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Space Based ADS-B

Satellite Payloads for World-wide Air Traffic Surveillance

H S Griebel
Thales Alenia Space Germany

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ADS-B at a Glance

Existing Technology

- Ground infrastructure exists to handle ADS-B data
- Majority of all international airliners already fitted*

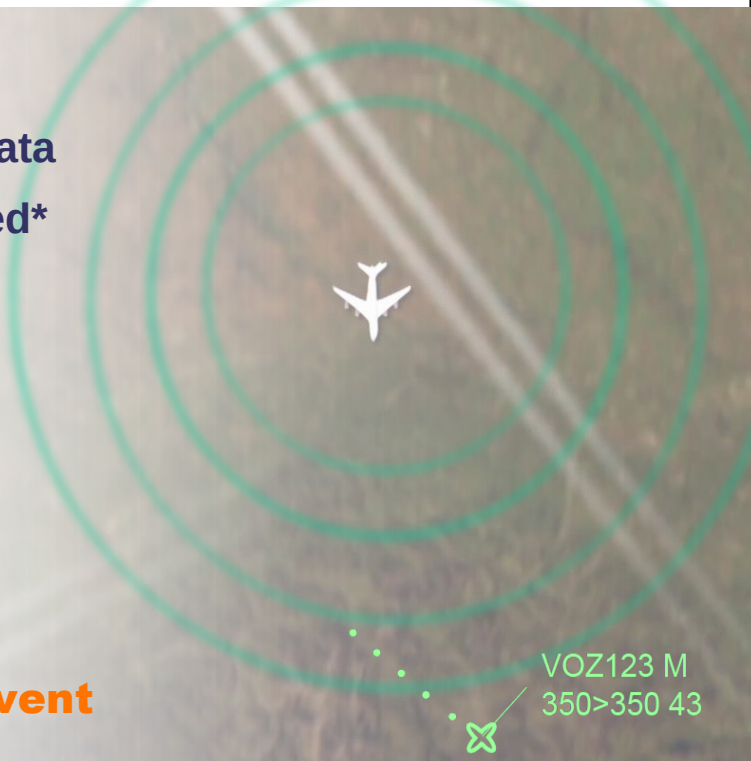
Automatic data broadcast every second

- Identity
- Position
- Velocity
- Altitude

Unexpected disruption indicative of critical event

Becomes mandatory over the next 6 years

- US, Europe, Australia, China



ADS-B is an ***established*** air traffic surveillance standard

*Airservices Australia

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Satellite ADS-B at a Glance

Takes ADS-B-technology to space

- For global radar-like coverage
- With an update interval of 10-15 seconds
- Providing data in near real time

Invented by Thales Alenia Space Deutschland

- patented in most countries
- US, Europe, Russia, Australia

Existing ADS-B transponders are fully compatible with space-based ADS-B

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Satellite ADS-B Key Benefits

- Almost 100% *global coverage*
- Turns non-radar airspace into *radar like* airspace
- Brings surveillance to oceans and *scarcely populated areas*
- More efficient use of airspace to *save fuel and reduce emissions*
- More efficient ATC operations and *improved situational awareness*
- Improves safety and security through *global flight tracking*

World air traffic routes

Additional safety layer and infrastructure expansion
with integration into existing ATM systems

