

The return of space objects: legal annotations and practical experience

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A rescue or a return agreement?

- Reference to Outer Space Treaty “which calls for the
 - rendering of assistance to astronauts (Art. V OST)
 - prompt and safe return of astronauts (Art. V OST)
 - return of objects launched into outer space” (Art. VIII OST)
- “prompted by sentiments of humanity”
- Five ‘material’ articles: only one deals with ‘objects’

Relevant terms

- **Launching authority** “shall refer to the State responsible for launching”
 - “territorial limits of the Launching Authority”
- **Space object** or its **component parts**
- Objects launched into outer space or its component parts

Art.5 ARRA: obligations of the “finder”

- Para.1 – **notification** obligation:
 - Launching Authority and UN Secretary-General
- ***Upon request*** of the Launching Authority:
- Para.2 – “take such steps as it finds practicable to **recover** the object”
 - with assistance of L.A.!
- Para.3 – **return** object or **hold** object at disposal

Art.5 ARRA: obligations of the “sender”

- Para.3 – **furnish identifying data** prior to return
- Para.4 – immediately take effective steps to **eliminate possible danger** or harm
 - under **direction & control** of finder
- Para.5 – **bear expenses** incurred in fulfilling recovery and return obligations

Intergovernmental Organizations

- Art.6 ARRA – ‘Launching Authority’ may also refer to an IGO provided that:
 - IGO declares acceptance of rights and obligations (-> unilateral act, IGO does not become ‘contracting party’)
 - majority of IGO Member States are parties to ARRA and OST
- ESA declared acceptance of ARRA in 1975 (1st IGO)

ESA's practical experience with the ARRA

- First flight of European VEGA launcher (VV01), 13Feb2012 from CSG, French Guiana
- VEGA AVUM upper stage shut-down in orbit of 400x1400km at 69.4deg inclination
- uncontrolled re-entry within 25 years orbital lifetime in line with international standards



VV01 AVUM tank return

- Uncontrolled VEGA AVUM (COSPAR ID 2012-006K) atmospheric re-entry 02Nov2016
- Objects retrieved in the Tamil Nadu province of the Republic of India in November 2016
- **COPV** (composite overwrapped pressure vessel) **gas tank** with Titanium shell
 - one of the stage's components expected to survive re-entry



Identification of object (c.f. Art.5.3 ARRA)

- **Information exchange** inter alia through international cooperation under the Inter-Agency Space Debris Coordination Committee (IADC)
- **Technical analysis** (orbital decay, atmospheric re-entry incl. re-entry corridor, break-up properties etc.)

Hazard analysis (c.f. Art.5 para.4 ARRA)

- no specific hazardous materials listed by supplier
- no specific hazards present on the tank before propellant/oxidizer loading
- ESA's re-entry break-up assessment revealed that no fluids were to be expected in retrieved tank fragments
- **Confirmation of non-toxicity of the objects**

Legal appraisal (1): Applicability of ARRA

- The Republic of India is a State Party to the ARRA
- ESA, through Declaration ESRO/AF(75)58 adopted on 25 June 1975, declared acceptance of the ARRA in accordance with Art.6 ARRA
- It follows that both parties are subjects to the rights and obligations provided for in the ARRA

Legal appraisal (2): Subsumption

- Retrieval within territory of the Republic of India
- Tanks constitute component parts of the AVUM upper stage of the VEGA launch vehicle
- VEGA launch effectuated under the ESA VEGA small launcher development programme, with ESA as the responsible Launching Authority

