

ATV-1 – AVUM - ERS-2

Silvia Sanvido
Space Debris Office, ESOC/ESA

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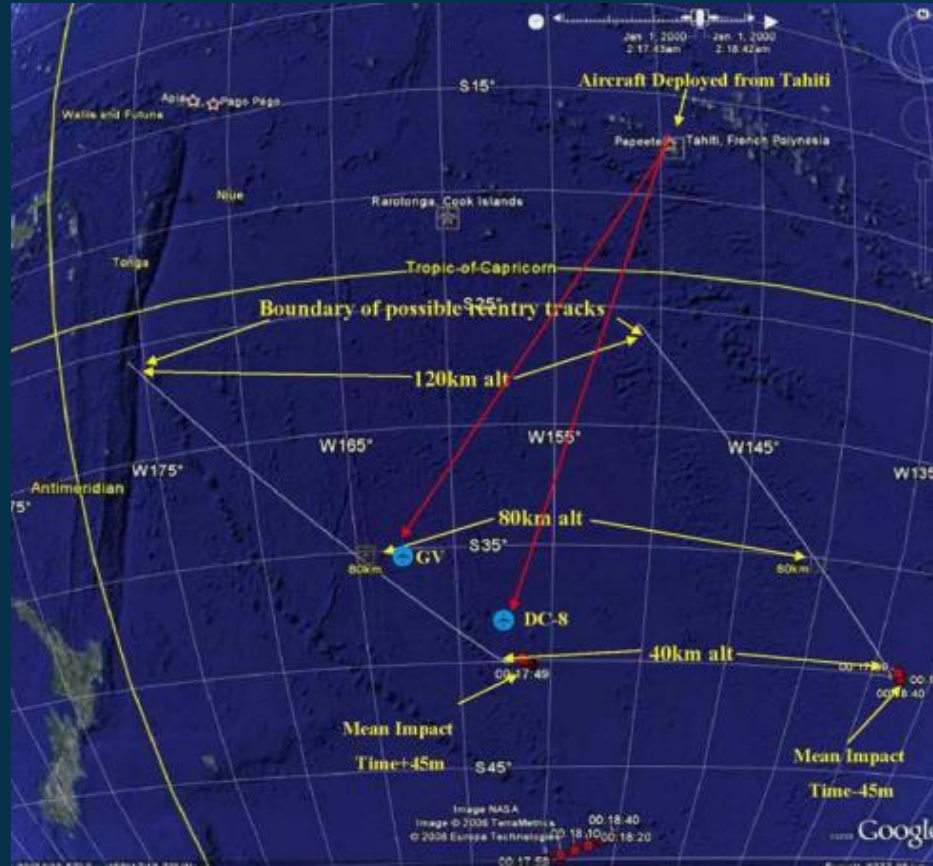
ATV-1 Jules Verne



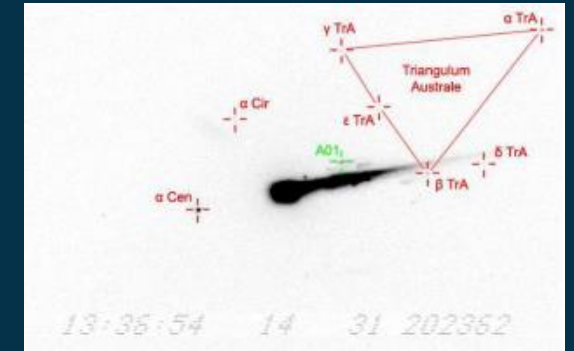
ATV-1 Jules Verne approaching ISS in 2008 (credits: NASA).



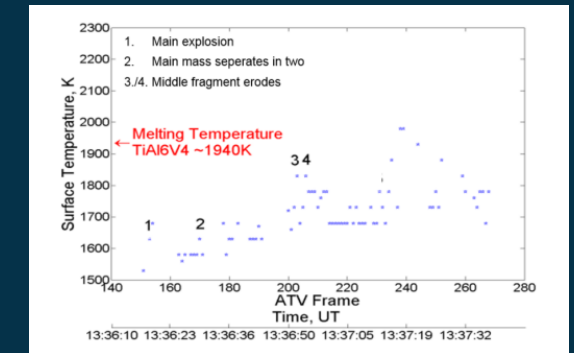
ATV-1 *Jules Verne* on reentry taken from the DC-8 aircraft which observed the reentry over the Pacific Ocean (credits: ESA).



ATV-1 re-entry zone and observation aircraft Deployment [1].



ATV-1 Fragment from GV (HFRS experiment, low-light level pointing camera, WATEC H2 Ultimate, 720x480, 30 frames/sec)[1].



Apparent temperatures during ATV-1 re-entry [2].

