



Funded by the Horizon 2020 framework program of the European Union

HEMERA RESEARCH INFRASTRUCTURE

P. Raizonville, on behalf of the HEMERA Consortium





HEMERA INFRASTRUCTURE

- HEMERA is a new Research Infrastructure, funded by the EC Horizon 2020 program
- Starting community, for a first 4 years timeframe, started January 2018
- 7 countries, 13 Partners : Space agencies, research laboratories, industry :

CNES (France) Coordinator

ASI (Italy),

SNSA (Sweden),

CSA (Canada),

DLR Oberpfaffenhofen (Germany),

Andoya Space Center (Norway),

CNRS (France),

IAPS-INAF (Italy),

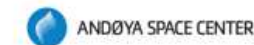
Cranfield University (GB),

University of Karlsruhe KIT (Germany),

University of Heidelberg (Germany),

SSC (Sweden),

AIRSTAR Aerospace (France).





HEMERA INFRASTRUCTURE OBJECTIVES

- HEMERA will coordinate European activities in the field of ballooning in order to:
 - O1: Provide better and coordinated balloon access to the troposphere and stratosphere for scientific and technological research,
 - O2: Attract new users to enlarge the community accessing the balloon infrastructure and foster scientific and technical collaboration.
 - O3: Enlarge the fields of science and technology research conducted with balloons.
 - O4: Improve the balloon service offered to scientific and technical users through innovative developments.
 - O5: Favor standardization, synergy, complementarities and industrialization through joint developments with greater cost-effectiveness.
- HEMERA is complementary to national programs and is mainly oriented towards newcomers in Europe (new countries, new teams).



HEMERA ACTIVITIES ORGANISATION

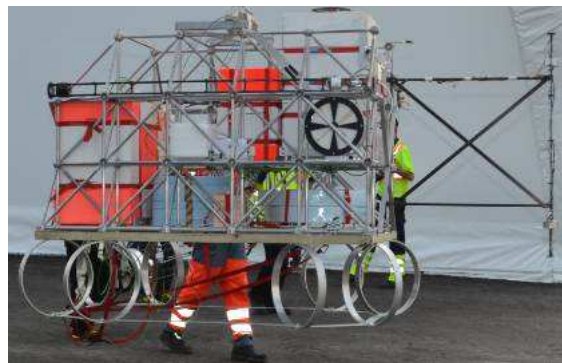
- HEMERA activities are split into 3 components: Access, Networking, Innovation
- HEMERA is fully user oriented:
 - Access includes both Virtual Access to HEMERA collected scientific data and Access to balloon flights
 - Networking mainly aims at promoting balloon activities in Europe, make HEMERA known among potential user community and create links with various bodies
 - Innovation, both at level of flight trains and payloads, with standardisation among partners and small instruments



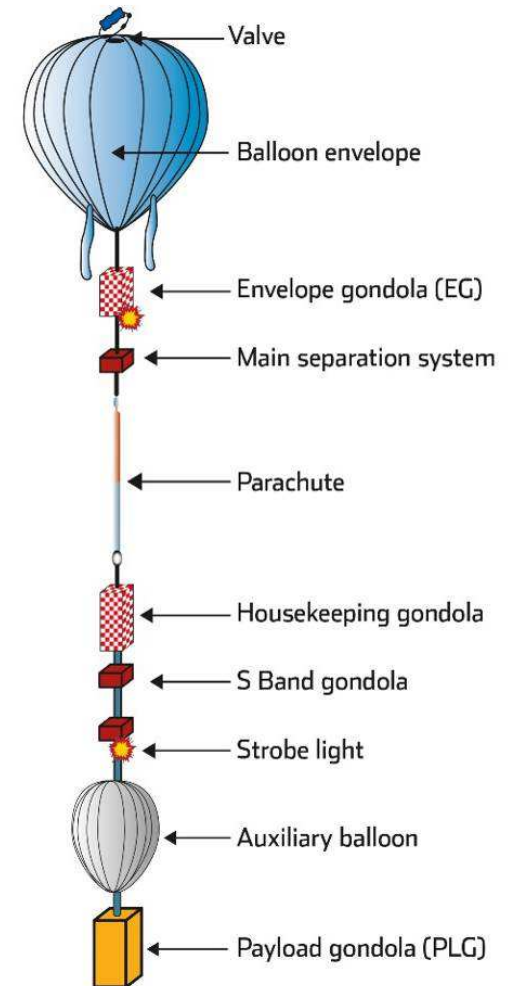
BALLOON TYPES AT SSC and CNES

Various types of balloons are available at CNES and SSC for HEMERA, corresponding to different missions:

- Zero Pressure Balloons (ZPB) for heavy payloads (100 kg to 3 tons) and short to medium duration (1 day to several days).
- Sounding Balloons (SB) for very light payloads (3 kg) and only ascent and descent to the stratosphere.



CNES HELIOS gondola



CNES flight train



HEMERA BALLOON FLIGHTS

Within the HEMERA framework, dedicated balloon flights free of charge for small to medium user payloads on CNES or SSC gondolas are provided.

