

International Law Perspectives on Small Satellites Activities

10th UN Workshop on Space Law

United Nations Office for Outer Space Affairs

Irmgard Marboe

University of Vienna

National Point of Contact Space Law Austria

Vienna, 5 September 2016

- **Background**
- **Are small satellites a threat to the long-term sustainability of outer space activities?**
- **Current developments and ways forward**

Definition of „Small Satellite“?

Minisatellite < 1000 kg,
Microsatellite < 100 kg,
Nanosatellite < 10 kg
Picosatellite < 1 kg



International Academy of Astronautics (IAA) Study Group on
'Cost-Effective Earth Observation Missions' 2006

Background

“Cube Satellite”

10 x 10 x 10 cm
< 1 kg



CubeSat Design Specification, California Polytechnic State University
<<http://www.cubesat.org/index.php/documents/developers>>

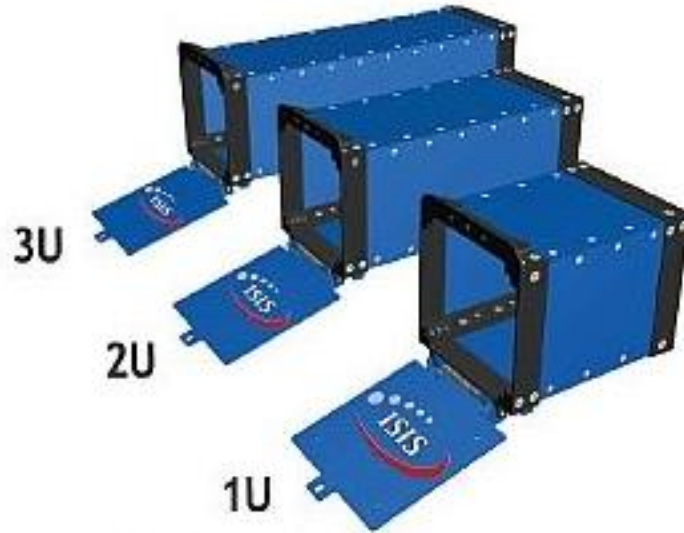
Background

CubeSat “standard”