[1] T. Lips, S. Lohle, T. Marynowsky, D. Rees, H.C. Stenbeak-Nielsen, M.L. Beks, and J. Hatton, Assessment Of The Atv-1 Re-entry Observation Campaign For Future Re-entry Missions, 4TH IAASS Conference, Huntsville, Alabama, USA 19–21 May 2010
 [2] S. Loehle, F. Zander, S. Lemmens, H. Krag, Airborne Observations of Re-entering Space Debris - Results And Prospects, p7th European Conference on Space Debris, 8–21 April at ESOC in Darmstadt, Germany

L-0: Photometric data: B/W and colour images or movies

L-0: Spectral data with location information

L-1: Fragments trajectory reconstruction

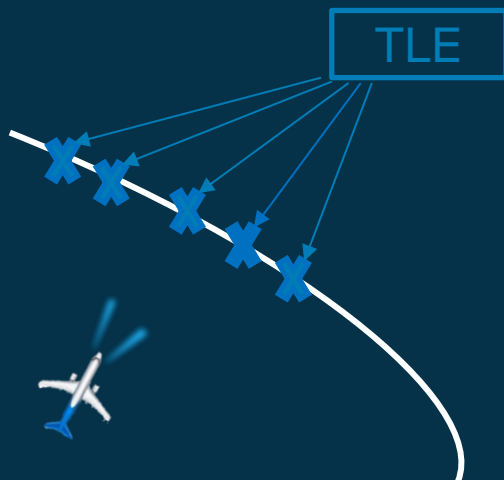
L-1: Fragmentation classification

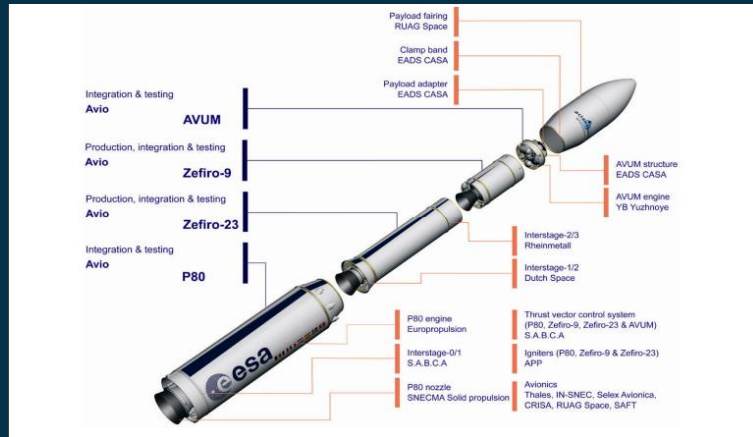
L-2: Main explosive and fragmentation events determination, fragments characterisation

L-2: Time tagging and fragments location

Metadata: GPS location measurements, accurate timing

ATV-1 Data subject to restrictions. What would be a relevant subset?





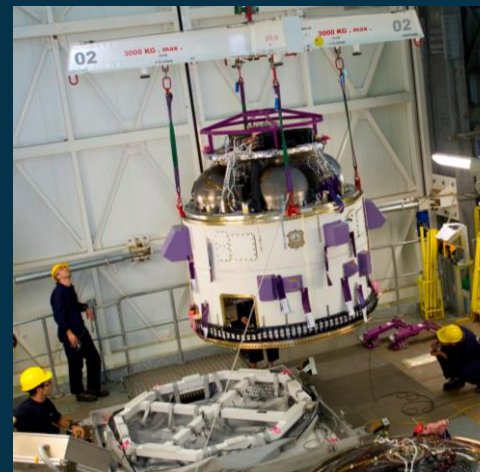
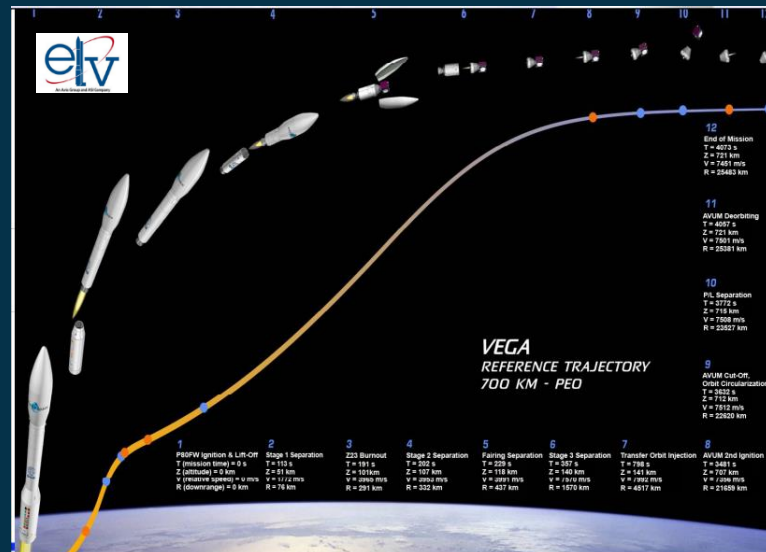
ESA VEGA Launcher.



