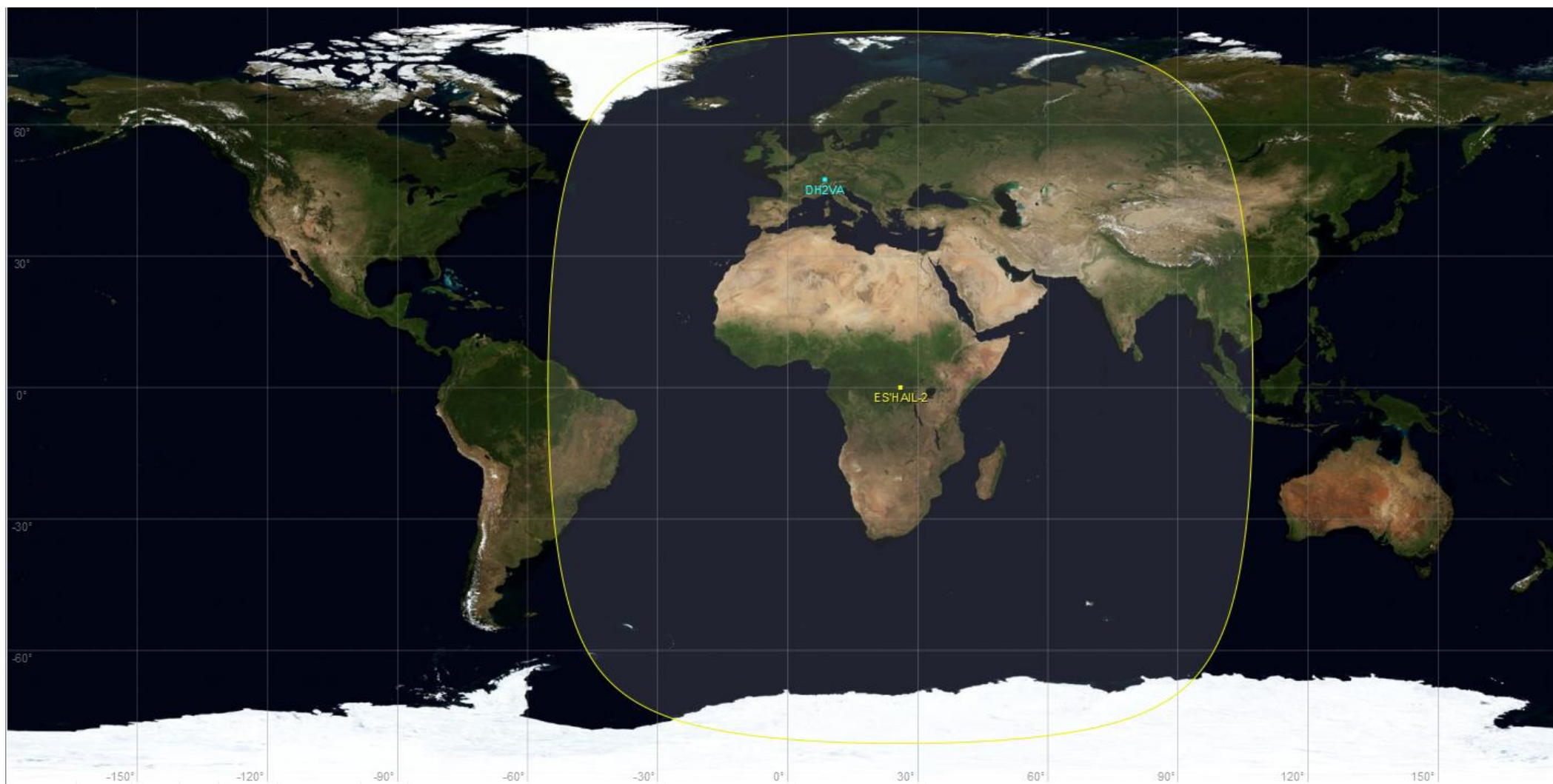


LAUNCH: ES'HAIL-2



-3dB Winkel = 17.4° → ~20dB Antennengewinn

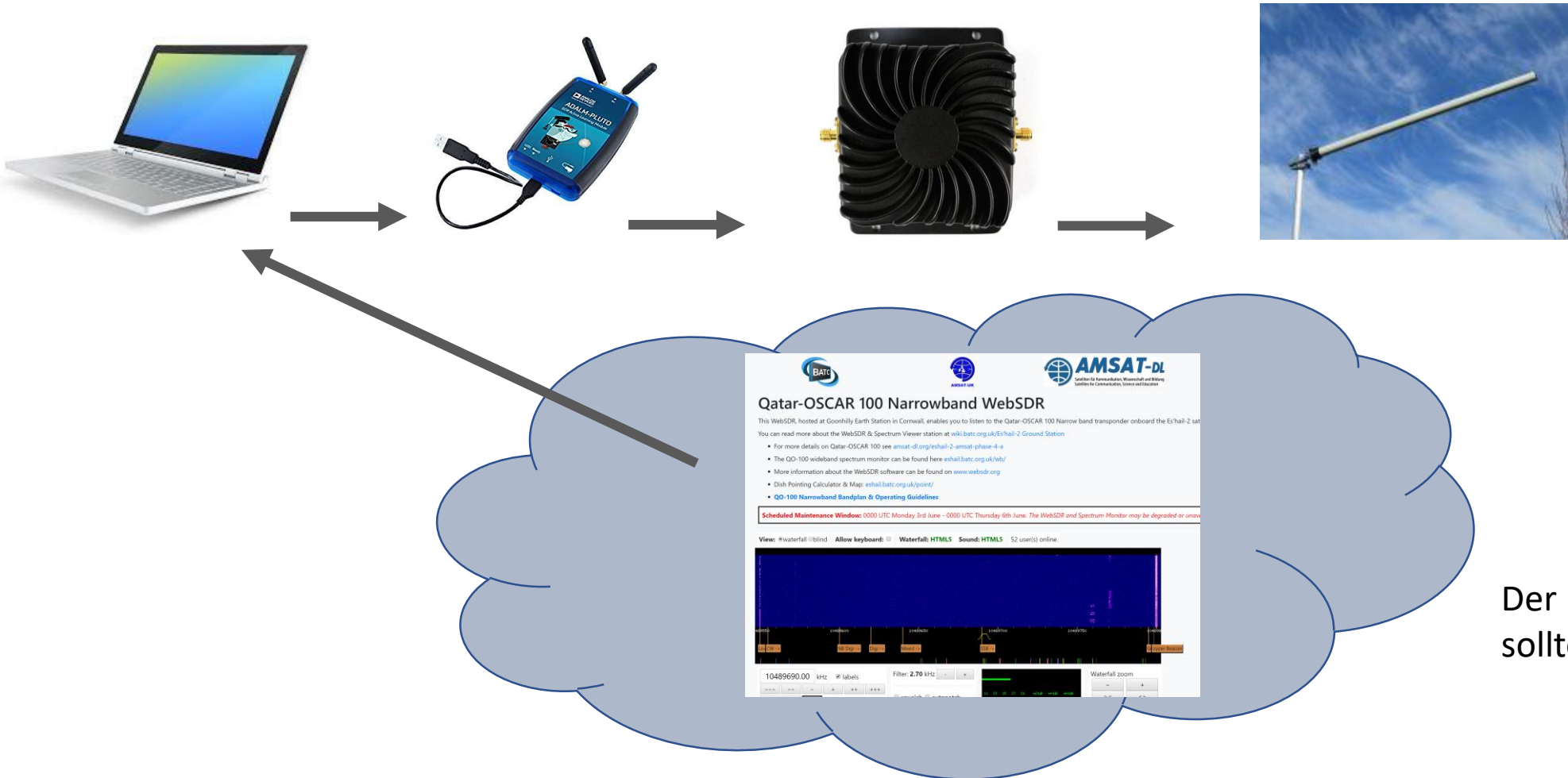




