

## U3Astronomy meeting - 28<sup>th</sup> March 2008

### ***International Space Station.***

Launch of the shuttle *Atlantis + Columbus*, originally planned for 6/12/2007 and postponed several times because of technical problems, eventually took place on 7/2. The *Columbus* – an ESA-built new laboratory, will double the Space Station's capacity for scientific research. On 11/3 the next shuttle mission took off: *Endeavour*, carrying the first sections of a large Japanese laboratory and the Canadian maintenance robot *Dextre*.

In the meantime, on 9/3, the ESA-built unmanned cargo spacecraft *Jules Verne* was launched. This 'space truck' carries a load of 4.6 tonnes of water, oxygen, food and scientific materials to the ISS, and takes waste and rubble on the way back (burns on re-entry into the atmosphere). Further space travel activities over the past weeks and months: the US destroyed a spy satellite which had gone out of control, and Iran launched a rocket that reached orbit around the Earth and was able to carry satellites. Further there was a natural threat to the Earth on 29/01, when a 600 by 150 metre big asteroid skimmed past the Earth at a distance of only 540,000 km, that's less than 1.5 times the distance Earth-Moon.

There was also news recently about **the Sun**, where a new *solar cycle* has begun. The Sun has an enormous magnetic field, probably the result of layers spinning at different speeds (dynamo!). This causes flows of material on the Sun's surface, and as a result (?) the strength of the magnetic field increases to a certain maximum and then decreases again. This whole cycle takes about 11 years, at the end of which the magnetic field reverses and the whole story begins again. The present cycle will reach a maximum of magnetic activities by about 2011 and then will slowly fade over a period of about 8 years. When the cycle is at its maximum, we see an increased level of activities at the Sun's surface: flares or loops of magnetic material, and sunspots. At the period of highest solar activity in a cycle, the 'solar wind' (electrically charged particles escaping from the Sun) can disrupt radio communications on Earth and harm satellites and spacecraft, while producing the beautiful red and green 'aurorae' in the Earth's atmosphere.

**Spacecraft travelling through our Solar System**, flying by or orbiting various planets and their moons, made several new discoveries in the recent past. For instance:

- The fly-by on 14/1 of the *Messenger* spacecraft along **Mercury** produced many beautiful, detailed pictures, several of regions never seen before.
- The spacecraft *Cassini*, in orbit around **Saturn** since July '04 has provided an enormous amount of info + pictures of Saturn and its rings and moons. *Cassini* saw large geysers erupting from Saturn's icy moon Enceladus in 2005. On 12/3 it flew by this moon again, taking sample material from these plumes to study their chemical composition. It has been concluded now that it is water, and scientists are convinced that there is a water lake beneath the surface, possibly at only 40 m depth. This is the first time that the presence of water in the outer regions of the SS has been proved.
- The *Venus Express* came into orbit around **Venus** in April '06. It recently provided more info about Venus's sulphur-dioxide atmosphere. The solar wind pulls Venus's atmosphere away, especially hydrogen and oxygen, and as a result Venus has constantly been losing water. The atmosphere is injected by sulphur-dioxide, probably from volcanism.
- The *Mars Reconnaissance Orbiter* came into orbit around **Mars** in March '06. It recently captured pictures of hundreds of metres large avalanches in action in the North Polar region of Mars. Dust and ice came down from a 700 metre high cliff, causing large clouds of dust. Cause uncertain: perhaps changes in the CO<sub>2</sub>-ice (it is spring there), or a Mars-quake, or a meteorite impact?