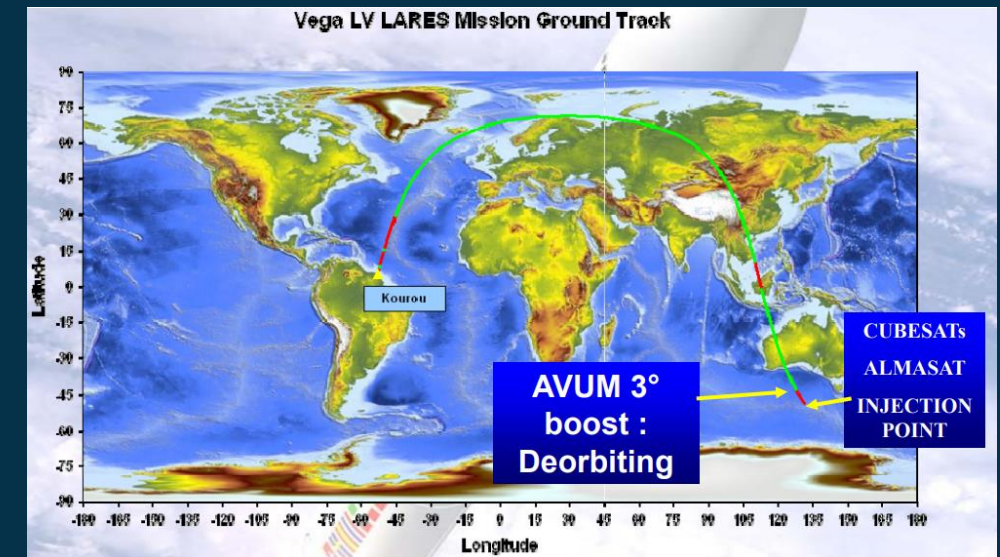
AVUM PLA.



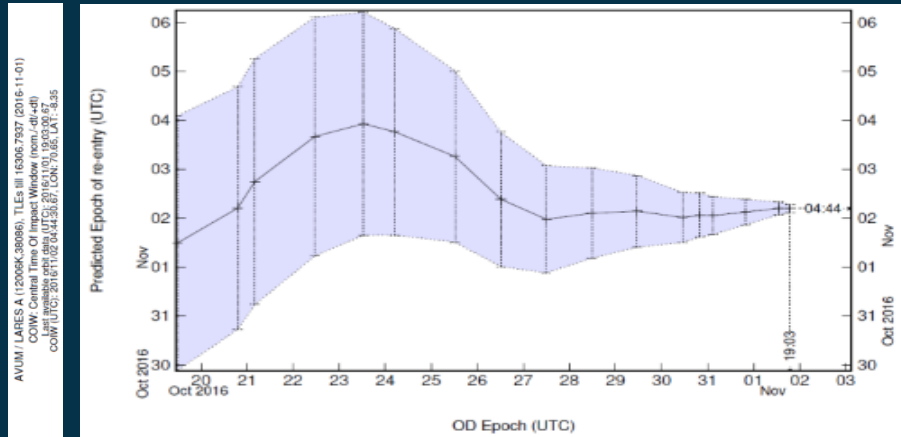
AVUM with LARES-A&H/SS platform. ALMASat and the Cubesats dispensers are also visible.



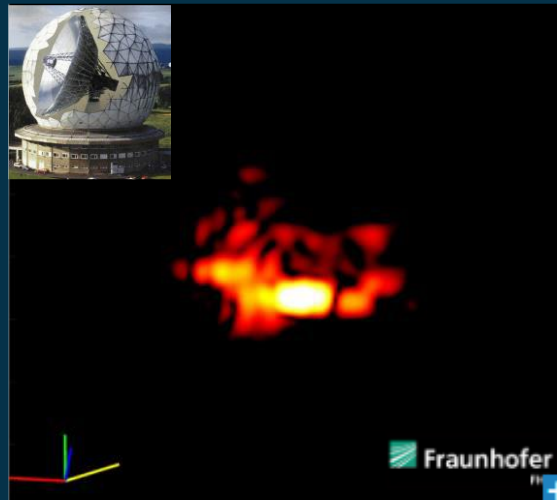
AVUM.



