

From the Earth's stratosphere to flying on Mars

- a few experiences from the SolarStratos project for the exploration of the Martian atmosphere -

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The SolarStratos project has built a manned aircraft to fly a pilot to Earth's stratosphere up to 20 – 25 km altitude powered by solar energy only. Comparing “solar flying conditions” at low altitudes on mars with those in the Earth's stratosphere, some parallels can be drawn and lead to a solar aircraft to explore the Martian atmosphere.

Key words: Martian atmosphere – to explore – solar aircraft - solarstratos

1. Flying solar

With a fully deployed wingspan of 25 m and a total weight of around 600 kg, the Solarstratos aircraft aims to reach the stratosphere up to 25'000 m in the coming years. The pilot will wear a russian sokhol space suit and the electrical engine will be powered by solarcells on the wings and horizontal tail.

Follow-on versions will be unmanned drones flying long duration stratospheric flights above flight level 600 with telecom, earthobservation and other potential payloads.

2. Flying solar on mars

Comparing

- the lower solar energy available on mars
- but also the lower gravity
- and the atmospheric density at low altitude (datumline)

one can imagine an unmanned solar powered aircraft flying at low martian altitudes in similar flying conditions as on earth in the stratosphere.

We thus can conceive a solarpowered aircraft, with vertical take-off and landing capability, to take off in the morning, as the sun rises, fly, do its mission with whatever payload included and land again at sunset.

In order to sustain atmospheric flight in the low density atmosphere, ground speed will be a few hundred km/h, provided by a solarpowered electrical engine. Hoping around at several hundred kilometers per day, large areas can be covered.

Right now, the priority of our team is to fly in the Earth's stratosphere and manage the challenges of low air-density flying; but this presentation will give some more glimpses on the potential of solarpowered unmanned flight in the Martian atmosphere to cover long distances, thus extending the range of research done by ground based rovers.

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