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HEMERA

New Science opportunities using stratospheric balloons

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on behalf of the HEMERA team:

CNES, ASI, Airstar, ASC, CNRS, Cranfield University, CSA, DLR, Heidelberg University, INAF, KIT,
Rymdstyrelsen, SSC



HEMERA

- **European Infrastructure** for scientific ballooning funded by the Horizon 2020 framework program of the European Union
- HEMERA has three major elements:
 1. **Provision of Trans-National Access to balloon flights**
 2. **Networking** to strengthen and enlarge the user community
 3. **Joint Research** to improve ballooning technology and scientific instrumentation





HEMERA PARTNERS

13 PARTNERS



Partners are space agencies and space access providers, scientific bodies (research centres and universities) and industry



WHAT HEMERA OFFERS YOU



- Balloon flights:
possibility to fly small to medium payloads at **no cost** on CNES or SSC gondolas under Zero Pressure Balloons (ZPB) and Sounding Balloons (SB).

The cost for the development and construction of the payloads is not included!

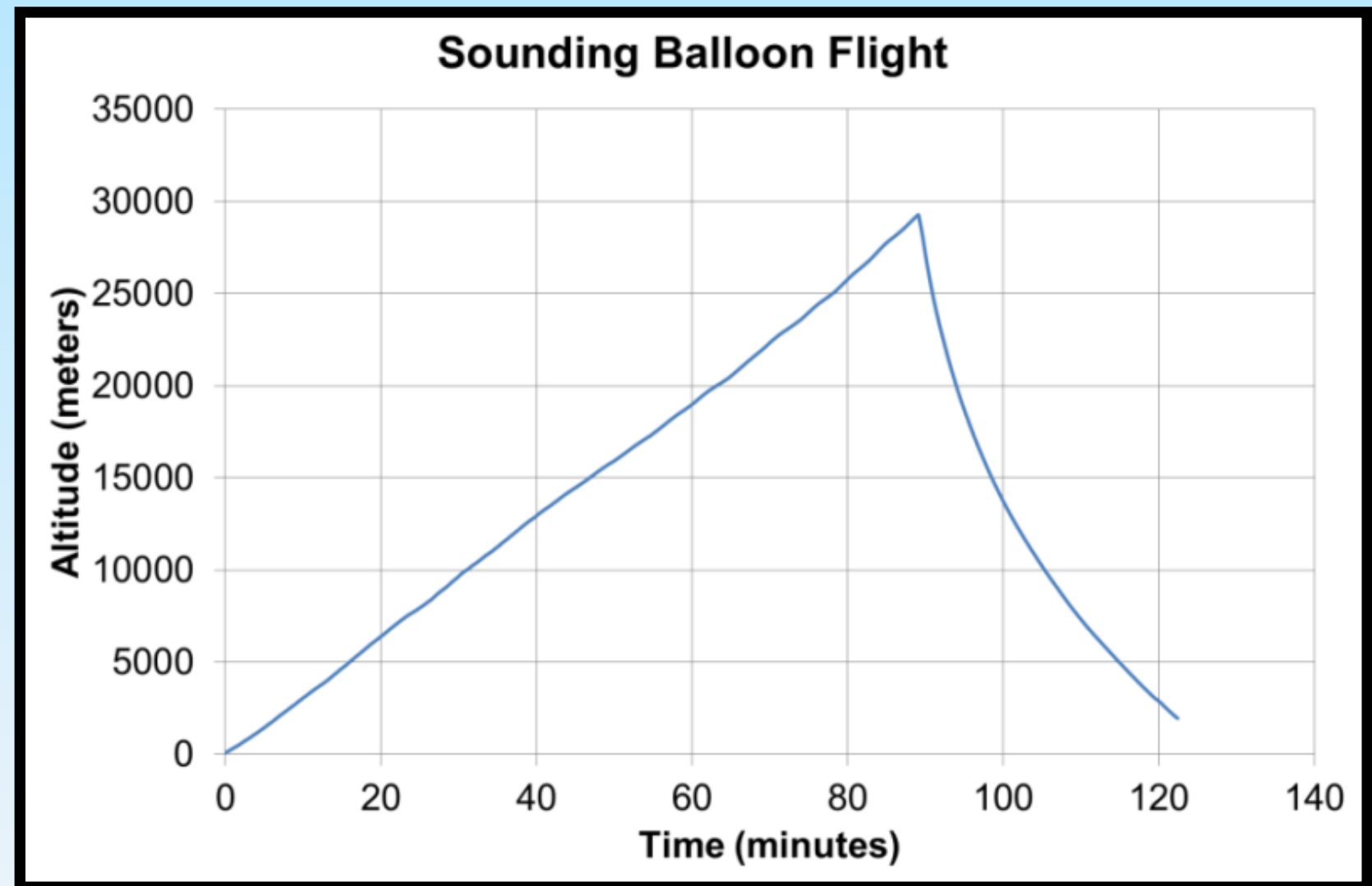
- Virtual Access:
the data acquired during those flights will be collected and made publicly accessible on a dedicated web portal on www.hemera-h2020.eu



