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An update of the CNES stratospheric balloon activities

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Abstract
For nearly 60 years, the French Centre National d 'Etudes Spatiales (CNES) has been developing and operating balloons to perform scientific measurements and technological tests in the upper atmosphere up to 40 km in altitude. To date, CNES operation teams have operated more than 4,000 flights at all latitudes.

Capable of remaining permanently at an altitude of 20 to 40 km in the stratosphere, the balloon remains a unique vehicle for collecting in situ data on the winds, the greenhouse gases, aerosols and radiations present at these flight levels, and for observing the Universe with telescopes weighing several hundreds of kilos carried above the dense layers of the atmosphere.

Thus, within the framework of partnerships with the French CNRS and collaborations with varied countries hosting launch sites, regular flight campaigns are organized around the world for heavy balloons flights, and in France from the CNES operation center in Aire sur l 'Adour for light balloons.

The extended range of vehicles and the payload gondola support provided by CNES allow addressing several kinds of missions such as astronomy, atmospheric physics and chemistry, stratospheric and tropospheric meteorology. In particular, CNES provides a very high performance pointing gondola service.

Further to a special effort made during the last 10 years to renovate the flight and ground systems, the new command and control systems are now operational for large zero pressure balloons (ZPB) and for long duration super pressure balloons (SPB).
Thus, since 2013, 8 scientific campaigns of heavy ZPBs have been carried out by CNES, the last 2 ones from Esrange in Kiruna, Sweden, hosted by the Swedish Space Corporation (SSC) in 2021 and from Timmins, Ontario, in partnership with the Canadian Space Agency, in 2022.
In the field of long duration balloons, CNES is conducting the STRATEOLE 2 project, for the study of the low stratosphere (UTLS) in equatorial regions. The observing system is based on the use of fleets of small super pressure balloons (SPB) flying up to 3 months each, carrying payloads of 25 kg at 18 to 20 km in altitude. The related infrastructure has been qualified with eight successful flights from Mahé, Seychelles Islands, in late 2019. The first scientific campaign, involving 17 flights, was carried out from October 2021 to January 2022.

The proposed paper will present a synthesis of the launch campaigns of the past two years and their preliminary results. In addition, the perspectives will be shown, as the content of the next campaigns 2023-2025, the new services and performances available, and the new developments like the “persistent” balloon.