**A Final Letter**

Friday 20 Feb 2004

Hello all-

Thanks to all of you for following the Sersio campaign with such enthusiasm. I have had many requests to summarize the "well, did it work?" question so here's an attempt. Overall: the launch event was beautiful, much more than we had hoped for; the trajectory was perfect and the motors in fact overperformed, bringing us about 9 km higher (which is always better) than expected; the rocket was tracked and full data was received from multiple telemetry sources; ground camera and radar data provide a beautiful framework for the in situ measurements; in fact in turns out that there was a serendipitous DMSP satellite pass across the event only 10 minutes before the launch; all onboard instruments returned data; but.... there was a major malfunction of one of the onboard payload subsystems so many of the onboard measurements are heavily compromised.

The ACS (attitude control system), a set of gas thrusters used to point the payload (after the motors are done firing) in a particular attitude, was supposed to align the spin axis of the payload to the local magnetic field line so that (a) the payload would not precess/nutate, (b) the particle detectors could look up and down the field line, and (c) the onboard camera could see aurora at the footpoint of the local field line. However, somewhere in the payload development or buildup something went wrong, and the net effect of the ACS efforts was to push the payload away from the field line direction, and also to aggravate rather than mitigate precesssion. Thus the payload ended up in what is called a "flat spin", where the body is rotating around the wrong axis and lying on its side.

As a result, the camera and particle detectors are looking sideways, the payload motion is unstable, and the various deployments (booms, subpayload) got messed up. At the moment we are working hard to assess what quantitative data we can retrieve from the onboard measurements. An analogy would be a video camera mounted on the front of a car which suddenly goes into a tailspin; we need to figure out which way we are looking and what we can see.

So, it is very hard at the moment to answer the questions "did it work?" and "are you happy?" and even "what will you learn?". As you can see from my first paragraph, many things did work, and worked well. Certainly we will learn a lot about the type of dayside reconnection and ion outflow event into which we launched. Certainly we are unhappy about the compromised onboard data. But we're certainly not ready to say just how bad, or how good, it is. We'll post updates to the Sersio webpage (www.dartmouth.edu/~aurora/sersio.html) and you can follow our progress there; we have already posted preliminary summaries of the onboard data, and there are links to the groundbased and other data as well. I hope that this launch campaign email series has been an interesting adventure for you. Now we will put our heads down and get to work on reducing the data into science.

-K