- Nominal offer is for small to middle size payloads, under ZPB, in 2019, 2020, 2021
- Several scientific instruments are integrated on the same gondola, which are recovered
- Launch teams: Kiruna and Timmins, during SSC and CNES campaigns
- Nominal scenario: 6 ZPB flights at 35 km altitude, 3 SSC and 3 CNES, with 150 kg payload each (balloon 150 Z, 150000 m³ at ceiling), flights up to about ten hours.
- 20 SB flights are also planned for 1 to 3 kg payloads, with recovery. Nominal launch site is Aire sur l'Adour.



Launch with Auxiliary Balloon (CNES)

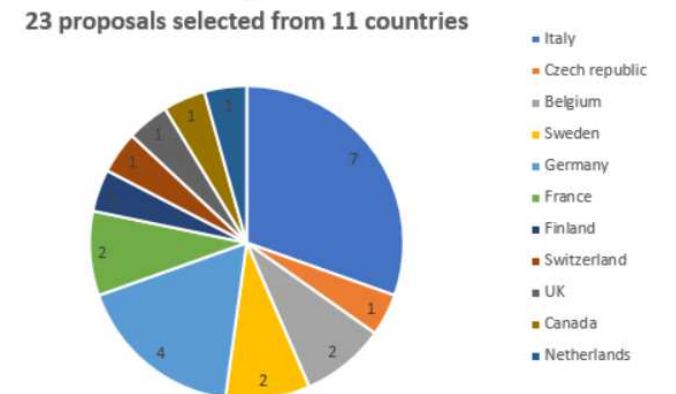
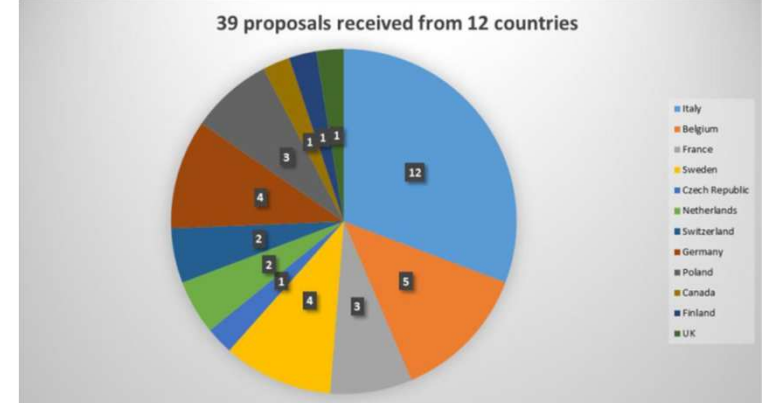
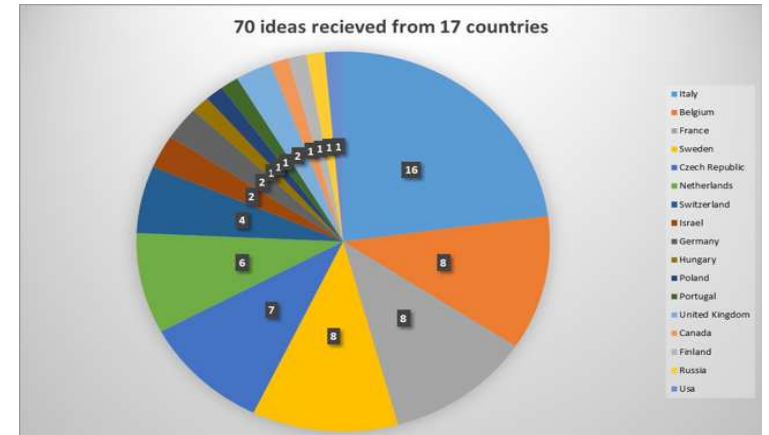


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Launch with Hercules vehicle (SSC)



EXPERIMENTS SELECTION

- A call for ideas was launched beginning of 2018, ending in April 2018.
- A call for proposal was launched in July 2018, closing in October 2018.
- 16 proposals were focused on atmospheric science, 9 on astrophysics, 6 on magnetosphere of the sun and space weather, 8 on technical research and educational experiments.
- Evaluation of the answers and ranking by an independent Peer Review Group, then grouping of the payloads and final list by the HEMERA Steering Committee.
- Selection criteria: scientific interest, technical credibility, new countries, new teams....
- 23 experiments from 11 countries have been selected for the 2019 and 2020 flights (*see list on HEMERA website*).
- The technical constraints of the experiments are taken into account, as well as the manufacturing of the experiments. The experiments have to comply with a balloon user manual to be accepted on board SSC or CNES gondolas.
- **Second HEMERA call for proposals : September 2019, for the 2021 flights.**





HEMERA VIRTUAL ACCESS



- Remote access is organised by HEMERA consortium to scientific and technical data acquired during flights.
- Some data from past balloon flights are also uploaded on the Data Portal.
- Those data are collected and made accessible on a dedicated Portal (based on AERIS for atmospheric data and INAF for other data).
- No access restriction, users need only to register to use freely the scientific data