1 U = 10 x 10 x 10 cm

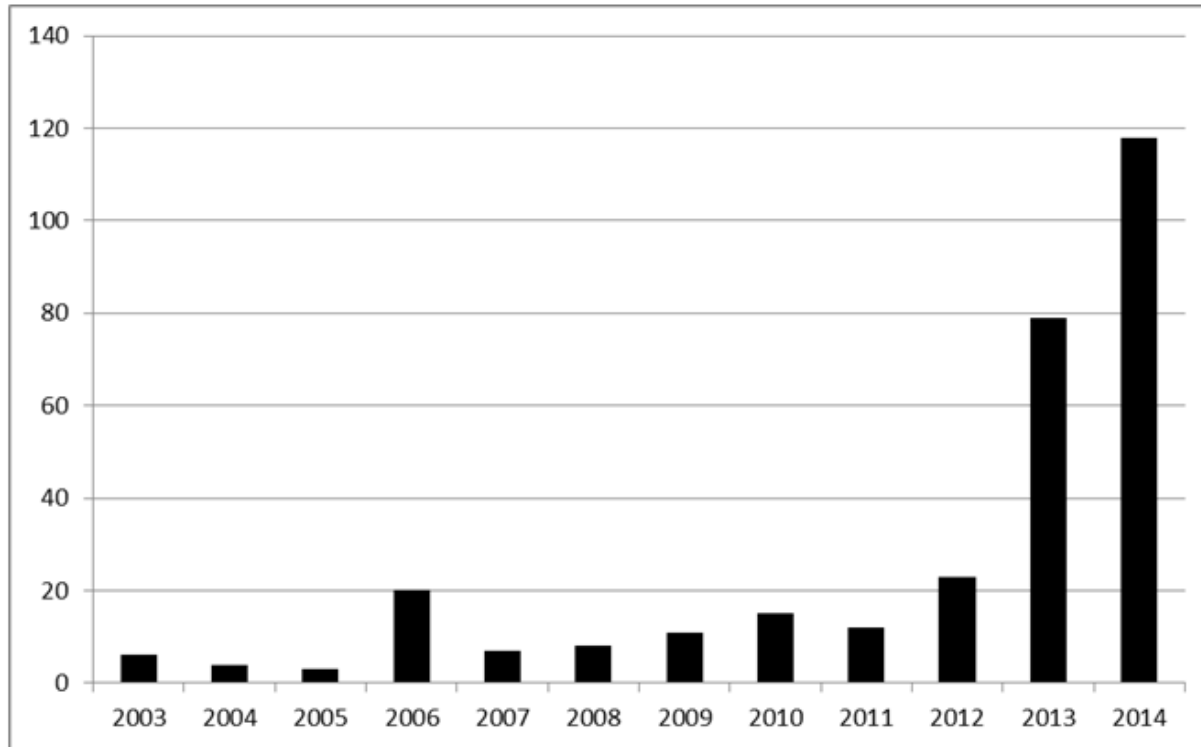
2 U = 10 x 10 x 20 cm

3 U = 10 x 10 x 30 cm



<https://directory.eoportal.org/web/eoportal/satellite-missions/c-missions/cubesat-concept>

Background



**Number of small
satellites launched**

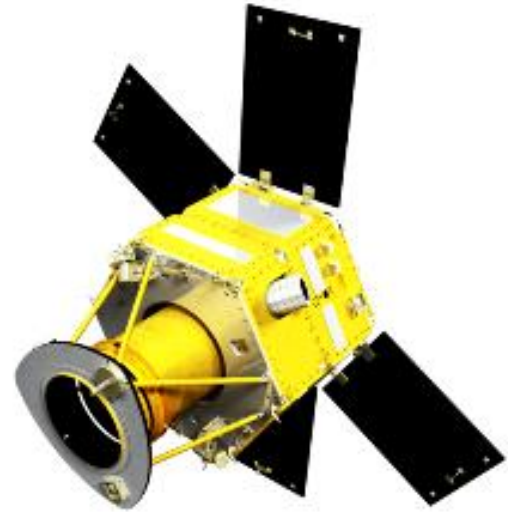
2003-2014

<http://sites.google.com/a/slu.edu/swartwout/home/cubesat-database>
Graph: Otto Koudelka

Background

Applications

- Earth Observation
- Observation of Weather and Atmosphere
- Astronomy
- Telecommunication
- Experiments for Mission Technology
- Biology, Astrobiology, Pharmacy
- Exploration of Celestial Bodies, including for Mining Activities



SpaceEye-1
<<http://www.satreci.com>>

Background

Earth Observation

- Skybox Imaging
- 24 Satellites until 2017
- Approx. 100 kg
- Start-up in California, Mountain View
- 2014 bought by Google
- Price 500 Mio USD



Skybox Imaging in Mountain View, USA

Are small satellites a threat to the long-term sustainability of outer space activities?

Issues

- Small satellites are often not manoeuvrable.
- Their failure rate is rather high (~ 50 per cent).
- They are often considered as ‘amateur’ activities
 - Lack of authorization under national space law.
 - Lack of frequency coordination under ITU rules.
- Compliance with space debris mitigation guidelines unclear.

Governance

Who is the launching State?

Important for liability and registration

Who is the responsible State?

Important for authorization and supervision

In particular in international projects?