AVUM Re-entry (Uncontrolled re-entry)



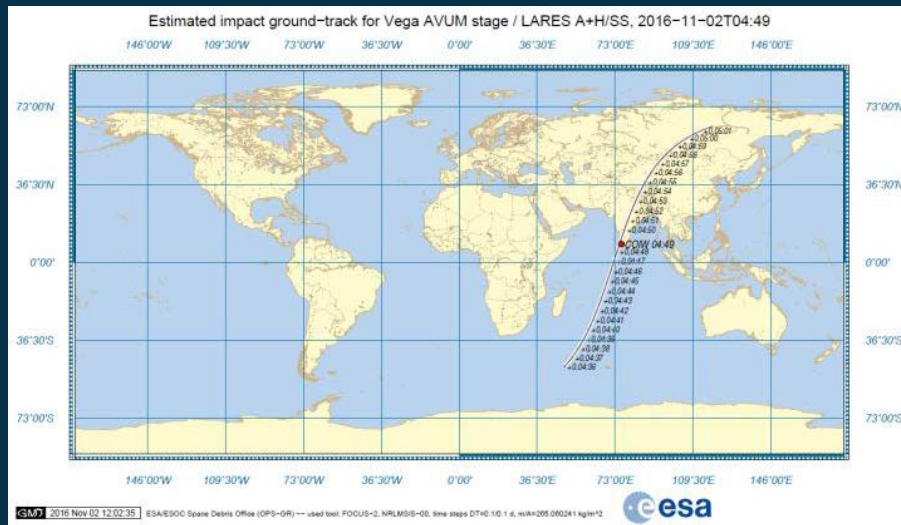
Re-entry epoch predictions for the AVUM re-entry campaign.



TIRA image of the AVUM on the 20th of October.



Titanium tank: before (left) and after re-entry (right).



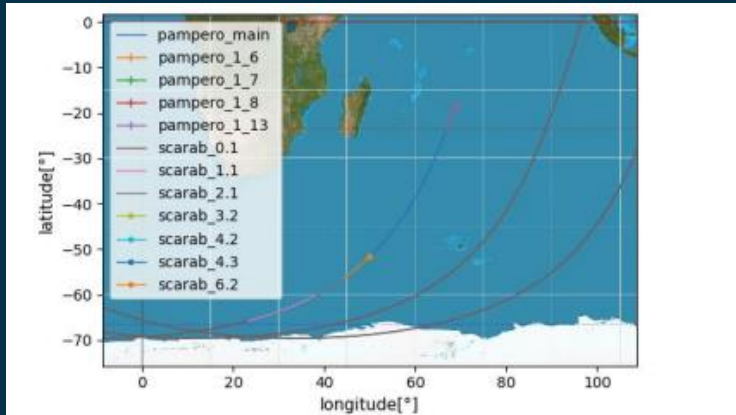
Estimated impact ground track for AVUM fragments.



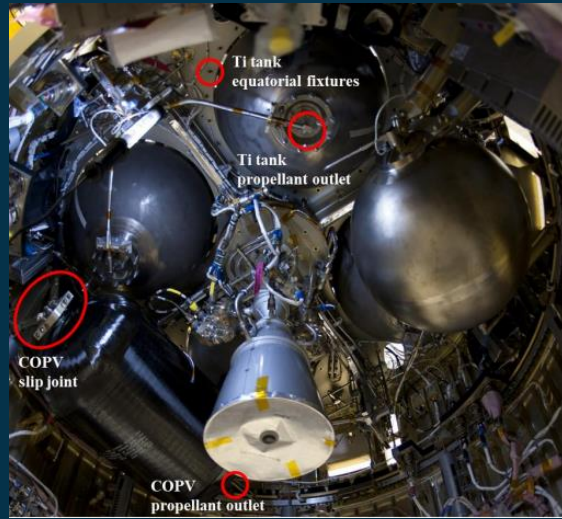
Fragments found on ground.



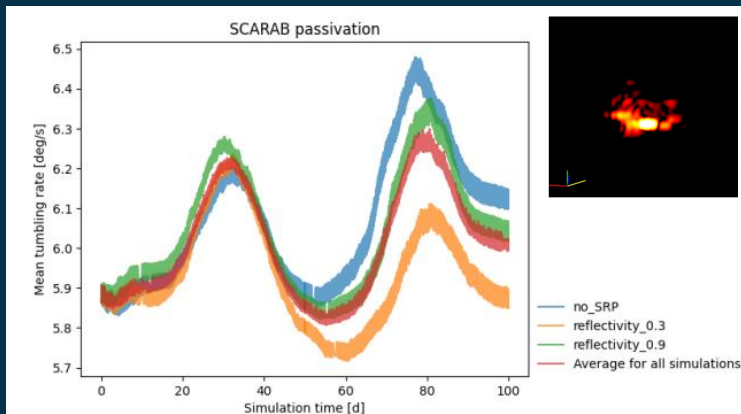
COPV tank found on ground.