IA2 *Italian Center for Astronomical Archives*
Centro Italiano Archivi Astronomici





JOINT RESEARCH ACTIVITIES



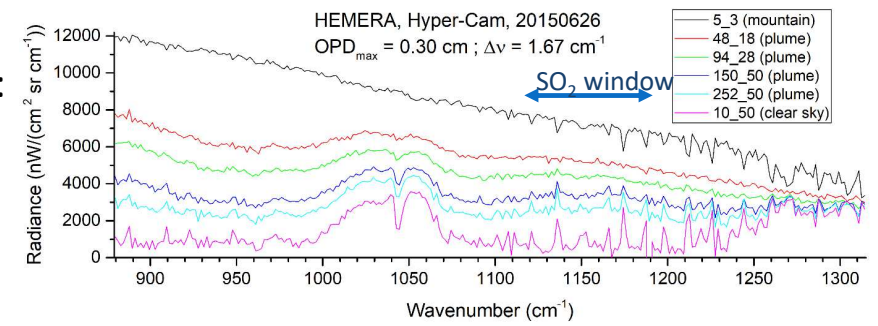
EUROS

ZEPHYR

- Standardisation, cost reduction: small ZPB flight train derived from Strateole 2, azimuth pointing system (CNES)
- Large balloon envelope (Airstar Aerospace with CNES and SSC)



- Telemetry (ASI)
- Payloads: very small and cheap instruments: CU with CNRS, INAF
- Processing algorithms: CNRS with KIT
- Infra Red hyperspectral algorithms (spectro-imagers): KIT with CNRS





NETWORKING ACTIVITY

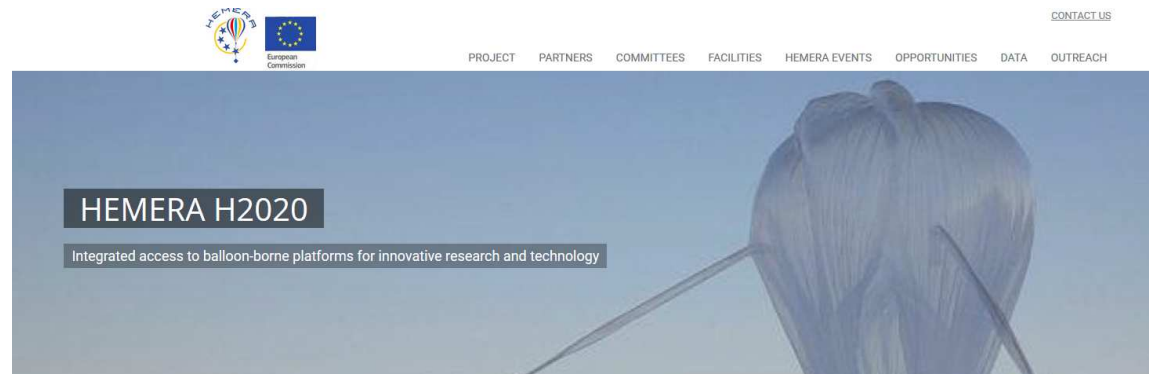
- HEMERA project WEB site

<https://www.hemera-h2020.eu/>

- Communications in congresses and workshops
- Links with other EC Research Infrastructures and projects (ENVRI, EUFAR, ESBO-DS, AHEAD...)
- HEMERA Summer School: at Heidelberg, September 9th - 13th , 2019

<https://www.hemera-h2020.eu/hemera-events/summer-school-2019/>

- HEMERA workshop in Rome: September 2020
- New launch sites investigation (Tropical, Svalbard, Africa, Italy...)





HEMERA SUMMER SCHOOL

September 9th-13th 2019

Heidelberg, Germany

The HEMERA summer school is open to advanced master students, PhD students and young scientists interested/involved in balloon-based research, including technicians and engineers from all kinds of research facilities, avionic and space agencies and industries.

TOPICS

- Ballooning in the historical and scientific context
- The atmospheric environment
- Balloon technology, logistics, and safety
- Scientific and industrial ballooning operations
- Instrumentation and scientific results
- Perspective and future opportunities

INVITED SPEAKERS

Per Baldemar, SSC, Sweden
Prof. T. Birner, LMU München, Germany
Prof. Andre Butz, Universität Heidelberg, Germany
Prof. Claude Camy Peyret, IPSL, France
Prof. Valery Catoire, LPC2E, CNRS, France
Prof. Terry Deshler, University of Wyoming, USA
Prof. Neil Harris, Cranfield University, UK
Prof. Albert Herzog, LMD, France
Dr. Nathalie Huret, OPGC, France
Philippe Raizonville, CNES, France
Prof. Pietro Ubertini, INAF, Italy
Andre Vargas, CNES, France
Stephanie Venel, CNES, France
Prof. Kaley Walker, University of Toronto, Canada



Deadline for registration on July 26th, 2019
<https://www.hemera-h2020.eu/hemera-events/summer-school-2019/>

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