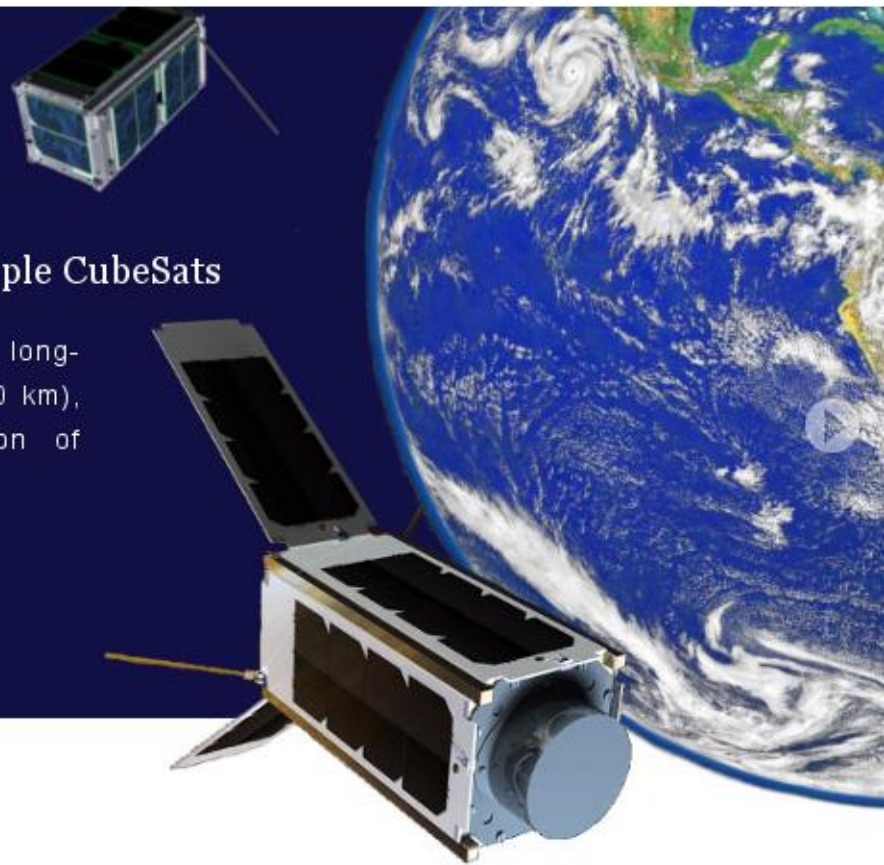
QB50, an FP7 Project



[Contact](#) | [Consortium](#) | [Network](#) | [Newsletters](#) | [News](#)

An International Network of 50 double and triple CubeSats

in a string-of-pearls configuration for multi-point, in-situ, long-duration exploration of the lower thermosphere (90-380 km), for re-entry research and for in-orbit demonstration of technologies and miniaturised sensors.



The Belgian Law on the Activities of Launching, Flight Operation or Guidance of Space Objects 2005

Applicability?

1) Who has 'effective control' over the CubeSats?

Is 'control' over CubeSats which are not manoeuvrable possible at all?

2) Belgian Law only applicable on activities on Belgian territory.

Operators of CubeSats are often situated in different countries.

Reform of the Law in 2014

Version 2005	Version 2014
<p>Art. 3 2° par « opérateur », la personne qui mène ou entreprend de mener les activités visées par la présente loi en assurant, seule ou conjointement, le contrôle effectif de l'objet spatial.</p>	<p>Art. 3 [...] Dans le cas d'un objet spatial qui n'est pas susceptible d'être opéré en vol ou d'être guidé une fois en orbite, l'opérateur est réputé être la personne qui donne l'ordre de mise à poste de l'objet.</p>
<p>3° par « contrôle effectif », la maîtrise des moyens de commande ou de télécommande et des moyens de surveillance associés, nécessaires à l'exécution des activités de lancement, d'opération de vol ou de guidage d'un ou plusieurs objets spatiaux;</p>	<p>3° par « contrôle effectif », l'autorité exercée sur l'activation des moyens de commande ou de télécommande et, le cas échéant, des moyens de surveillance associés, nécessaires à l'exécution des activités de lancement, d'opération de vol ou de guidage d'un ou de plusieurs objets spatiaux;</p>

Reform also in the NL 2015

Decision on ‘Unguided Satellites’ of 19 January 2015

Besluit van 19 januari 2015, houdende uitbreiding van de toepassing van de Wet ruimtevaartactiviteiten op het beheren van ongeleide satellieten (Besluit ongeleide satellieten)

Wij Willem-Alexander, bij de gratie Gods, Koning der Nederlanden, Prins van Oranje-Nassau, enz. enz. enz.

→ Dutch Space Act is also applicable to activities involving unguided satellites.

Current developments and ways forward

cubesats – fly your satellite!