Sorglos-
Variante:
Komplett
System
CHF ~ 2 Tsd

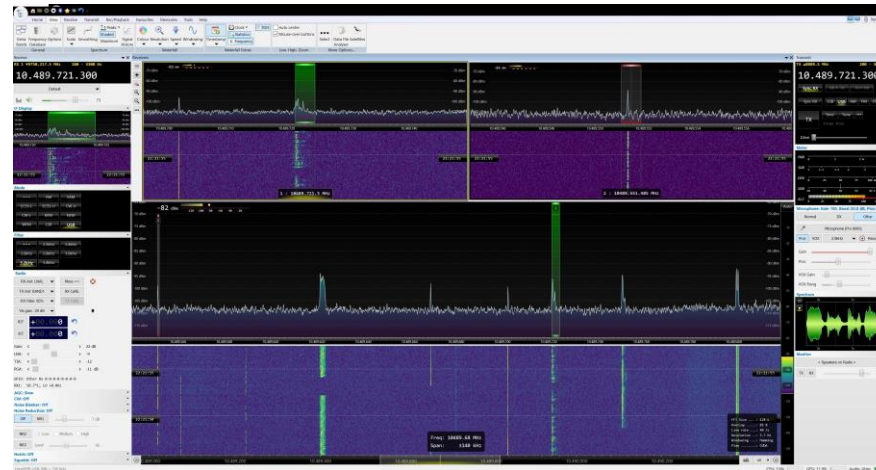
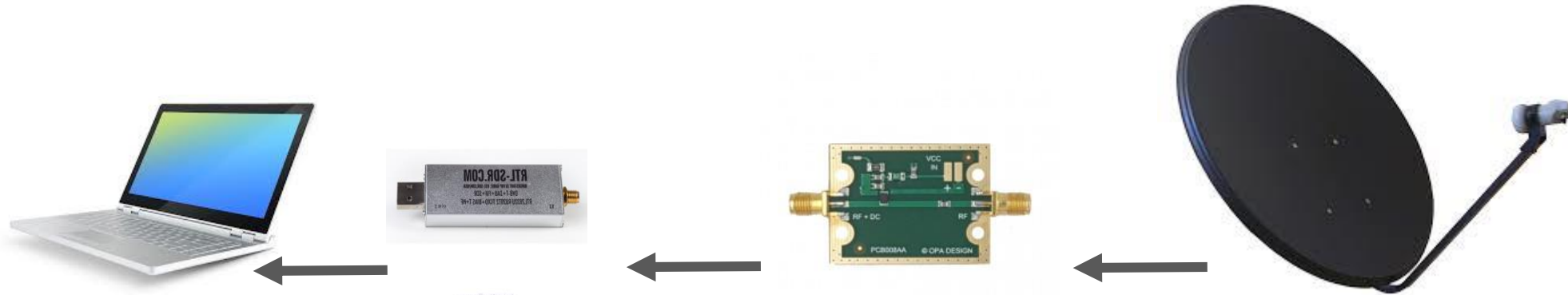