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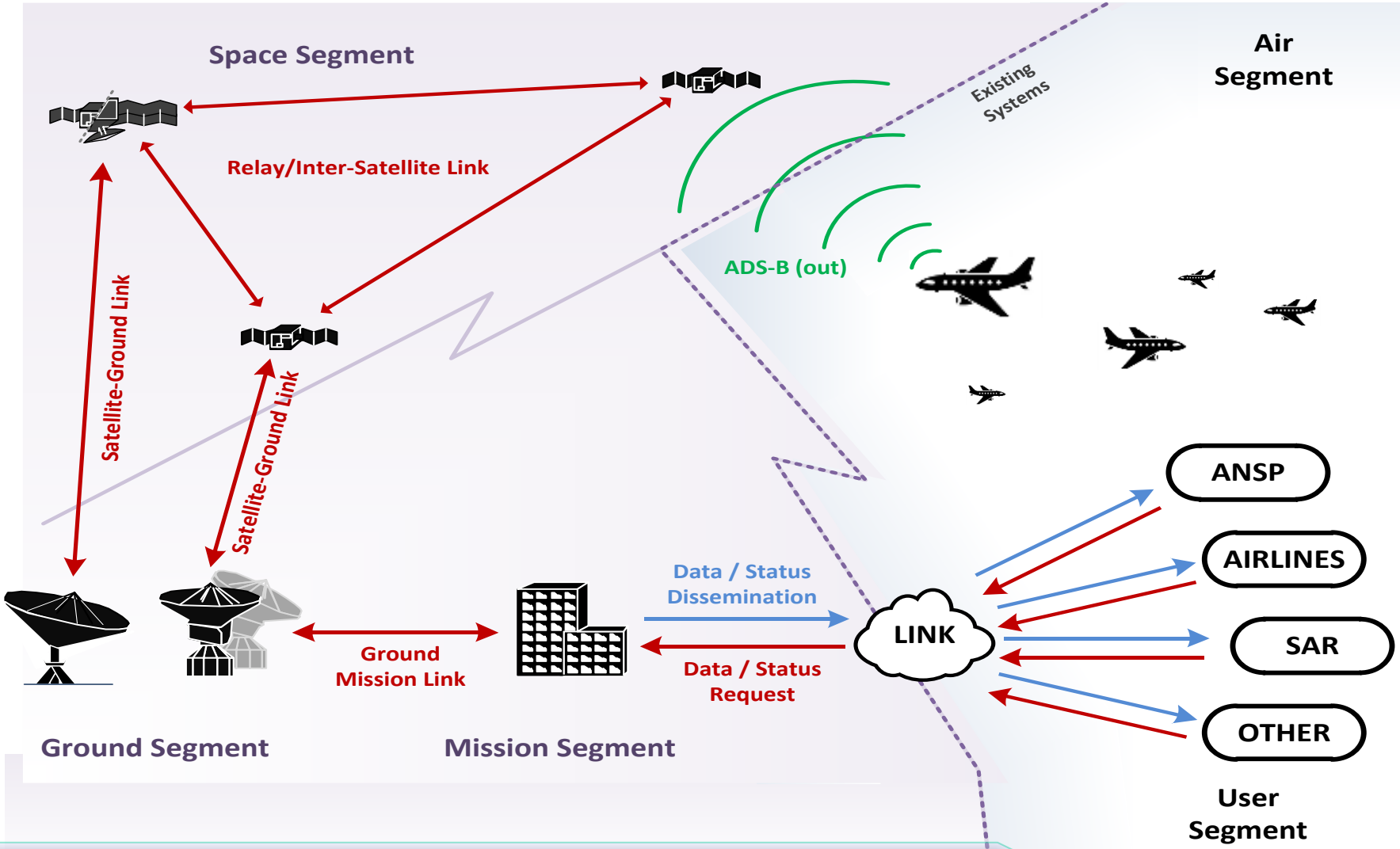
Aircraft traffic

System Architecture



Designed for seamless system integration!

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Thales Satellite ADS-B Key Advantages

Purpose-built Payload for Air Traffic Services

- Integrating surveillance and ATC communication in a single unit

Seamless Integration

- with existing surveillance systems to ensure ease of operation
- with a wide variety of satellite constellations and platforms

Interoperability

- Between TAS-D payloads across constellations to provide a scalable network

Safety Layer

- complementary to other ground- and space based global flight tracking systems

A purpose built constellation payload can ***better address and adapt*** to operational, safety and availability requirements of air navigation services!

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The Thales Advantage

Global Resources

- Thales centres cooperate around the globe, putting Thales in the unique position to have world-leading experts available for each key element of Satellite ADS-B payloads and their implementation!