- **Educational Initiative** of the ESA Education Office (FYS 2013-2016)
http://www.esa.int/Education/CubeSats_Fly_Your_Satellite/Fly_Your_Satellite!_programme
- **Frequency Registration Guidelines for SmallSat Missions**
Issued 2 February 2014
- **Space Object Registration Guidelines**
Issued 8 April 2014

Current developments and ways forward

UNOOSA Handout on Small Satellites of 2015



Guidance on Space Object Registration and Frequency Management for Small and Very Small Satellites

(UN Doc. A/AC.105/C.2/2015/CRP.17 of 13 April 2015)

New Agenda Item in the UNCOPUOS Legal Subcommittee

- **“General exchange of views on the application of international law to small satellite activities”**
- Single issue item started in 2016
- Will be continued in 2017

A look into practice: the QB50 Project

QB50 CONSORTIUM

Coordinator



von Karman Institute, Rhode-St.-Genese (VKI), Belgium

The VKI coordinates the activities of the consortium, the CubeSat community, the system engineering activities, the ground segment, procures the main launcher and acts as the interface to the founding source Research Executive Agency. Moreover the VKI develops the technology demonstrator cubesat Qarman.

www.vki.ac.be

A look into practice: the QB50 Project

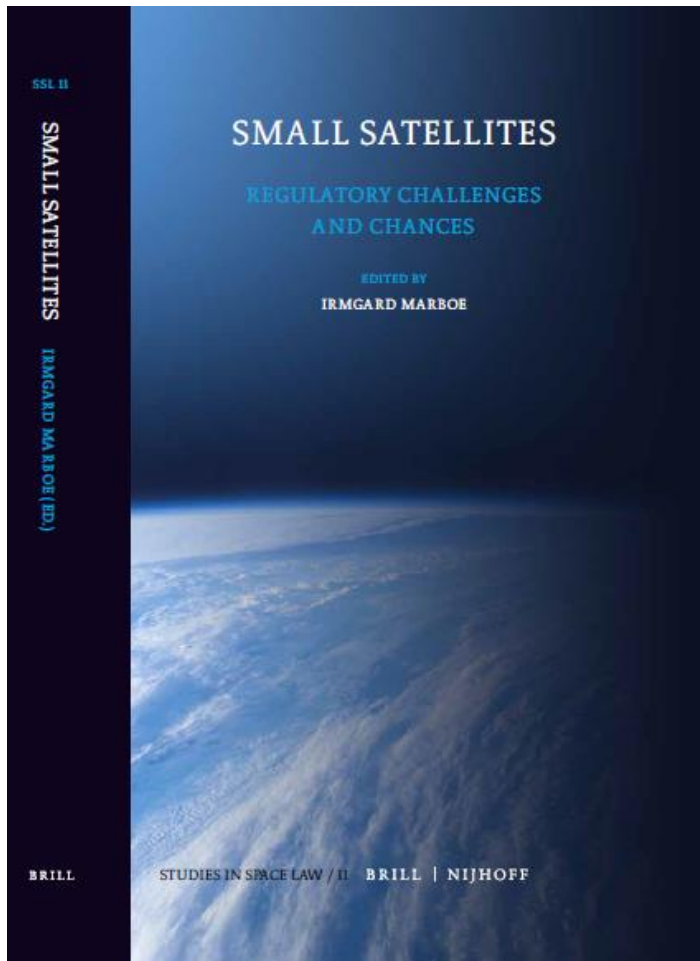
- “Responsible State” of the “Space Activity” (Art. VI OST) in general is Belgium.
 - “Launching State” of the CubeSats are also the home States of the CubeSat (definition under Art. 1 LIAB and Art. 1 REG).
 - Who is the State of Registry?
 - It is only possible to have ONE State of Registry.
- Liability is upon several States, State of Registry is only one.

“Flexible“ approach of Belgium with regards registration

- CubeSats of the QB50 Mission are registered by Belgium “by default”.
- The home State of a participating institution can declare that it will register the satellite .
- Belgium did not actively engage to find an “agreement” in accordance with Art. II para. 2 REG.
- Would it be possible and/or desirable to have a “one-stop-shop” for authorization/supervision and registration?

Are small satellites a threat to the long-term sustainability of outer space activities?

- The technical deficits of small satellites are not an unsurmountable hurdle for good governance.
- Small satellites are ‘space objects’ and thus **covered under the existing international legal framework.**
- Small satellites should also fall under the scope of **national space legislation** (which should be existing).
- An appropriate national and international legal framework that deals with authorization, supervision, and registration can ensure ‘good governance’ of small satellite activities.



I thank you
for your attention!