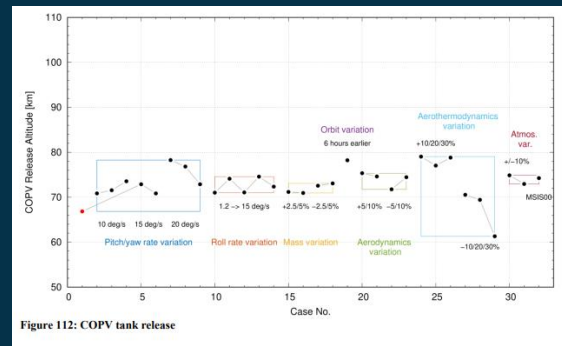
Re-entry conditions analysis for the AVUM re-entry



Structural critical points analysis



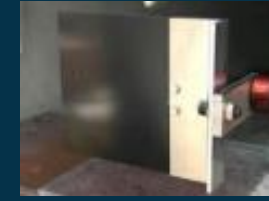
Re-entry attitude analysis for the AVUM re-entry



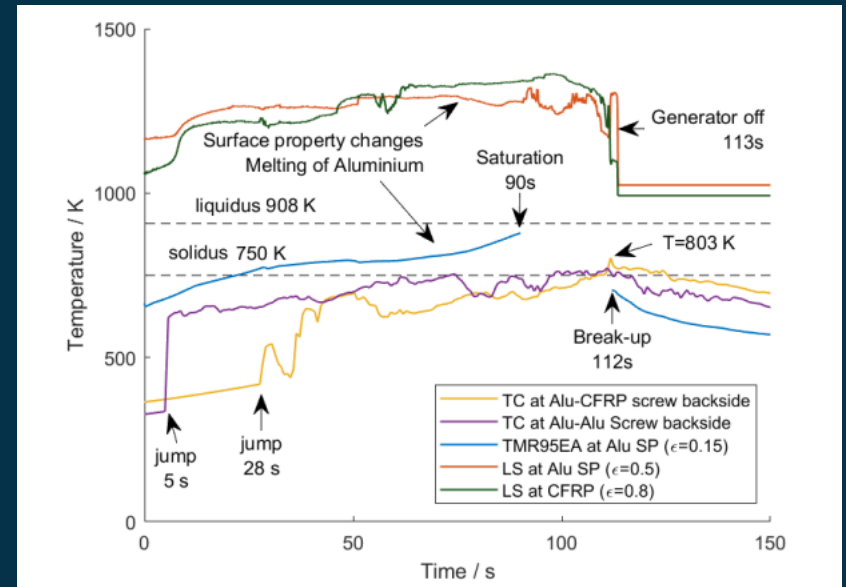
Analysis of fragments release conditions



AVUM -PLA



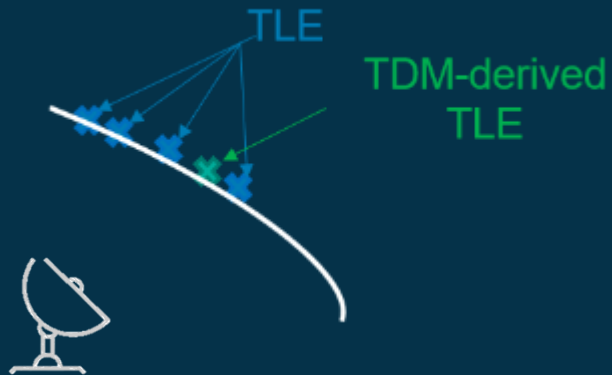
PLA sample setup for the PWT test case in PWK4 test facility



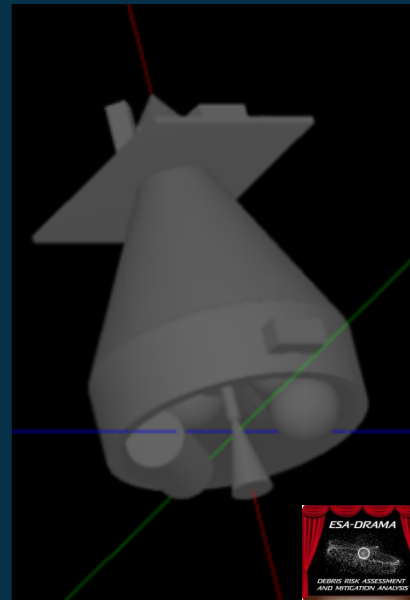
Analysis of demise conditions for the AVUM-PLA

[1] Dumon, J., Constant, E., Spel, M., Lips, T., Kanzler, R., Pagan, A., Buntz, M., Herdrich, G., Santana, C., Sanvido, S., Lemmens, S. and Annaloro, J., "Rebuild and data exploitation of the AVUM re-entry event for break-up model development", 2nd International Conference on Flight Vehicles, Aerothermodynamics and Re-entry Missions & Engineering (FAR), Heilbronn, Germany, 2022.