Thales industry-leading experience

- ATM Systems
- ADS-B ground systems and airborne transponders
- space payloads
- satellite constellations
- data security

Satellite ADS-B is a Thales Alenia Space Invention

- Longest-running satellite ADS-B experience
- World-wide IPRs

Thales & Thales Alenia Space ***can ensure both aviation and space*** operator needs are understood and met ***on every level***!

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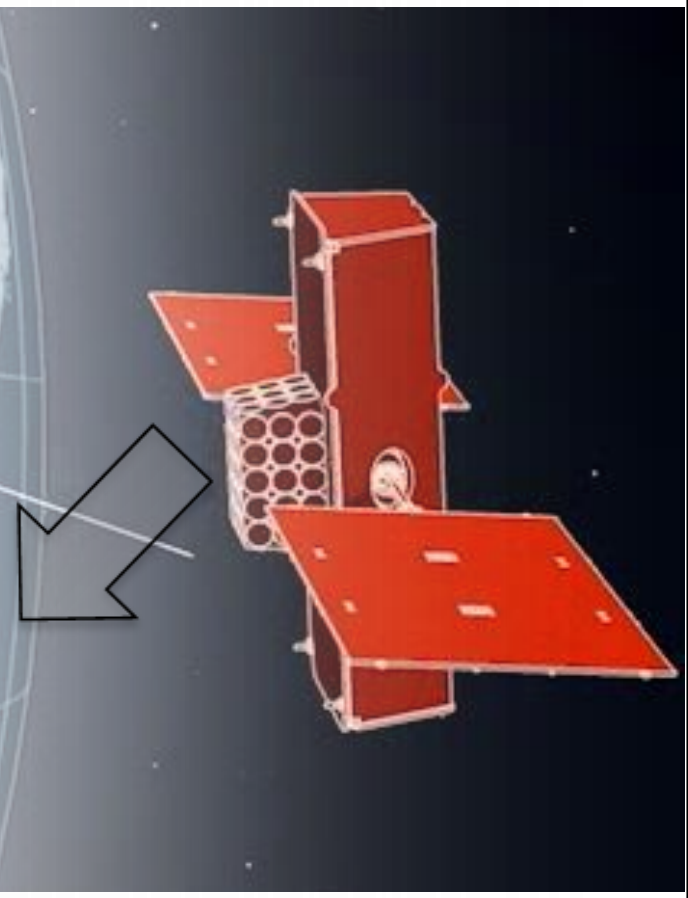
Constellation Payload

Designed for Low Earth Orbit

- Up to 900km orbital altitude

Basic Characteristics

- 24 to 36 electronically adjustable beams
- Generated by 5 to 7 physical panels
- Two parallel, redundant receiver chains
- 24 ADS-B reception channels
- 12 signal processing channels
- Enhanced pre-processing data reduction
- 24 hour raw data storage on spacecraft
- 25kg, 50W



Prototype of constellation payload ***under construction***.

Constellation Payload Development

Led by Thales Alenia Space Deutschland

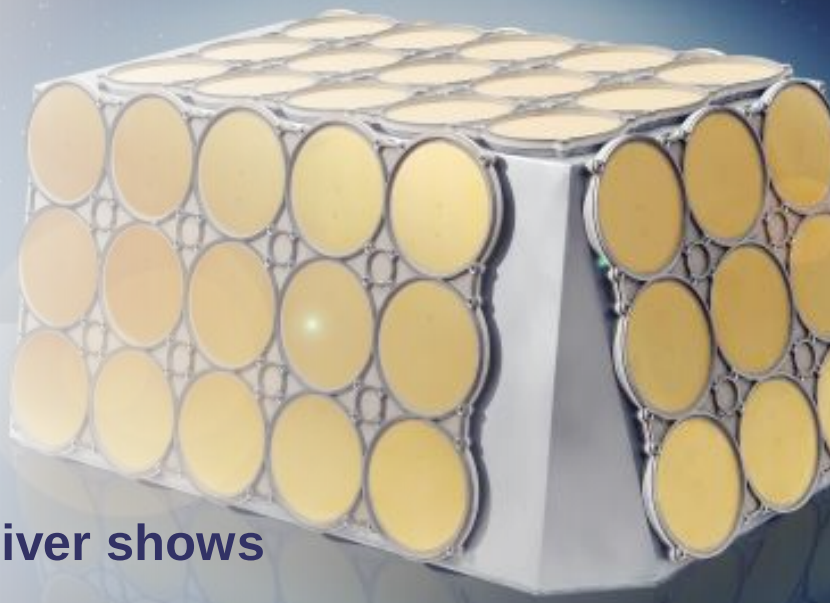
- Combining ATM heritage and space
- Co-funded by the European Space Agency