Minimalisten Variante



Der Empfang via Web-SDR
sollte nur eine Notlösung sein

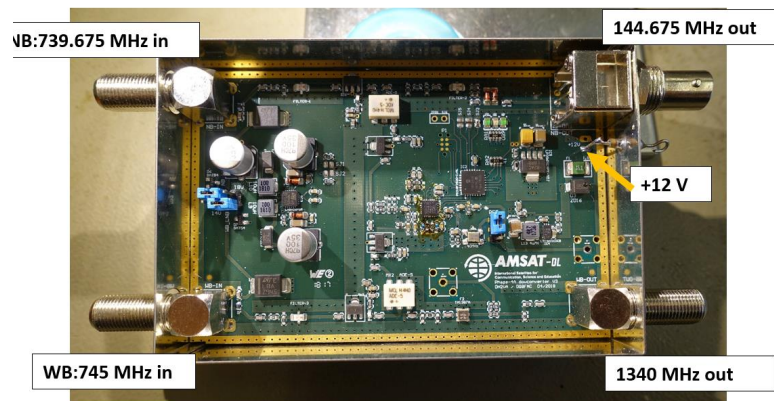
Etwas besser für den Downlink



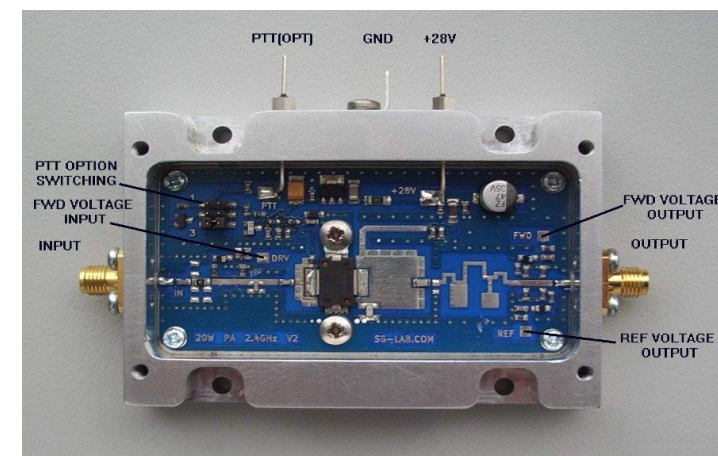
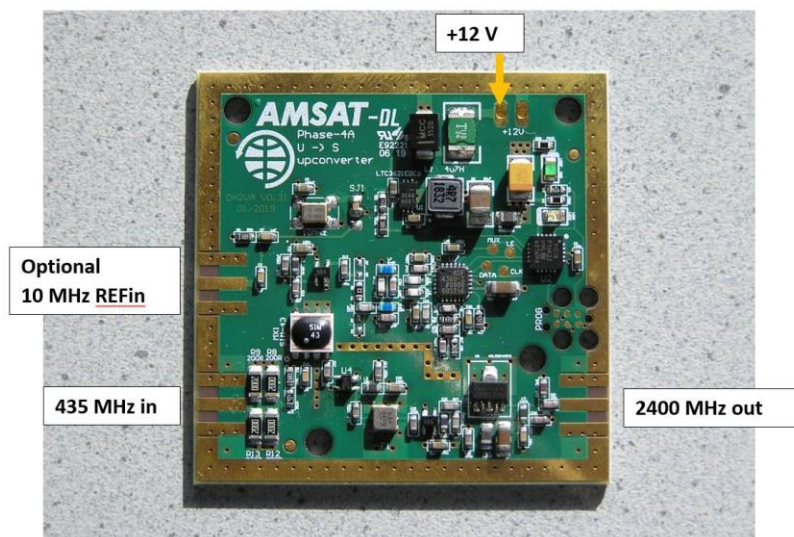
SDR Console sdr-radio.com

Und etwas besser...

