Hi this is Steve Nerlich from Cheap Astronomy www.cheapastro.com and this is *A multiple payload.*

There is an HIIA rocket launch planned for May 18 2010 from the Tanegashima Space Center, on the island of Tanegashima, which is south of the most of the rest of Japan. The HIIA rocket's primary payload is the Akatsuki mission to Venus, developed by the Japanese Aerospace Exploration Agency - or JAXA. But, as an example of the principle of why launch just one thing when you can launch six, the mission will include the world's first interplanetary solar sail, the UNITEC-1 probe and three pico-satellites.

But let's start with Akatsuki, also known as the Venus Climate Orbiter. If the 18th of May launch goes according to plan, this 640kg spacecraft, fitted with hydrazine thrusters and solar arrays for electrical power, will arrive at Venus in December 2010 and enter a highly elliptical orbit for a science mission that will last at least 2 years.

Akatsuki's science goals include trying to understand Venus' meteorology - including how the atmosphere formed and why it screams around the planet at such a phenomenal rate – much faster than the planet spins, although still in the same direction as that spin. Also, Akatsuki will look for any evidence of active volcanic activity on the surface of Venus.

Akatsuki will scan Venus' atmosphere, monitoring different wavelengths from infra-red to ultra-violet with the hope of gaining cross-sectional views of the atmosphere at different altitudes. From right at the top at 90 kilometres altitude, down to the cloud tops at about 65 kilometres altitude and then all the way down to 0 kilometres altitude. The spacecraft will be able to monitor for lightning flashes and light emitting chemical reactions in the atmosphere. The spacecraft will also fire radio signals through the atmosphere back to Earth during its closest approaches.

So that's all very exciting, but the H11A rocket also carries a secondary payload – IKAROS (the Interplanetary Kite-craft Accelerated by Radiation Of the Sun) – and I think the original idea might have been to say Icarus, but finding a suitable word starting with U - nup.

When deployed, IKAROS will unfold into a square sail of about 20 metres diagonal width. The plan is to deploy it beyond Earth orbit in interplanetary space –and then allow it to sail on towards Venus – which is sailing into the solar wind of course, but just like a sail boat it's possible to sail into the wind on the right sort of tangential tack. Parts of IKAROS are covered with a thin-film solar array, just sufficient to be able to steer the sail and to power a little cosmic dust counter.

Based on the experience of IKAROS, JAXA (the Japanese space agency) is planning a second solar sail mission, later in 2010, to Jupiter and its Trojan asteroids. This as-yet-unnamed sailcraft will include a small ion drive which will be electrically powered by those thin-film solar arrays – so it will essentially be a hybrid spacecraft powered by both photon and ion propulsion.

So, IKAROS is pretty exciting too – but we better get on, because there's still another four missions aboard.

The little box-shaped UNITECH-1 deep space probe was designed by a university and engineering consortium, to test how well computer hardware survives in space and will also engage amateur radio enthusiasts by receiving, decoding and returning their radio signals.

And then there are three picosatellites – which are tiny, roughly cube-shaped units, loaded within the Jaxa Picosatellite Deployer or J-POD which will be deployed in Earth orbit. At this point, we are pushing the limits of information that's available in English, but here's what I think the 3 picosatellite missions are:

Firstly, K-SAT (from Kagoshima University) which will make observations of atmospheric water vapour as a means of predicting rain and will undertake basic communications tests for super small positioning satellites. Now whether that’s about positioning super small satellites or super small positioning of satellites – not really sure.

Secondly, there's WASEDA-SAT2 (from Waseda University) which is going to shoot (I think that means transmit) QR codes. Now QR codes are a Japanese innovation where a graphical pattern is displayed in a public location – perhaps on a billboard or a bus timetable – which can be decoded by your camera phone into a URL internet link. So I think WASEDA-SAT2’s QR codes will be received on Earth by students from the university. And also WASEDA-SAT2 seems to have these little panels which can be opened outwards, I think with the idea of seeing if that gives the little satellite more attitude stability – and, let’s face it, we all need a stable attitude.

The third satellite Negai *” (from Soka University). I think the Negai asterix quotation mark thing translates into something approximating 'wish upon a star' – and this little satellite will somehow engage the interest of children in Japan in a way that's sadly lost in translation. But otherwise, Negai *” is testing the operation of an FPGA in space.

Now an FPGA is a Field Programmable Gate Array – or really just a computer chip you can program in the field – as opposed to your standard Application-Specific Integrated Circuit which just comes fixed for purpose out of the factory. FPGA’s are still a little experimental but may represent an early step into the world of evolvable hardware. This is all about computer chips that can reconfigure themselves to work on a whatever new task is brought to them, potentially learning from past experience and developing new capabilities as they go. By hey, it’s not Sky-Net - not yet anyway.

So, come the 18th of May 2010 and all going well, the Japanese HIIA rocket is going to launch with all this stuff aboard. The rocket is 53 metres high – with two stages, both powered by liquid hydrogen oxygen fuelled engines – and, making up the whole launch stack, two detachable solid rocket boosters. After launch, the HIIA rocket will fly east up over the Pacific Ocean, gaining altitude before it drops its expended SRBs and then its first stage. From there, the second stage will fire once to get the rocket into low Earth orbit and then the J-POD, with K-SAT, WASEDA-SAT2 and Negai*” aboard, will jettison and the three plucky little pico-satellites will be released into Earth orbit to commence their missions.

Meanwhile, the second stage engine of the HIIA rocket will fire up again, long enough to get the main payload Akatsuki – the Venus Climate Orbiter – on its way into a Venus transfer orbit. Once Akatsuki has detached, the platform it was sitting on will also detach allowing first

Ikaros, the solar sail, to be launched, closely followed by UNITEC-1 the deep space probe, with its radio experiments.

And then, with its job done, the empty second stage of the HIIA rocket will proceed onwards in a lonely solar orbit, probably one that will spiral slowly inwards until it crashes into the Sun. So folks, remember the date, 18th of May 2010.

Thanks for listening. This is Steve Nerlich from Cheap Astronomy, www.cheapastro.com. Cheap Astronomy offers an educational website where NASA isn't the only game in town. No ads, no profit, just good science. Bye.