Research and Testing

- jointly undertaken together with SES Techcom of Luxemburg & German Aerospace Research Centre DLR

Proof of Concept

- Flight test data of simple ADS-B receiver shows better-than expected performance.



Prototype of constellation payload ***under construction***.

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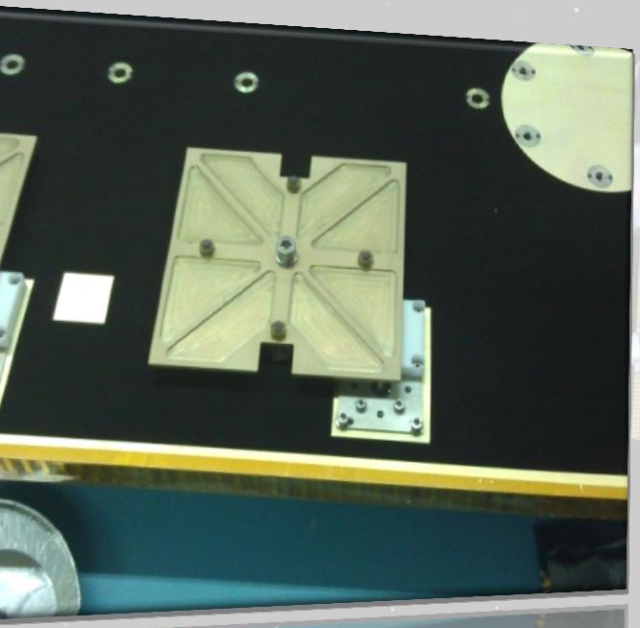
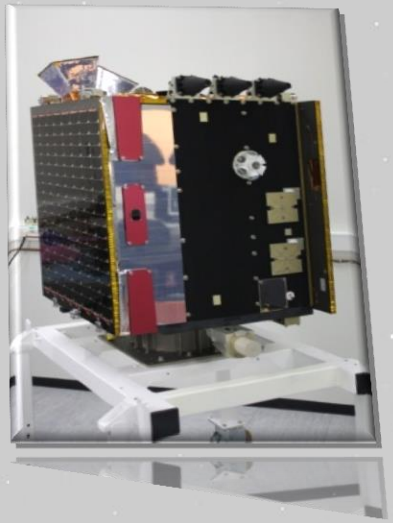
DLR flight test equipment