AMSAT-DL Up- und Downconverter



Note: kit comes without tin box (111x74mm), photo only for illustration

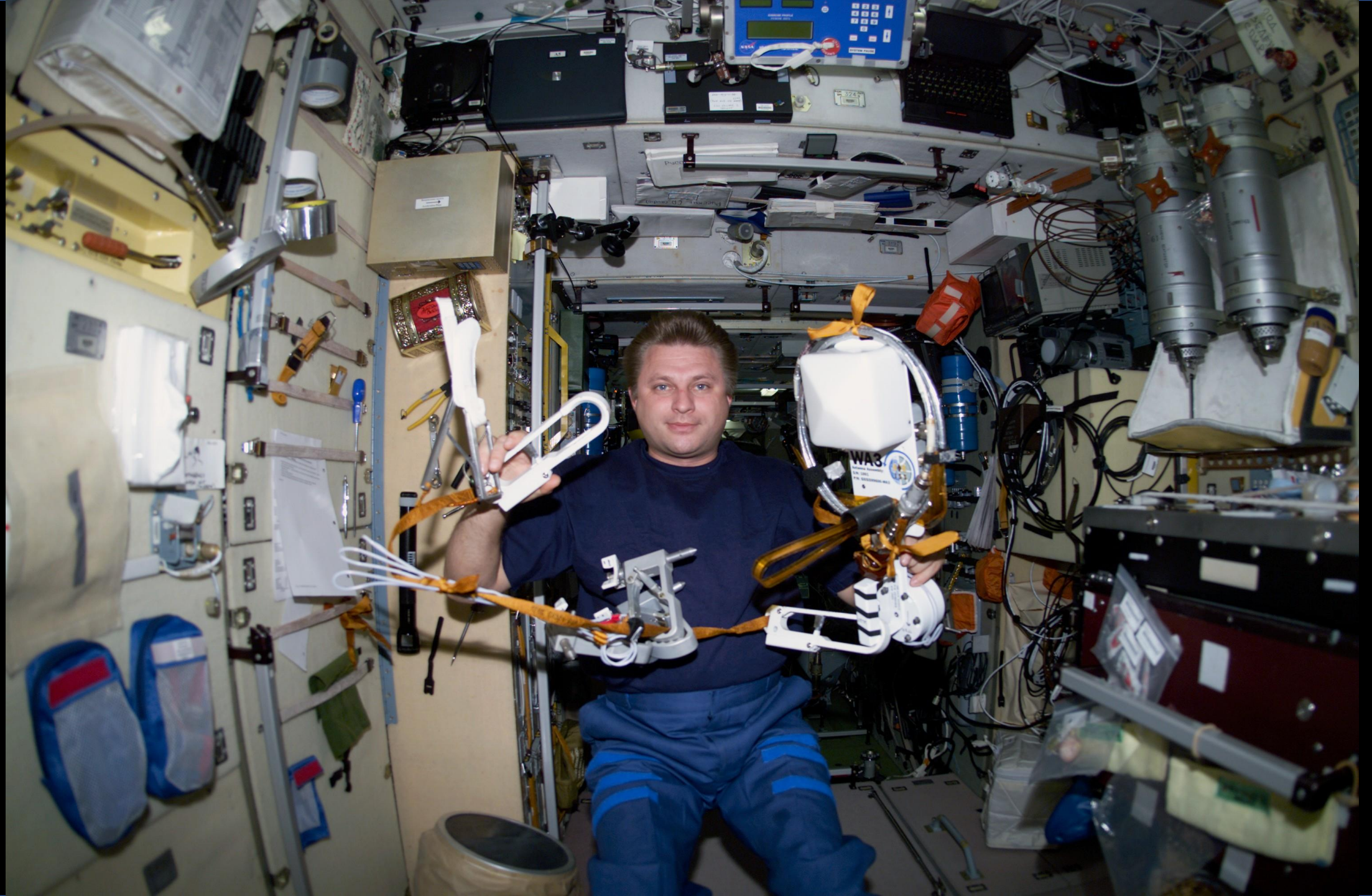


Satelliten Praxistipps für...



Astronauten-Romantiker



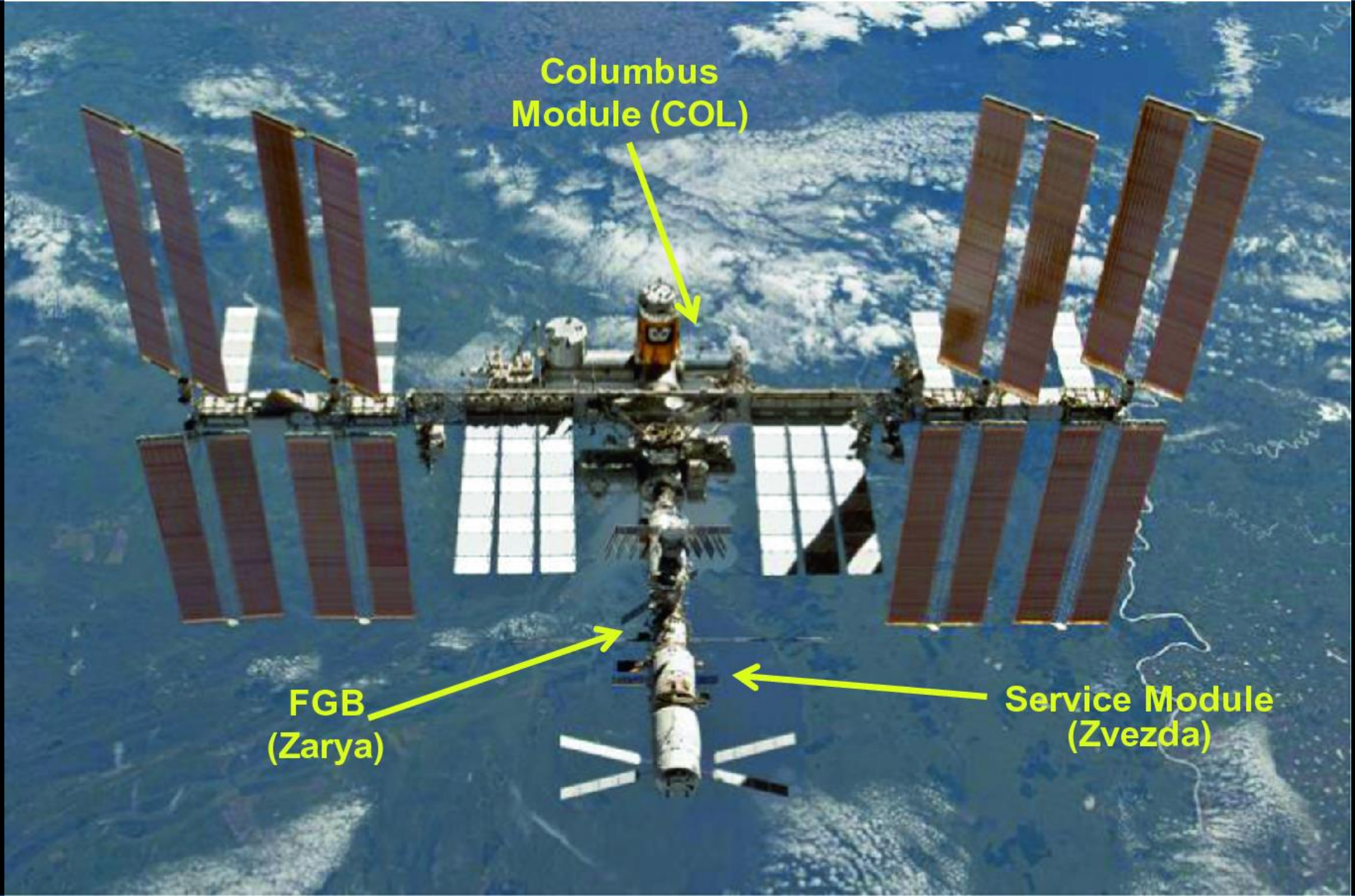




**Columbus
Module (COL)**

**FGB
(Zarya)**

**Service Module
(Zvezda)**







S104E5092 2001/07/16 03:02:36



sign: NABSS
to use: (SM) Kenwood
VSS channel: CH 40
SS channel: CH 41
AOS time: 08:45 GMT
Telebridge: telebridge
Station Coordinates: KGDUE - Maryland, U.S.



