THE FISHERHAVEN ASTRONOMER

INSIGHT MSSIION

On 26 November 2018, NASA’s Martian robotic lander ***Insight*** landed safely on the Elysium planitia (according to Greek mythology, Elysium is the place where good people go when they die) on Mars after a journey of 205 days and approximately 485 million kilometres. On the day of the landing, Mars was 145 million kilometres from Earth and a radio signal from Earth would take approximately 8 minutes to reach the space craft. Under these circumstances it is essential that the landing takes place under the control of the space craft’s computers. ***Insight*** was not alone on its journey to Mars, it was accompanied by two small ***cube satellites***(each approximately 10 cm x 20 cm x 30 cm in size) named ***MarCO-A*** and ***MarCO-B***. These satellites were designed to fly past Mars during the landing stage of ***Insight*** in order to relay radio communications between ***Insight*** and the Earth while the lander is behind Mars and direct communications with the Earth cannot be achieved.

I was able to enjoy the tense atmosphere in the control centre during the landing stage with the help of NASA’s online live TV, and to share in the elation when all went well and the landing was successful. The first photo received was blurred because it was taken through the transparent lens-cap designed to protect the lens against the Martian dust blown up into the atmosphere by the lander’s landing rockets.

There are many questions that need to be answered before the first manned mission to Mars. Why go to Mars? Mars is the only other planet within the Sun’s habitable zone, Earth is on the inner edge of this zone and Mars is on the outer edge. The other two rocky planets are both completely hostile to human life. Mars is like a rung of mankind’s ladder to the stars. The Moon was the first rung, the International Space Station (ISS) the second rung, a space station orbiting the Moon as a halfway station to Mars could be the third rung.

The questions NASA is trying to find answers to are, amongst others, the following:

• Is there water on Mars? The robotic lander ***Phoenix*** that landed on Mars near the northern arctic circle in 2008 to study the geological history of water and its second goal to assess the potential habitability near the polar regions. It has found water ice in its landing area.

• Why has Mars no magnetic field? Earth has a strong magnetic field which is our essential protection against harmful solar and cosmic radiation, without this field we cannot survive.

• Why is Mars, compared the Earth, a ‘cold planet’? Earth’s core is estimated to have a temperature of 6,000ºC, just about equal to the temperature of the surface (chromosphere) of the Sun. This temperature is maintained by the radioactive decay of elements in the core. Mars has the largest dead volcano in the Solar system, Olympus Mons, about 2½ times as Mount Everest’s height above sea level, as well as a number of large volcanoes. What has happened to Mars’s internal heat?

***Insight*** has been designed to investigate these questions and has been fitted with a seismograph to study the internal structure of the planet, as well as a heat flow probe, the ‘mole’, which will burrow down to 5 metres below the surface designed to measure how heat flows from the core to the surface. The lander will also take precise measurements of the planet’s rotation to build on the knowledge base regarding the size of the planet’s core.

After arrival and the successful landing on Mars, the lander has been setting up itself to commence its experiments. First and foremost was the generation and testing of the solar power required to conduct its experiments. Second was the testing of its robotic arm that is required to place the two instruments required for the seismic and heat-flow measurements. ***Insight*** is planned to be conducting its experiments over a period of one Martian year (728 Earth days). ***Insight’s*** landing site has been selected to be 4½º north of the Martian equator where it will experience good sunlight during both the Martian summer and winter for its power requirements. It will take about a month to fully test all the onboard systems before the experimentation commences.

**Sources**: Data from the NASA’s websites and Wikipedia

Compiled by Johan Retief in December 2018