Experimental DLR payload already flying on ESA's ProbaV satellite

esa European Space Agency

SES Techcom Services

DLR

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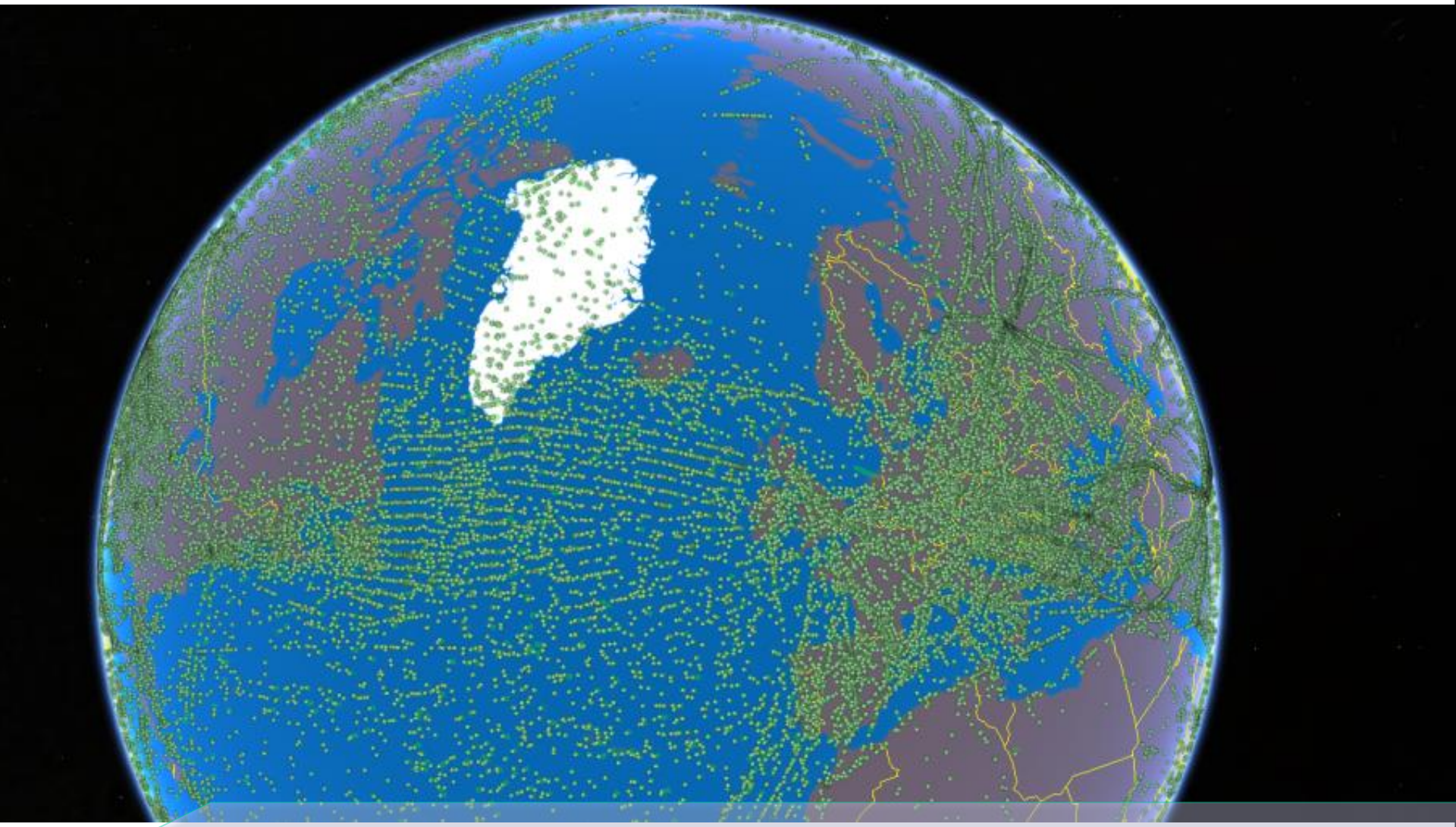
First Satellite ADS-B Data



Satellite ADS-B data gathered by ESA's ProbaV confirms feasibility!