Sounding Balloons (SB)

Payload: up to 3 kg

Altitude: up to 30 km

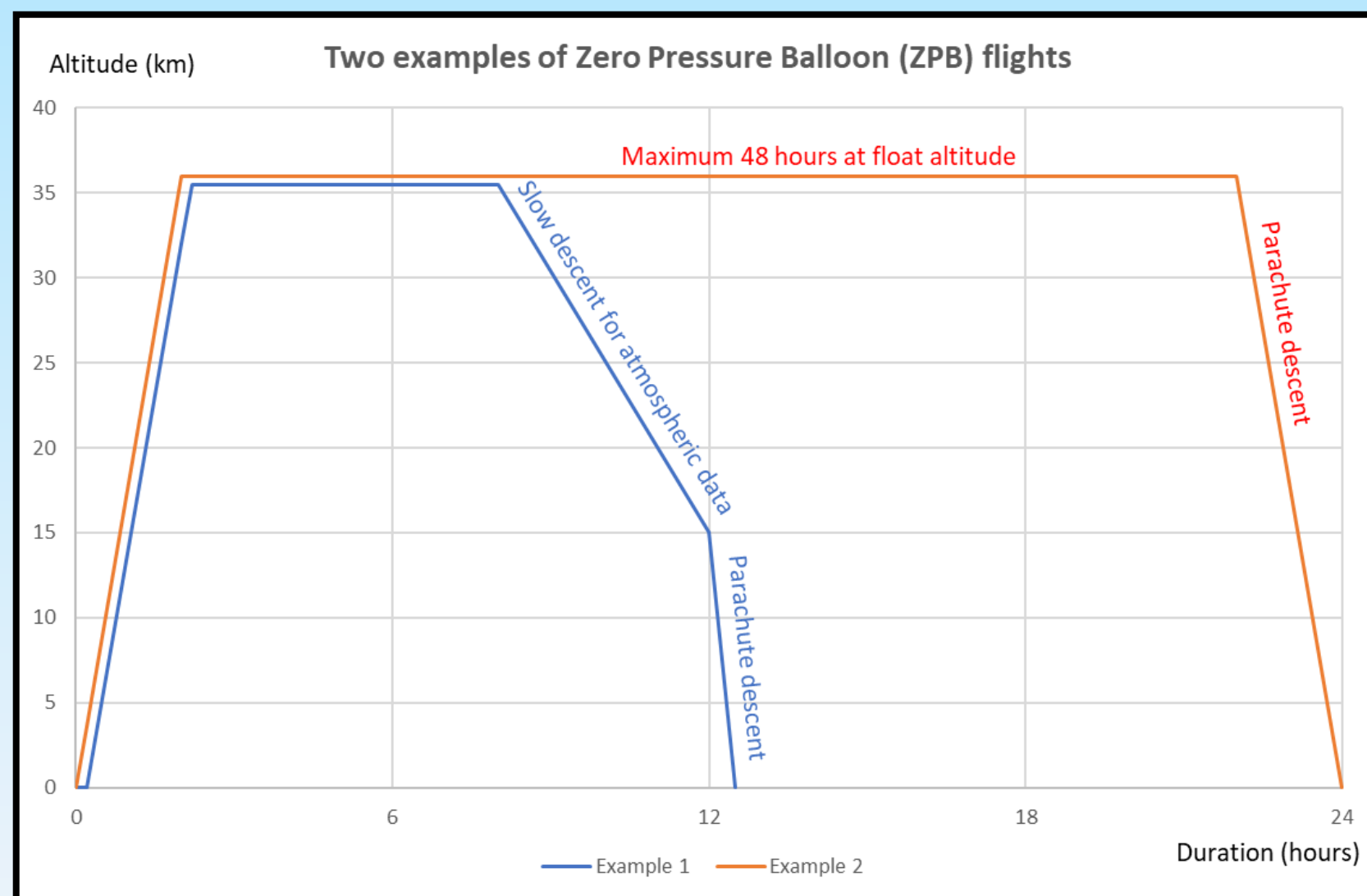
