

NASA STARGAZING MISSION OVER NEW ZEALAND

From exquisite images of the centre of the Milky Way to the discovery of oxygen in the atmosphere of planet Mars, NASA's star-gazing missions above New Zealand are uncovering secrets of the hidden universe. Each winter, a radically modified Boeing 747 aircraft arrives at Christchurch Airport from the US with NASA and German space scientists on board. **In its fuselage, a massive hole has been cut to accommodate a 2.5-metre telescope hiding behind a sliding door that rolls down soon after take-off, to open a view of the heavens.**

Mission Control sits in the refurbished economy section of the old Pan Am jet, with row upon row of computer terminals. Endearingly called the Stratospheric Observatory for Infrared Astronomy (SOFIA), it is the world's largest airborne observatory. Its mission is the latest incarnation of airborne astronomy. SOFIA's job is to track the part of the night sky that is invisible to us on Earth. Like police hunting for a hidden suspect, **SOFIA uses infrared technology to create a heat image of the universe.**

Most infrared radiation is blocked from reaching the ground by water vapour in the Earth's atmosphere, and to get above this layer, SOFIA has to reach the stratosphere (shown yellow). The stratosphere is the second major layer of Earth's atmosphere, just above the troposphere (red), and below the mesosphere (green). About 20% of the atmosphere's mass is contained in the stratosphere. The stratosphere is stratified in temperature, with warmer layers higher and cooler layers closer to the Earth. The increase of temperature with altitude, is a result of the absorption of the Sun's ultraviolet radiation by ozone. Depending on location, the stratosphere starts between 13 km and 18 km altitude and ends at about 50 km. .

New Zealand was chosen as the launch site because many cosmic objects can only be seen from the southern hemisphere. This includes our nearest galactic neighbours, the Magellanic Clouds, and many interstellar spaces where stars and planets are born.

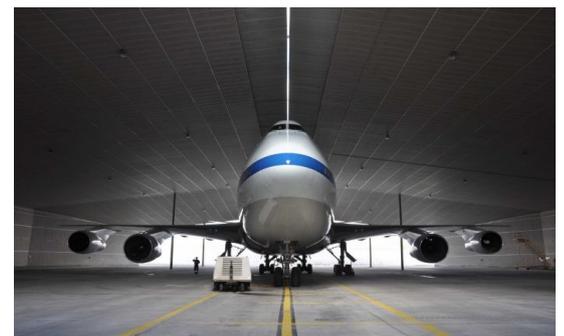
This hidden universe cannot be observed from the ground. You have to be above the denser part of the atmosphere. The target on this voyage is a very bright star called Fomalhaut, known in astronomy as the Loneliest Star, as it sits right out on its own in the night sky. The star is 25 light years from Earth, and is famous for being the first to be discovered with an observable planet orbiting around it, like the planets that go around our own sun. SOFIA's scientists hone in on the disc of cosmic debris that surrounds Fomalhaut. By studying stars with these discs around them at various stages of life astronomers can put together an evolution – a story of how these materials, which are left over after their birth, form into the planetary systems that we see, and ultimately form solar systems like ours. With a pointing accuracy equivalent to watching a dollar coin from a one-kilometre distance, there are more spectacular discoveries ahead for SOFIA. **Already, the flying telescope has detected new molecules that help explain how water is formed in space and how that is linked to the water in Earth's oceans.** An ultimate goal would be to explain is the origin of life on earth: **Where did the material come from that formed life here on Earth? Did that come from up there?**

As a sideline a new documentary is being made of just how big an impact humans have had on the face of our planet. Over the course of its missions, SOFIA has observed many different types of objects, including asteroids and comets, planets and their moons.

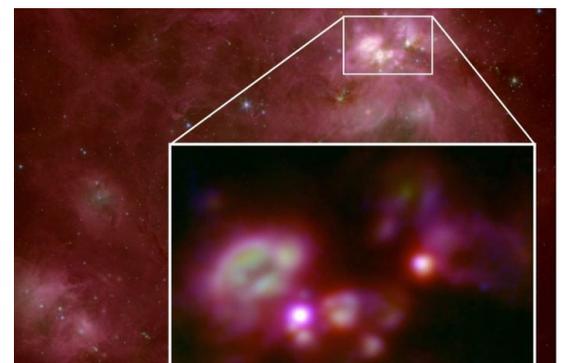
AK, thanks to Eva Marso



Pilot Frank Batteas and the scientists and crew on board have clocked thousands of hours in the stratosphere.



The SOFIA aircraft is a refurbished Pan Am jet



Rho Ophiuchi star, seen with infrared technology
Star clusters are groups of stars held together by a gravitational pull