esa European Space Agency

SES Techcom Services

DLR

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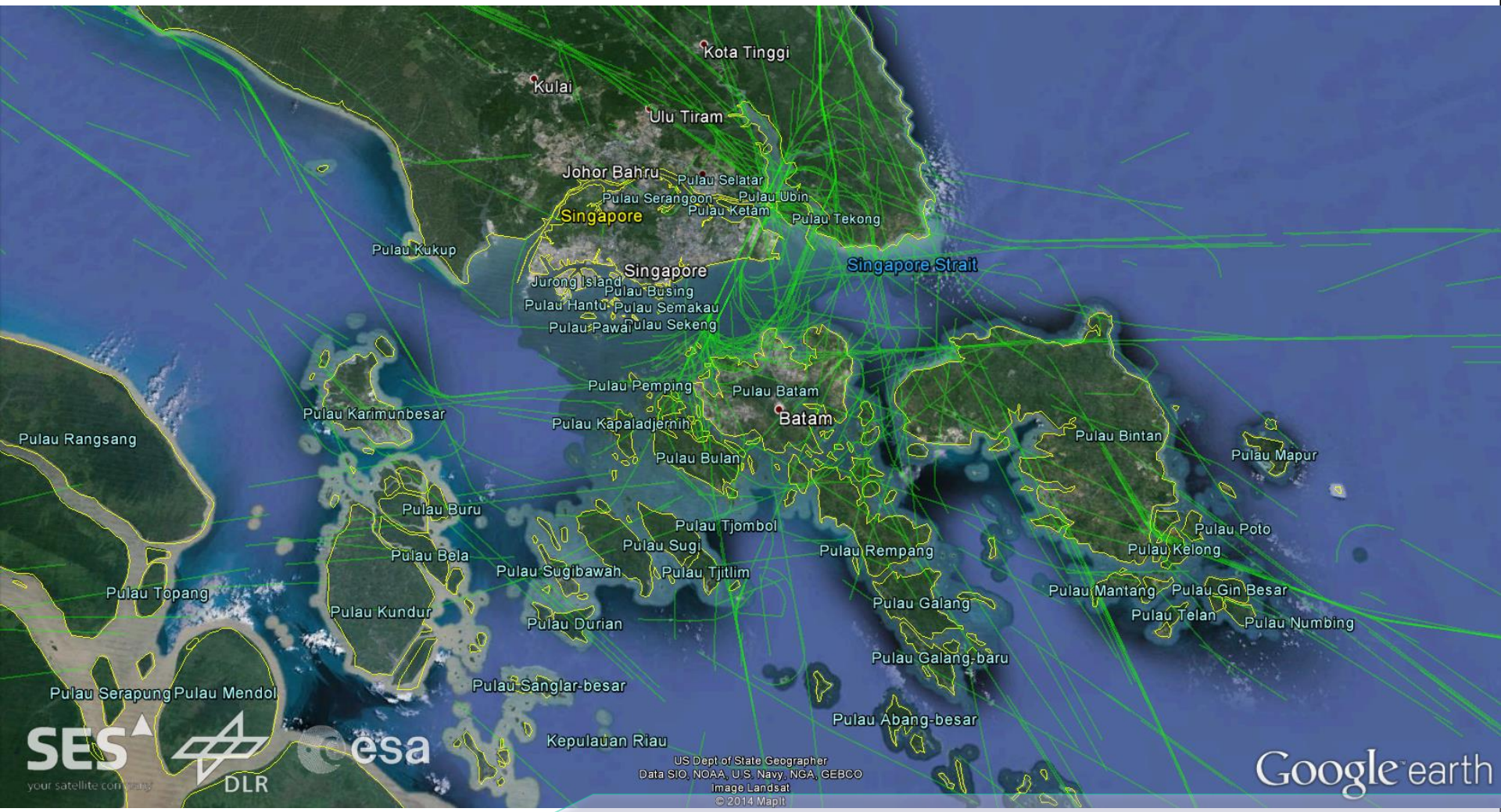
First Satellite ADS-B Data



ADS-B data shows ***approach and runway traffic***!