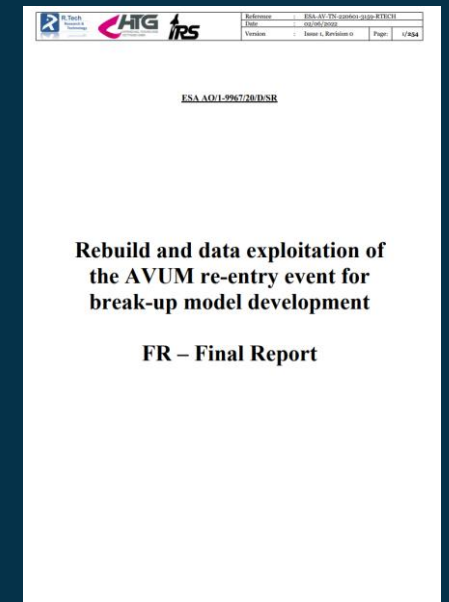
Tracking data and
ESA re-entry
predictions (two
atmospheric models)



DRAMA Model



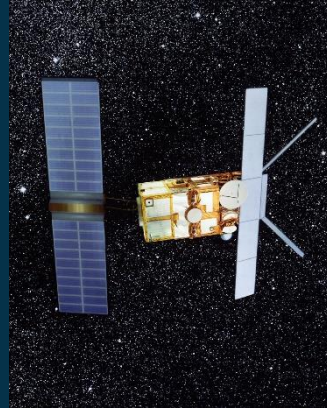
AVUM Rebuilt Final
Report
(sensitivity analyses for re-entry
trajectory, critical structural points
analysis, CDs estimation, attitude
analysis, etc)



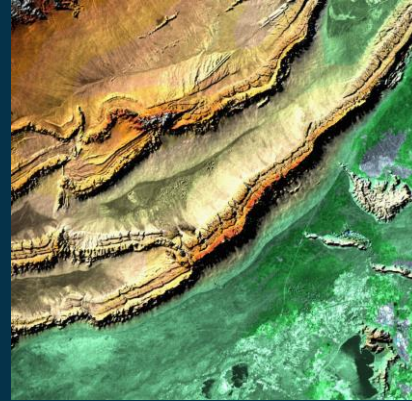
ERS-2 Mission



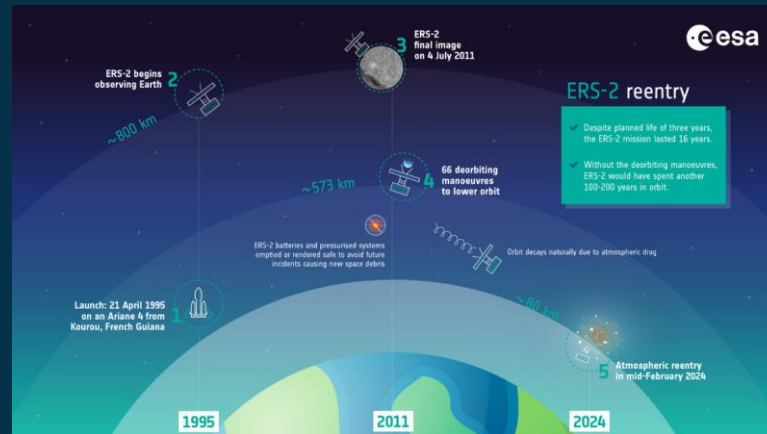
The ERS-2 satellite in the cleanroom - credit: ESA.



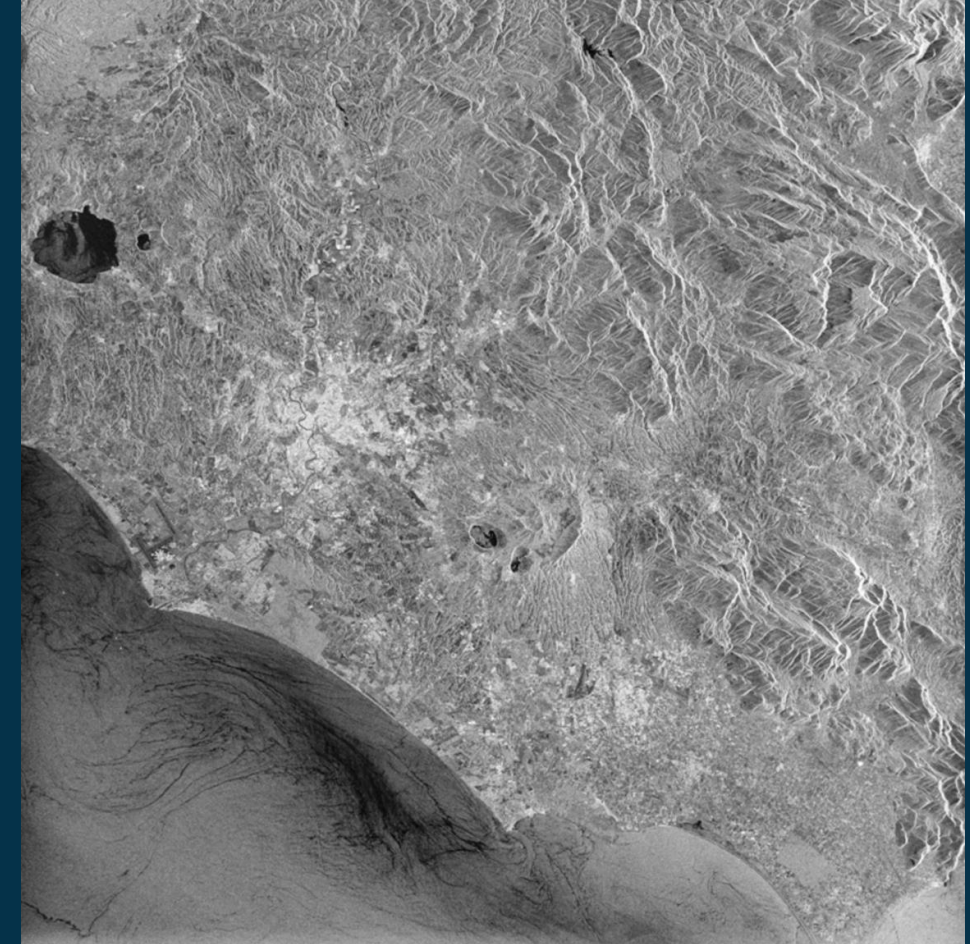
The ERS-2 satellite - credit: ESA.