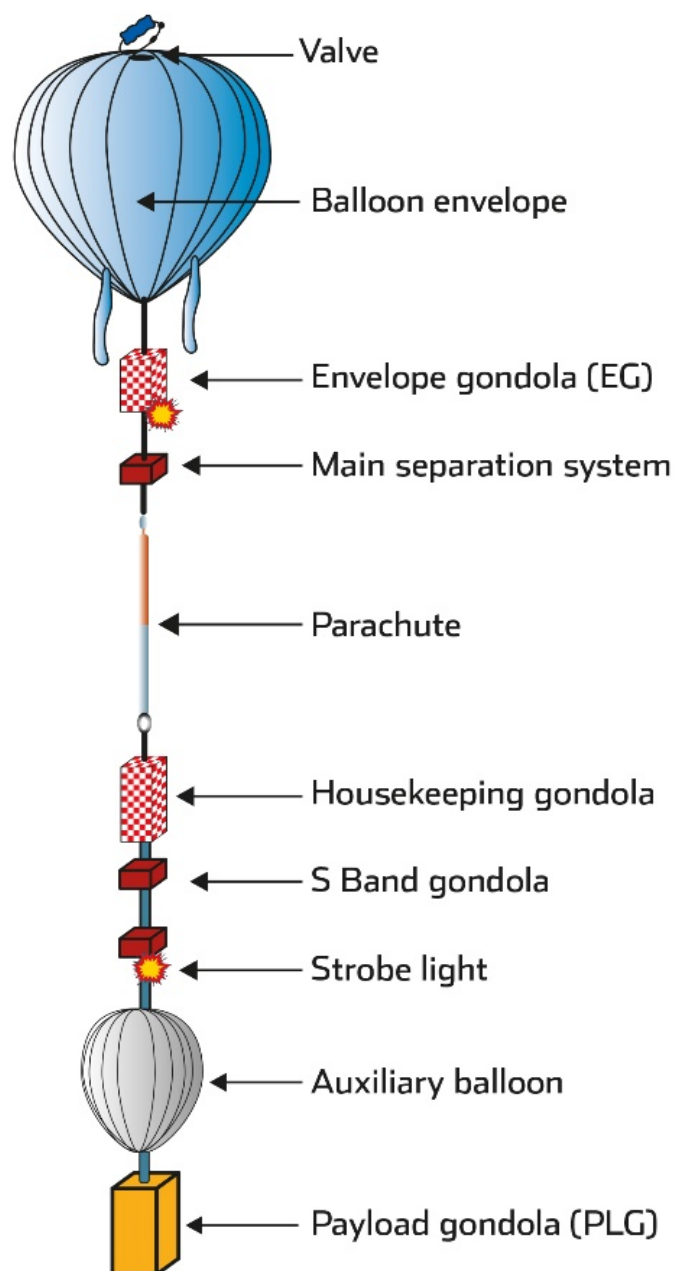




Zero Pressure Balloons (ZPB)