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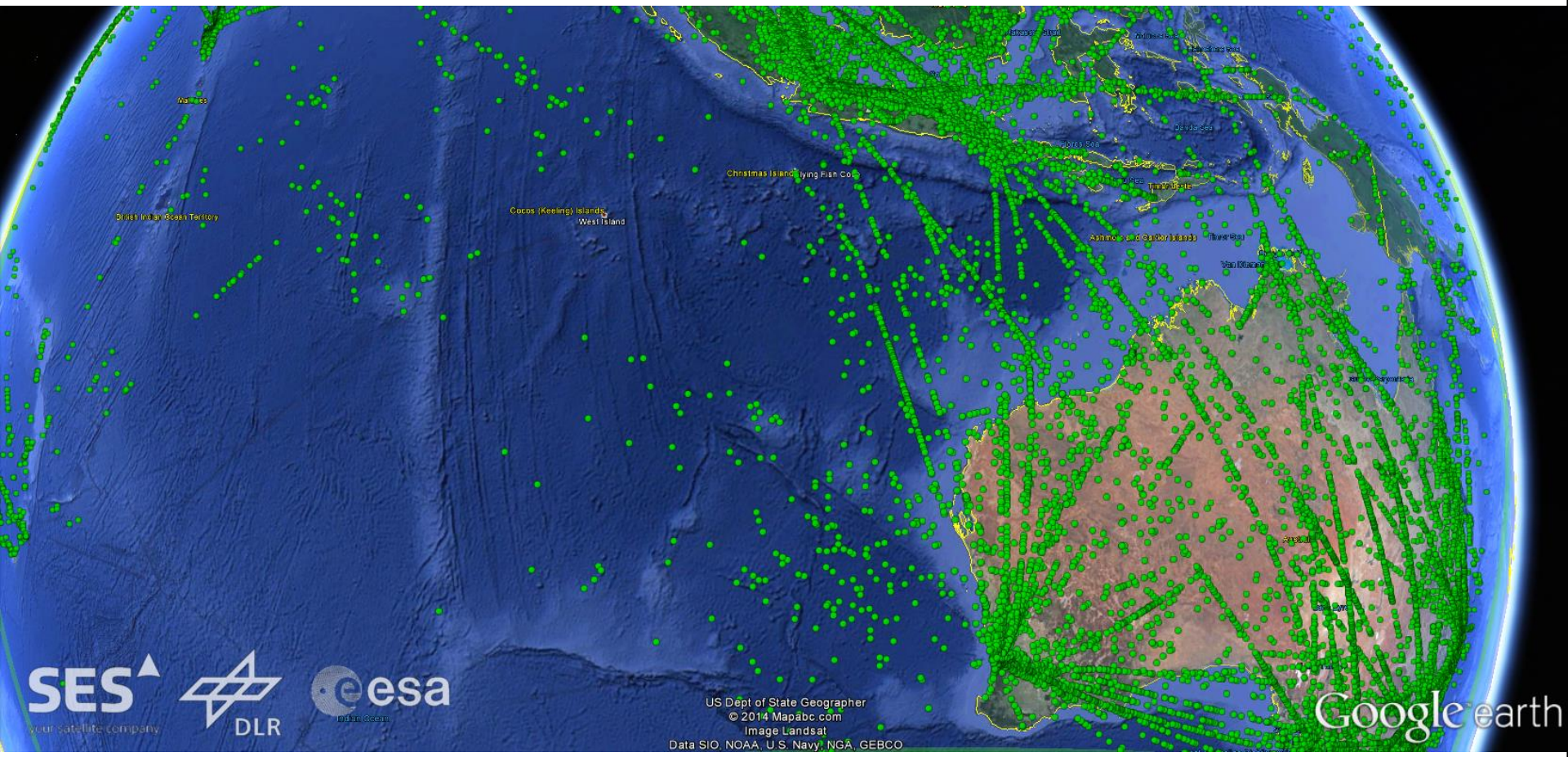
First Satellite ADS-B Data



Data acquired over Australia is in ***excellent agreement*** with Australian ADS-B network data!

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Conclusion and Next Steps

Space-based Air Traffic Payloads by TAS Germany

- bring together the best Thales and Thales Alenia Space have to offer for the benefit of the global aviation community!

Schedule Drivers

- Service level definition 2015
- In-orbit demonstration and sample commercial data 2018
- Market entry 2020-2021

Every Constellation is an Opportunity

- The more the merrier: overlapping coverage allows better redundancy and better reliability!

Thales and ***Thales Alenia Space*** share all it takes to offer the best possible space based surveillance and tracking solution for nearly any constellation!

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Thank You
for your attention!

Hannes S. Griebel

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