Elevations of Bachu in western China credit: ESA.



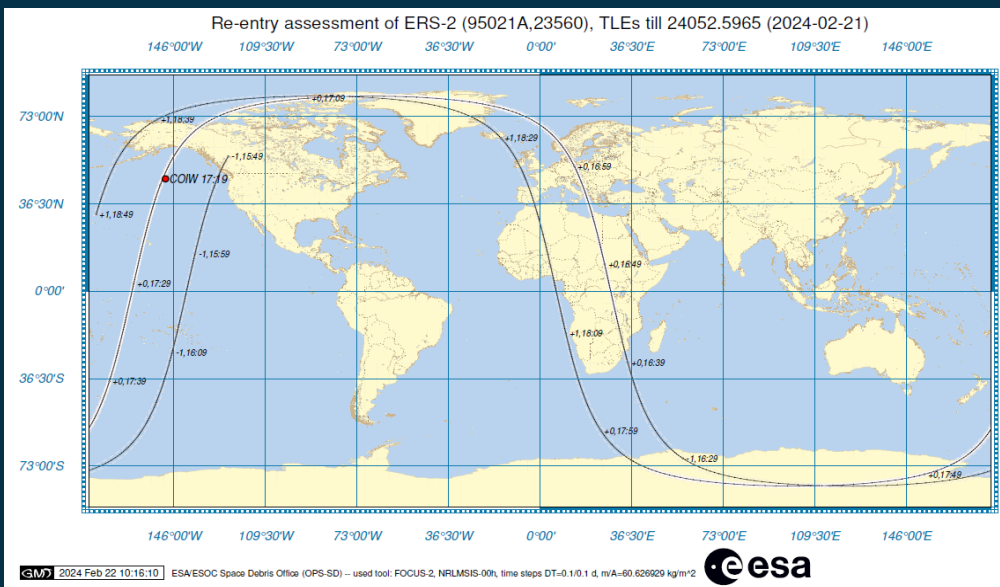
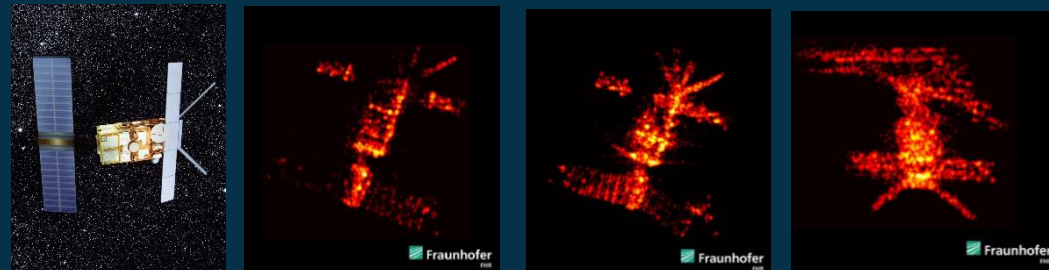
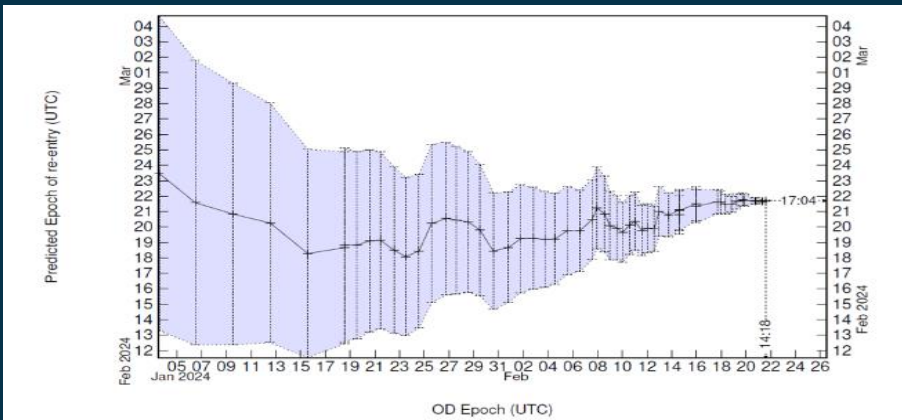
The ERS-2 mission- credit: ESA.