ISS QRG

- **FM VOICE for ITU Region 1: Europe-Middle East-Africa-North Asia**
 - Downlink 145.800
 - Uplink 145.200
- **FM U/v VOICE Repeater (Worldwide)**
 - Downlink 145.800
 - Uplink 437.800
- **FM V/u with PL VOICE Repeater (Worldwide)**
 - Downlink 437.800
 - Uplink 145.990 with 67.0 PL
- **FM L/v VOICE Repeater (Worldwide)**
 - Downlink 145.800
 - Uplink 1269.650
- **AX.25 1200 Bd AFSK Packet Radio (Worldwide)**
 - Downlink 145.825
 - Uplink 145.825
- **FM SSTV downlink (Worldwide)**
 - Downlink 145.800
- **UHF Simplex (rarely used)**
 - Downlink 437.550
 - Uplink 437.550

Und jetzt?

Reichen die Informationen, um die ISS zu hören, oder gar mit einem Astronauten zu funken?

Mit viel Glück «Ja»

Aber ohne Zusatzwissen eigentlich «nein»

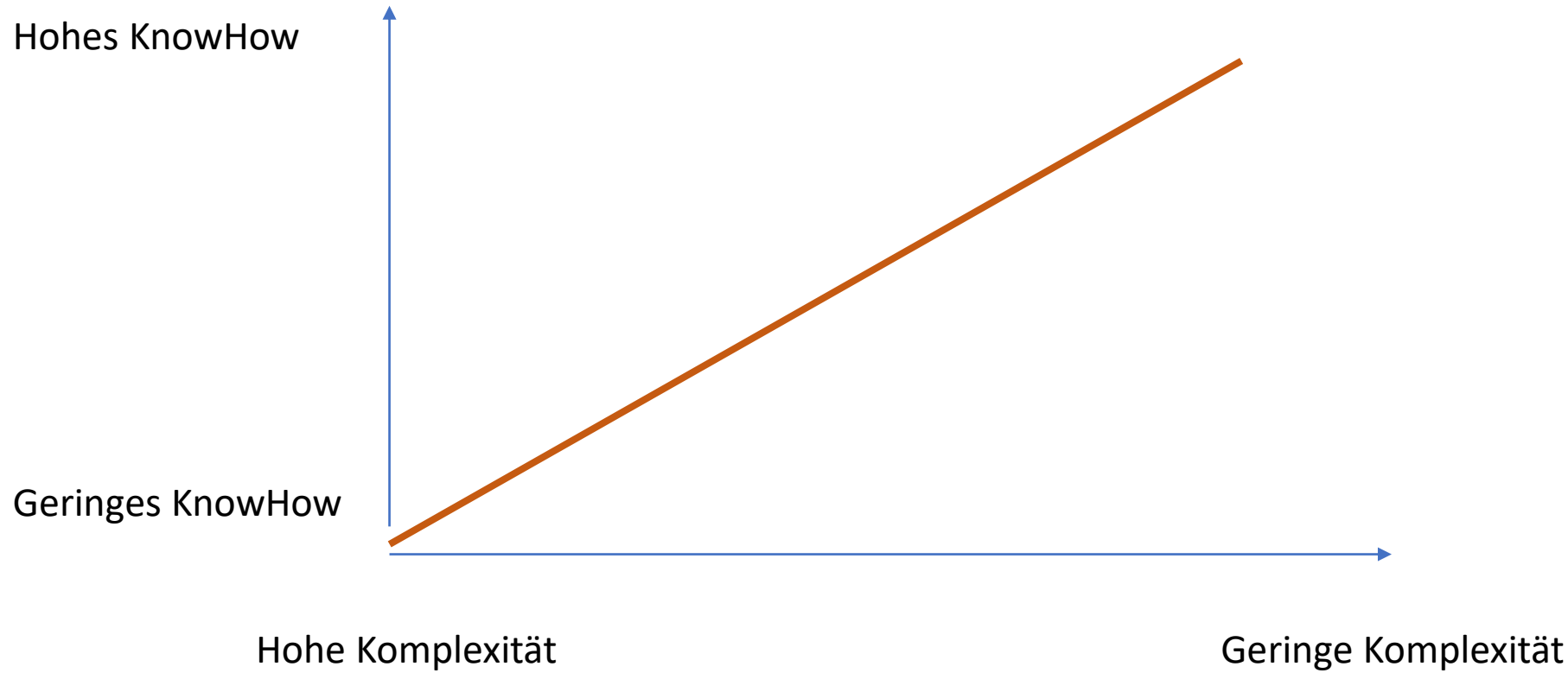
1.Frage: Welche Ausrüstung brauche ich?



vs.

