

## **The descent of the Huygens probe on Titan on 14 January 2005 (A Personal impression)**

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I was invited by ESA to stay at the European Space Operation Centre in Darmstadt (ESA-ESOC) during the landing of the Huygens Probe on Titan. The reason for the invitation was that I had contributed to the project by studying the possibility of Titan halos. Here I give some personal impressions of this experience.

It was a great event. Thrilling. First, about 15 min after the Huygens entry in the Titan atmosphere, they got directly the carrier signal of Huygens transmitter A (there is a redundant transmitter B on Huygens also) on Earth, with the radio telescopes. That was a very good sign, meaning that the Huygens parachutes had deployed properly and the probe was descending well and indeed sending signals to the Cassini orbiter. As the Project Leader Jean-Pierre Lebreton put it: 'we hear the baby crying, we have now to count his toes and fingers'. The direct receipt of this signal on Earth has scientific significance, as they will use these data to track Huygens trajectory through the atmosphere which Very Long Baseline Interferometry, giving accuracy of 1 km. Note, however, they cannot distract information from this carrier signal about the images and measurements.

After a few hours Cassini turned to the Earth for play back. Then the people looked very disappointed: it turned out the receiver of channel A on board of Cassini had not been switched on! No Huygens information whatsoever in that channel. But after a few minutes of tension it turned out that channel B had been switched on, so that the data could reach Earth.

This mistake (failing to activate receiver A on board of Cassini) caused the loss of half of the pictures. All the other data were send redundantly with both transmitters, so they all reached Earth. Only the Doppler wind experiment using the Doppler effect between Cassini and Huygens has become impossible, as it could only be performed with Channel A data (Channel B is frequency modulation and therefore not suitable). A big disappointment for the PI, who has been waiting on this moment for 25 yrs.

It was thrilling when the images came in. No one could make anything up from the first picture, with alien structures. Then came the surface picture, taken after landing – everyone thought that it was a joke, holding it for Mars! But then (the next day) there was the panorama from a few 100 m high, with something that resembles a lake and an isle. That one was strange. In some sense, it looked like a picture of a resort; only the sailing ships where missing.

I learned that Huygens had a bumpy ride. Therefore the sun sensor could not locked very well with the sun. This is good news for us, as it means that also part of the above-

horizon sky are scanned that are not in the solar vertical. This brings detection of lateral halo arcs within reach (in the original planning Huygens would never have looked to that part of the above-horizon sky).

After another month of patience we may know about the halos. I insisted them to look for all halos, including the subsun as a pioneer of presence of halos.

*Postscript: No halos were found in the images of Huygens. At the time it crossed a cloud of crystals (which it did), it was overcast so no chance to have halos, rainbows or glories. Hardly a disappointment to me, as I knew that it had been a long shot. The surprise came one year later, when I saw just by chance a subsun – not on a Titan but on Mars. It is seen on a picture taken by the Mars Global Surveyor in its extended mission. I published this in Weather 2006.*



*Huygens scientists and staff gather in front of the model of the Huygens Probe. I am on the last row. ESA-ESOC Darmstadt, 14 January 2005. Photo credit: European Space Agency/J. Mai*