Legal appraisal (3): Ownership

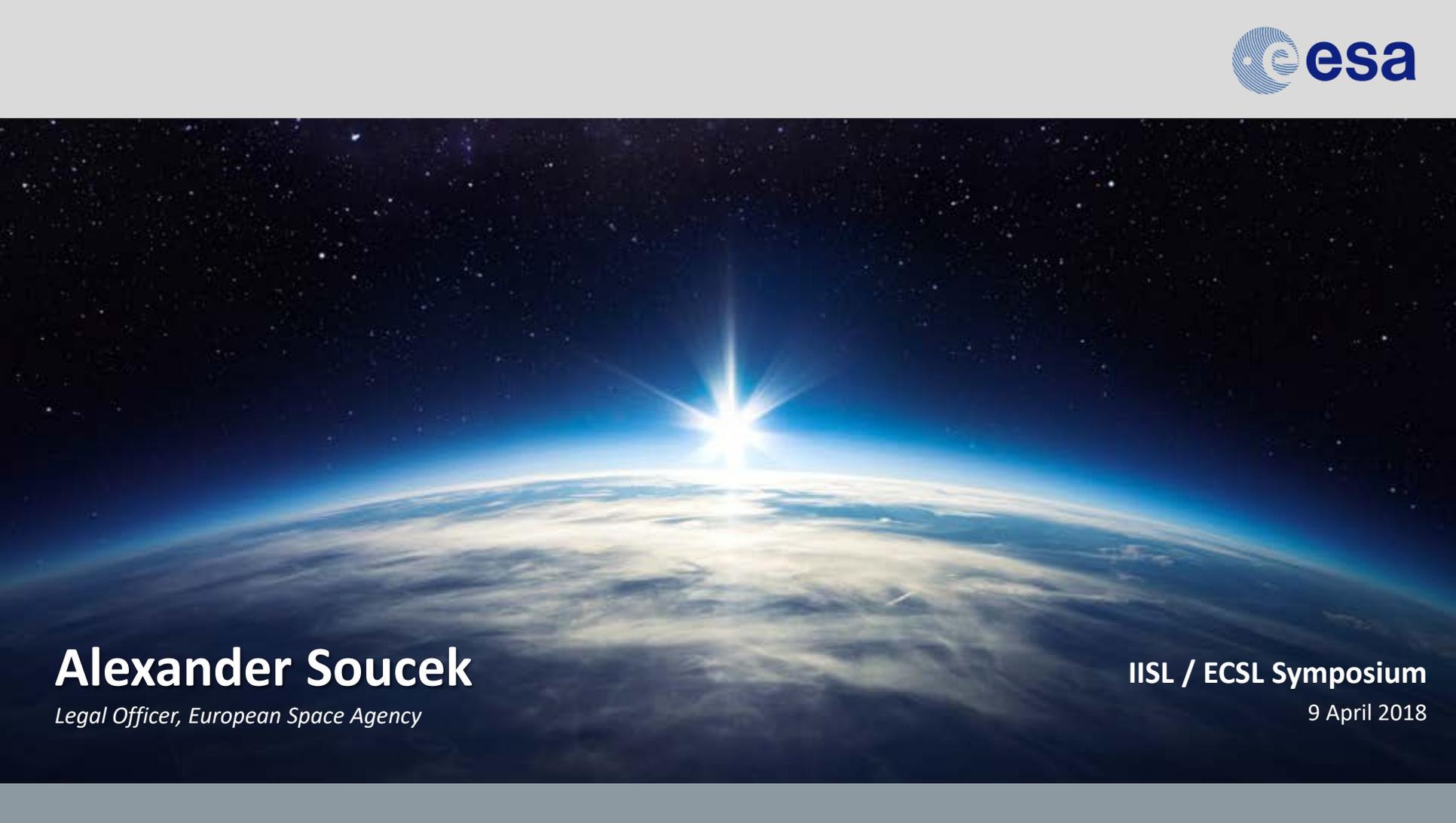
- “The Agency, acting on behalf of the participating States, shall be the owner of the satellites, space systems and other items produced under its programmes”
 - (Annex III, Art. IV ESA Convention)
- reiterated under Art.9 Implementing Rules of the ESA Small Launcher Development Programme
- **ESA is owner** of the VEGA VV01 launch vehicle including its component parts

Successful return to ESA

- **Exchange of notes** between ESA and ISRO with reference to the ARRA and the ESA-ISRO ‘Cooperative Agreement’
- **Excellent cooperation** with Indian authorities throughout the recovery, identification, storage and return
- *What is the interest in returning a burned tank fragment?*
 - **atmospheric break-up analysis** (aerodynamic / -thermal effects)

Concluding remarks

- Return of the ESA AVUM tank: a practical case of applying the ARRA
- International law as embodiment and enabler of international cooperation in space activities
 - provides a **normative frame** and **procedural aspects**
- ARRA: 50 years old ... yet modern

A wide-angle photograph of Earth from space, showing the curvature of the planet, the blue atmosphere, and white clouds. A bright sun is visible on the horizon, creating a lens flare effect. The background is a dark field of stars.

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