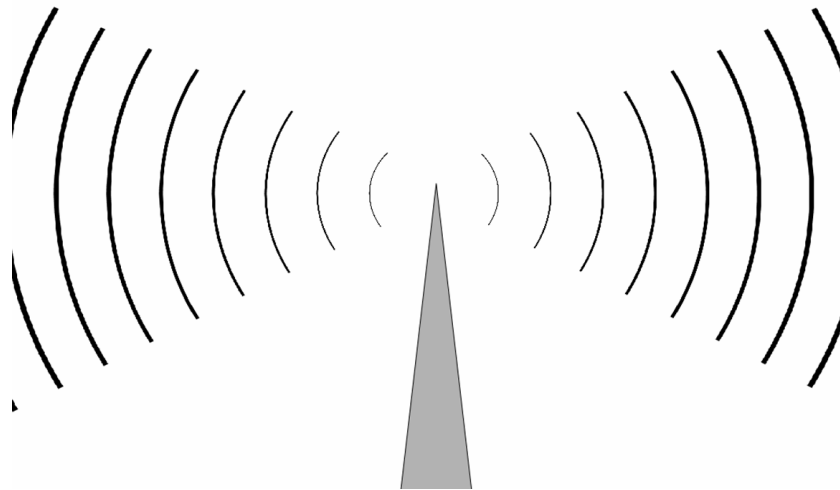


Zusammenhang Operating KnowHow<>Komplexität Station



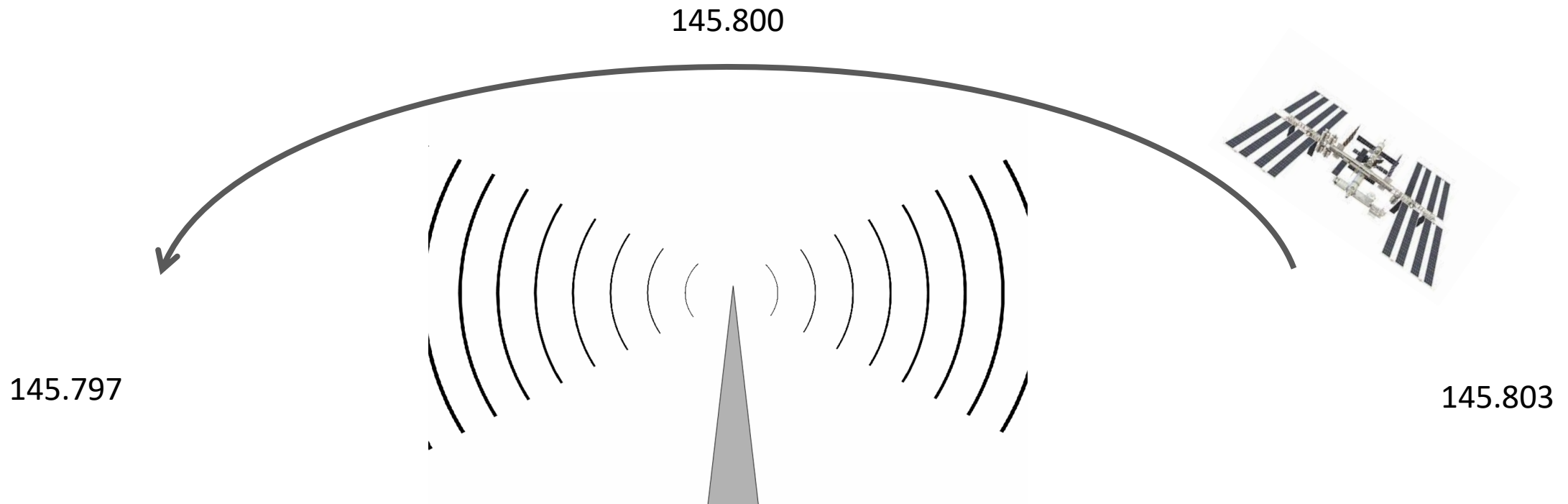
Die meisten Funkamateure haben eine Vertical (X-50) auf dem Dach

- Ein «Blindenstock» hat auf 2m zwischen 25-45 Grad Öffnungswinkel



Die meisten Funkamateure haben eine Vertical (X-50) auf dem Dach

- Es nutzt nichts, die ISS auf der Standard-QRG 145.200/145.800 (ohne Doppler-Korrektur) zu rufen.
→ Die meisten Funkamateure tun das aber...



Die meisten Funkamateure haben eine Vertical (X-50) auf dem Dach

Hier der Trick!

- Ein Überflug von 10-30 Grad ist ideal
- Und das sind die «magischen Frequenzpaarungen» 😊
 - AOS-Frequenzpaar 145.802,5 <> 145.197,5
 - LOS-Frequenzpaar 145.197,5 <> 145.202,5

