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## Tracking aircraft from space

03 May 2013

*Update: Vega lifted off at 04:06 CEST on 7 May.*

On 4 May 2013 at 04:06 (CEST), when the European Proba-V satellite lifts off on a Vega launcher with the primary mission of observing vegetation from space, it will be carrying another instrument on board – one that will be keeping an 'eye' on aircraft. A German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) receiver will locate the ADS-B (Automatic Dependent Surveillance – Broadcast) signals that flights broadcast with a special antenna, while the satellite orbits Earth at an altitude of 820 kilometres. Over the next two years, researchers intend to test, for the first time, whether continuous monitoring of aviation routes is possible. At present, this cannot be achieved in non-radar airspace; location monitoring from space could close this gap.

When an aircraft flies over the major oceans, large areas without infrastructure or the Polar Regions, it is no longer trackable by ground radar stations – the range of the stations is insufficient. "But the aircraft continuously transmit ADS-B signals, with information such as altitude and speed – and we want to make use of this," explains Jörg Behrens, a department head at the DLR Institute of Space Systems in Bremen. In initial experiments, the project has already proved to be successful. In 2009, during a series of high-altitude balloon flights in northern Sweden, the receiver was able to pinpoint an aircraft flying 1100 kilometres away, from a height of about 30 kilometres. "For example, we could 'see' a flight from Beijing to Amsterdam over the North Sea." In a further experiment in 2012, the researchers flew their receiver on a balloon at an altitude of 40 kilometres and examined the interfering signals that it must cope with in a heavily flown and radar-monitored area.

### **Premiere for tracking from space**

For the researchers, tracking flights from a satellite is new territory. "Until now, no satellite had been used to receive ADS-B signals," says Behrens. At what distances can the airplanes be tracked from space? Are the theoretical calculations of the number of aircraft in flight correct? In areas such as Central Europe or the central United States, there are thought to be around 4000 aircraft in the air simultaneously.

In this first test, the characteristics of how aircraft radiate the ADS-B signal will be recorded. "We need to gain experience. What are the limitations of our receiver, and where must improvements be made?" The receiver and antenna were developed in cooperation with the DLR Institute of Flight Guidance in Braunschweig.

A similar DLR project is expected to take off towards the end of the year on an Indian launcher. The AISat satellite will receive signals from ships using a four-metre-long, deployable helical antenna. "With both systems – aircraft signals as well as signals from shipping – we want to contribute to closing the gaps in location data," says Behrens.

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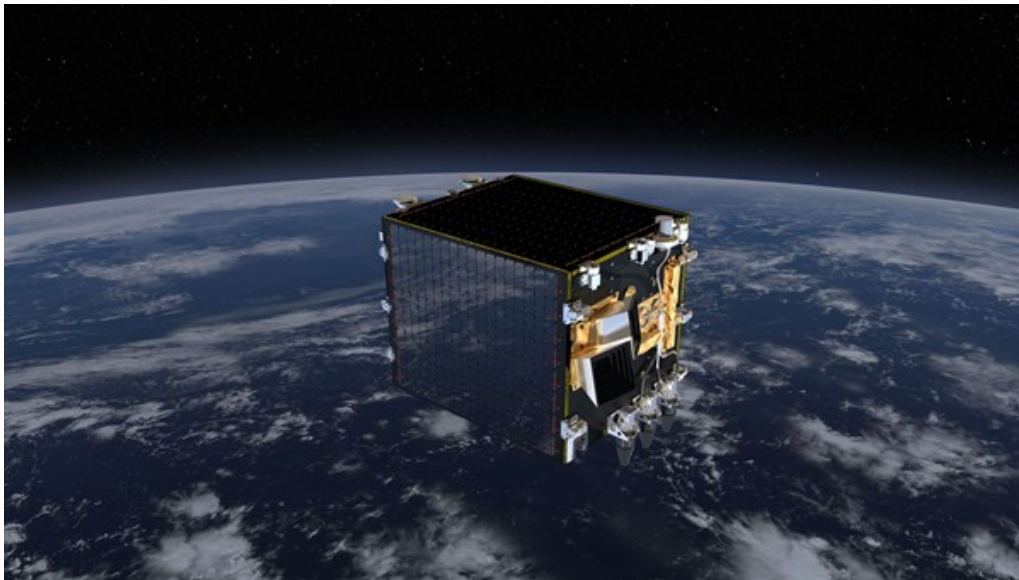
### Launch of the Vega rocket



The Vega rocket was launched on 7 May 2013. On board was the European satellite Proba-V, which carried an instrument of the German Aerospace Center (DLR). With this receiver, researchers want to track air traffic from space using the ADS-B signals (Automatic Dependent Surveillance - Broadcast) emitted by aircraft.

Credit: ESA.

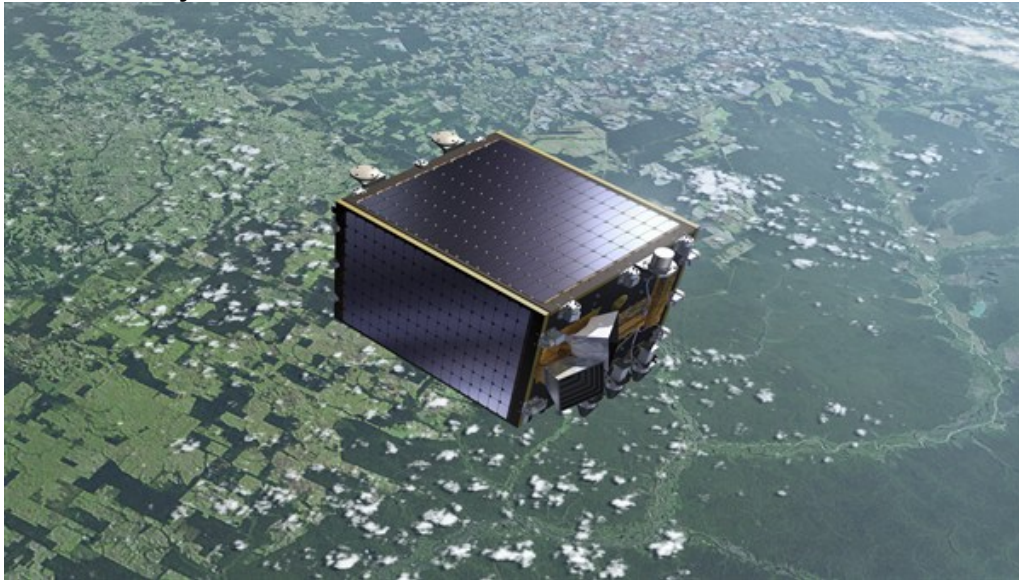
### Proba-V satellite



The European Proba-V satellite is also carrying a German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) payload. The receiver will locate the ADS-B (Automatic Dependent Surveillance – Broadcast) signals that flights transmit with a special antenna, while the satellite orbits Earth at an altitude of 820 kilometres.

Credit: ESA.

## Proba-V will fly at an altitude of over 800 kilometres



Over the next two years, researchers intend to test whether continuous monitoring of aviation routes is possible for the first time. The European Proba-V satellite carries a receiver for the ADS-B signals that are continuously broadcast by aircraft.

Credit: ESA.

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