

Hi this is Steve Nerlich from Cheap Astronomy www.cheapastro.com and this is *STS 127 (Just another SS mission)*.

So imagine it's August 2009 - not only is it the international year of astronomy but arguably the pinnacle of the space age so far – an age that began nearly 52 years ago on October 4 1957, with the launch of Sputnik 1. In August 2009, there was a growing feeling that all might not be well with the US Manned Spaceflight Program – since you had the impending retirement of the Space Shuttle fleet just around the corner and nothing yet clearly indicated as the next step. But this isn't really a new thing - the US had experienced a similar hiatus between 1975 with the last Apollo launch and 1981 with the launch of STS1, the first ever space shuttle launch.

Anyhow, the point of this podcast is to see that if we do just pick any old Space Shuttle mission - which being August 2009, will be the just-landed STS 127 – would it really be just another Space Shuttle mission?

STS 127 was the 128th Space Shuttle mission and the 23rd flight of the Endeavour orbiter. It had a seven person crew including a Canadian female astronaut Juliette Payette and otherwise 6 guys - one of whom, Timothy Kopra was actually dropped off at the ISS and a JAXA astronaut Koichi Wakata was brought home by STS 127 after a six month stay at the ISS. Koichi Wakata was the first Japanese member of an ISS crew - and in fact the first person to be a member of five different missions during an interrupted stay in space. His five missions were STS 129 which flew him up in March 2009 and then he was a member of three successive ISS crews - Expeditions 18,19 and 20 - each crew iteration being determined by a change in commander and generally a change in most of the personnel.

Wakata is arguably most famous for trialing a pair of long duration high-tech underpants - which he apparently wore for a month straight during his stint on the ISS. It's unclear if this is a record as such - and probably the less said about it, the better.

In any case, there is a statistical likelihood that pretty much any space shuttle mission will carry some kind of a world record. For STS 127, as well as ferrying home the record breaking Wakata, it also supported the launch of the 500th person in space.

Now, it was no straight forward matter deciding which of the seven member crew should gain this particular distinction. Prior to STS 127's launch, 498 people had flown to space – comprising 51 females and 447 males. So, to decide which member of the crew would be the 500th – firstly there was an obvious a process of elimination – since three of the crew could be immediately excluded having each flown into space previously. Hence the No. 500 distinction would necessarily fall to one of the four rookie astronaut members of the crew.

The decision was narrowed down to two of these four on the basis of the seating within the crew compartment, since sitting closer to the front means you pass the space entry point first. That entry point, by convention, is exactly 100 kilometres altitude from sea level. Rookies Hurley and Cassidy were both seated in upper flight deck –but in the end a final decision was arrived at in a civilised fashion - the crew reaching unanimous agreement that they would just declare Cassidy the first across the line - which he possibly, though not definitively, was.

On top of all those records, STS 127 contributed to the record of having the most people in space in the same vehicle, by contributing to the count of 13 people in the ISS at the one time.

STS 127 is also somewhat distinguished by having had a particularly hard time getting off the launch pad. It endured five scrubbed launches, before a six successful attempt. This was only short of the record of six scrubbed launches experienced by both STS-61C in 1986 and STS-73 in 1995.

STS 127's initial problems involved tanking – which is the process of getting highly explosive liquid hydrogen into that main orange tank. Liquid hydrogen only stays liquid at low temperatures - so filling the initially warm empty tank is complicated by gas boiling off during tanking. This gas is allowed to flow out a vent line - but this line was found to be leaking - resulting in the first launch scrub on the 13th of June 2009. With that problem apparently fixed, a second launch was scheduled on the 17th of June but the leak problem occurred again. The engineers went back to the drawing board and then came up with a new flexible seal for the vent line, which passed all tests thrown at it – so, a third launch was scheduled for the 11th of July.

But the night of the 10th of July had big thunderstorms with multiple lightning strikes near the launch pad, meaning a 24 hour delay to check that lightning had not affected the shuttle or the launch systems. But, that delayed **12th of July** launch was then scrubbed anyway due to a new storm building, as was the rescheduled 13th of July launch and then the rescheduled 15th of July rescheduled launch - launched.

After launch, things became a bit tense as footage of the launch showed that large bits of foam had fallen away from the external tank. Such foam fragments had struck the heat shield of STS 107 in 2003 causing the heat shield's failure and the death of the crew on re-entry. But of course after that tragic event, all shuttle orbiters have undergone a heat shield inspection – firstly by their own robotic Canada arm, followed by what's called an RPM (a rendezvous pitch manoeuvre) – which essentially involves spinning the orbiter bow over stern in view of a high resolution camera that's on the ISS. Both these tests determined that the Endeavour's heat shield was intact and that all was well.

And from there, STS 127 went on to carry out a successful mission. It delivered the final component of the Japanese science laboratory Kibo – this final component being the exposed facility which would allow experiments involving exposing things to the vacuum of space. It also delivered the LIDAR ranging system manufactured by SpaceX – to trial a docking system which will be used by the commercial SpaceX Dragon re-usable cargo carrier which is planned to send supplies to the ISS after the retirement of shuttle fleet.

And after all that STS-127 landed, with no dramas, on the 31st of July 2009.

So, in a nutshell, there was a bunch of stuff this mission had to do - and it got it done - it really was just another Space Shuttle mission. Indeed it's unfortunately more than likely that the most memorable factoid of the mission will be Koichi Wakata's high-tech underpants.

But look, if I had been asked to do a targeted search of the most memorable Space Shuttle mission in 2009, I probably would have picked STS 127 anyway, just because of the Day 6

wake up song. This was a short sound byte played for Juliette Payette, in recognition of her young son's favourite TV show - which went like this...

Thanks for listening. This is Steve Nerlich from Cheap Astronomy, www.cheapastro.com. Cheap Astronomy offers an educational website where manned space flight might seem a little expensive until you realise the whole point is to create new human outposts so we don't leave all our eggs in one basket. No ads, no profit, just good science. Bye.