APRS
AOS 145.802,5 <> 145.795,5
LOS 145.795,5 <> 145.802,5

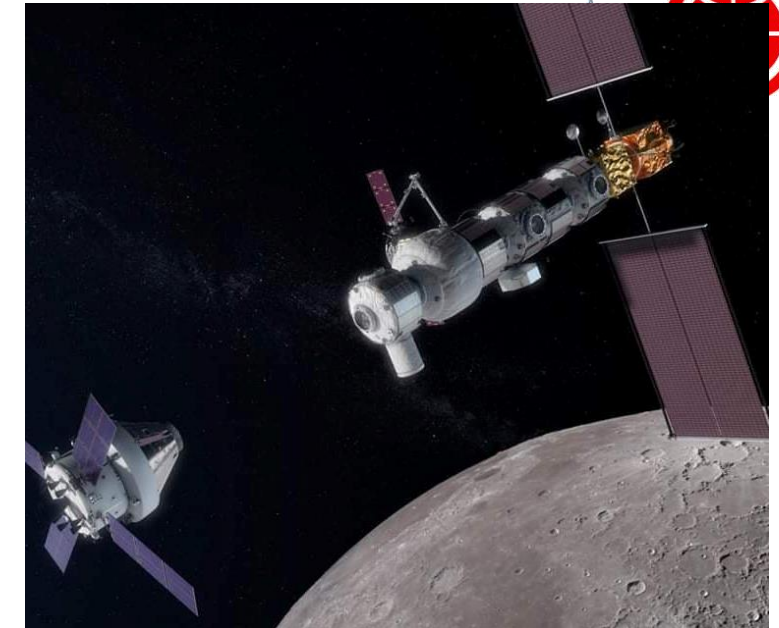
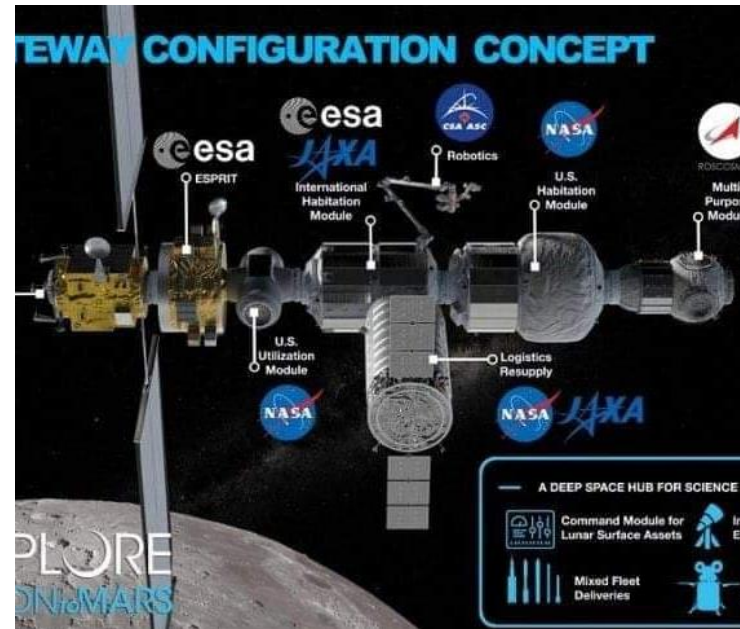
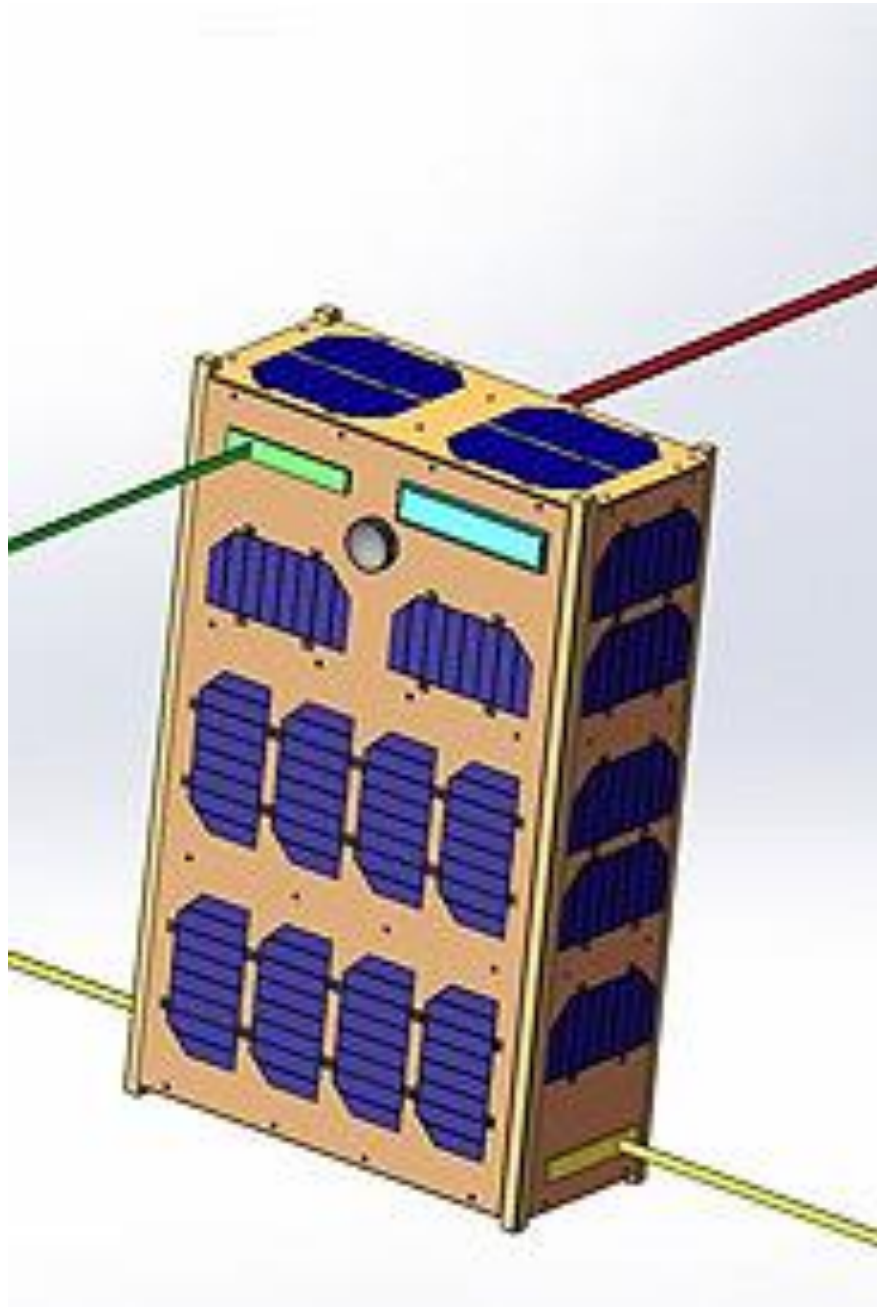
2. Frage:

Wann ist der richtige Zeitpunkt, die ISS zu rufen?