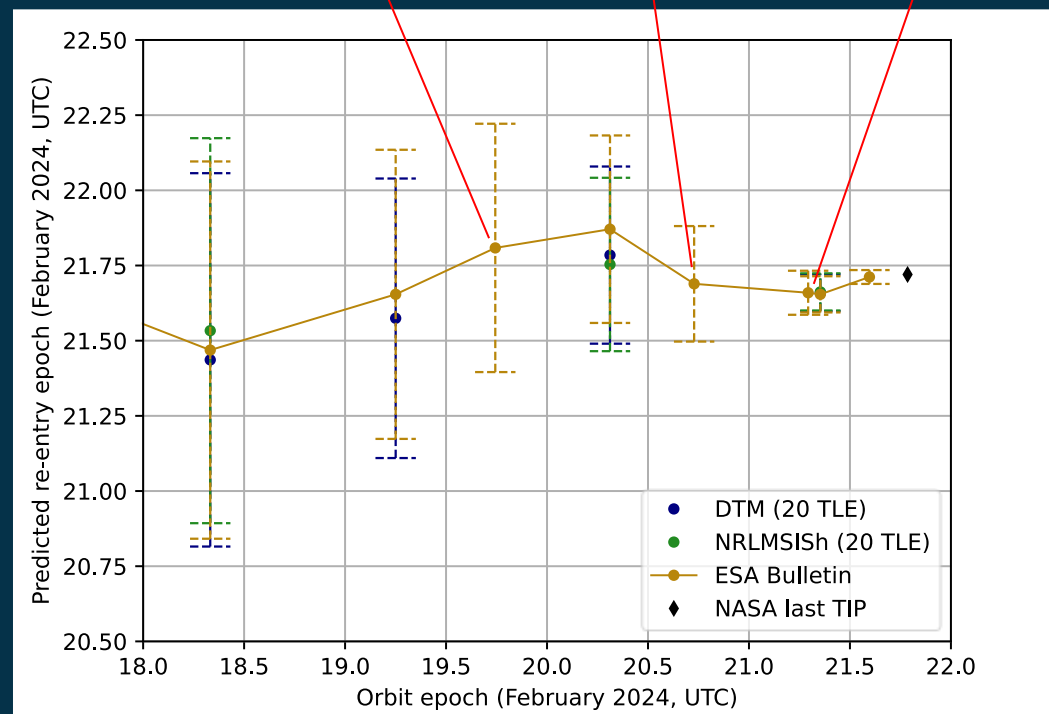
Final ERS-2 image showing Rome, Italy (4 July 2011) - credit: ESA.

ERS-2 Re-entry Campaign (Uncontrolled re-entry)

ERS-2 (95021A,23560), TLEs till 24052.5965 (2024-02-21)
COIW: Central Time Of Impact Window (nom./-dt/+dt)
Last available orbit data (UTC): 2024-02-21 14:18:59.69
COIW (UTC): 2024-02-21 17:04:59.69; LON: -1.10; LAT: 70.47

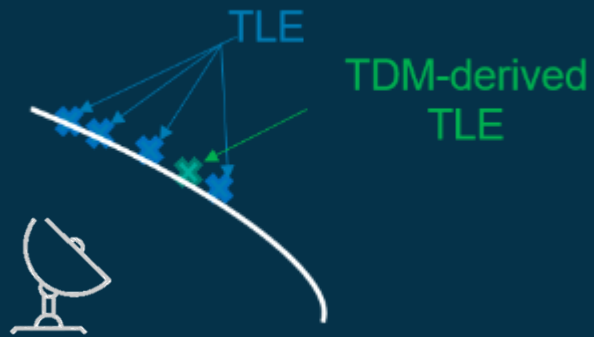


Last re-entry prediction for the ERS-2 satellite.



ERS-2 re-entry prediction trend (NASA last TIP: 2024-02-21T17:17:00±1)

Tracking data and
ESA re-entry
predictions



DRAMA Model