- Schritt 1: Aktuelle Überflugsdaten ermitteln
- Schritt 2: Wann hat der Astronaut freizeit?
 - An Board gilt UTC Zeit
 - Es gibt Pause am Mittag und am Abend
 - Wenn die ISS am Abend über die Schweiz fliegt, besteht die grösste Chance

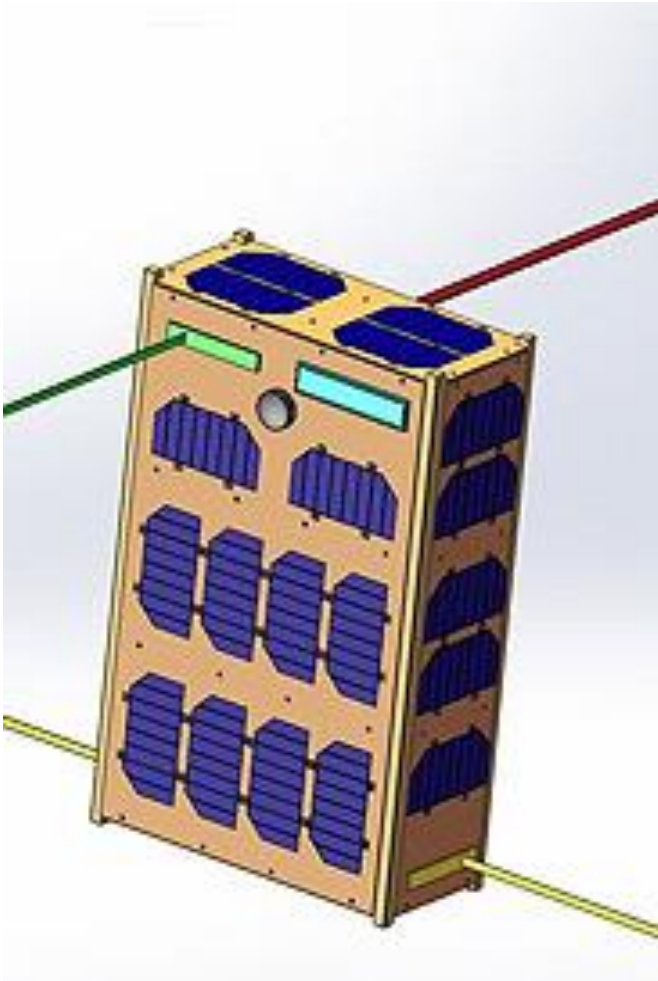


Satelliten Praxistipps für...



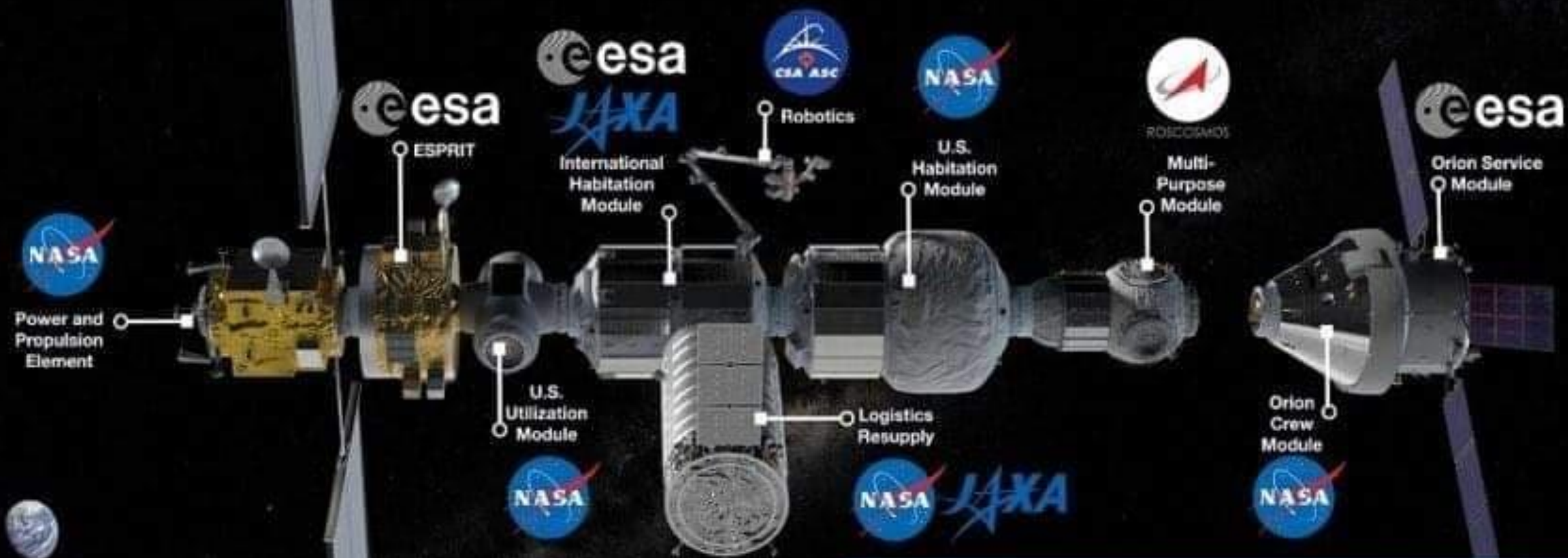
...alle, die sich auch in Zukunft davon begeistern wollen

CAS-5,6 und Start im Okt/Nov 2019



- 15m/10m Transponder
- 15m/70cm Transponder
- 2m/70cm Transponder

GATEWAY CONFIGURATION CONCEPT



EXPLORE
MOON & MARS

A DEEP SPACE HUB FOR SCIENCE AND EXPLORATION COLLABORATION



Command Module for
Lunar Surface Assets



Internal and
External Payloads



Internal and External
Robotics



Mixed Fleet
Deliveries



Human Lunar
Surface Systems



International
Crew



www.amsat-hb.org

www.amsat-dl.org

www.amsat.org