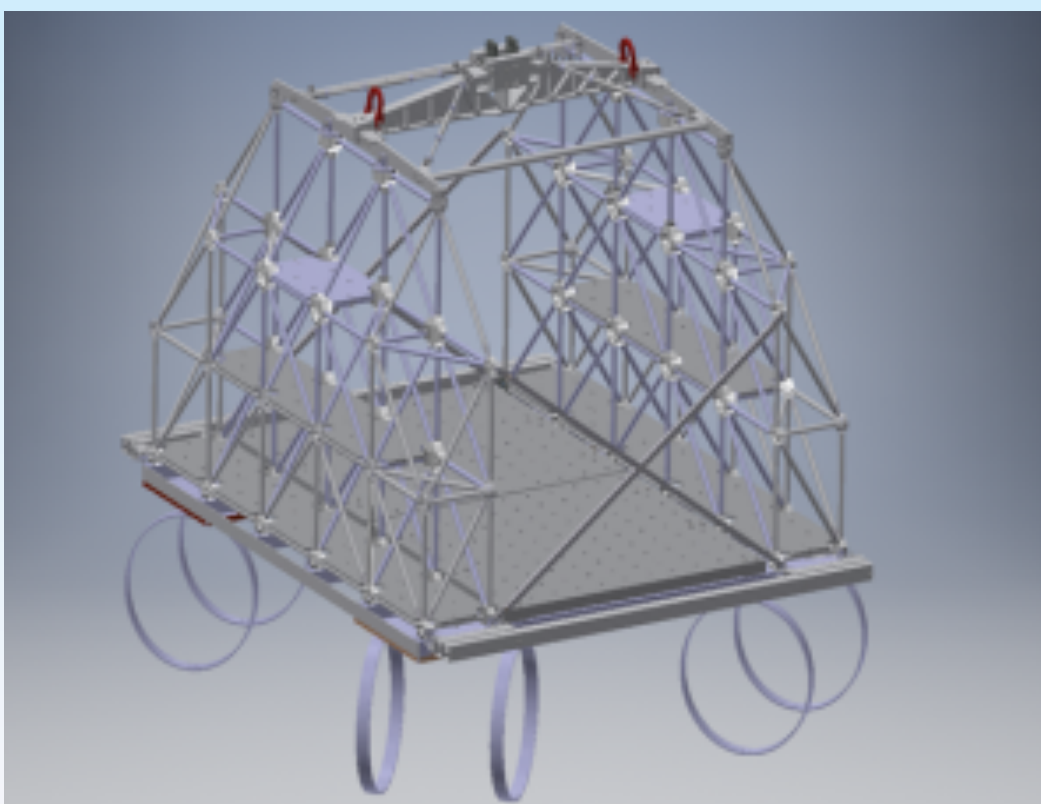
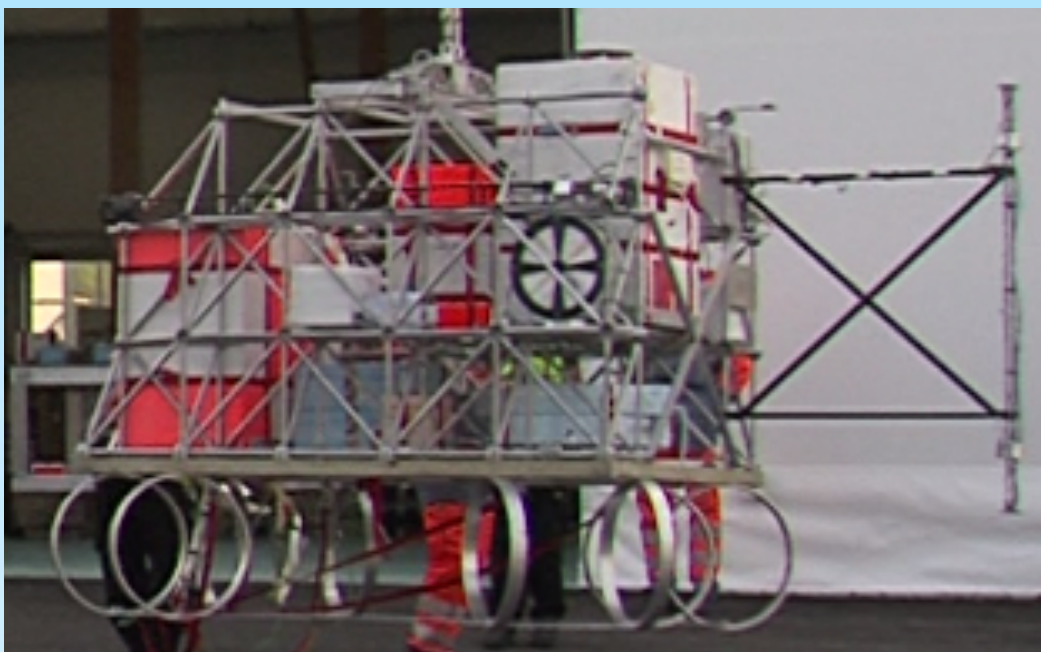
Payload: up to 150 kg

Altitude: up to 35 km

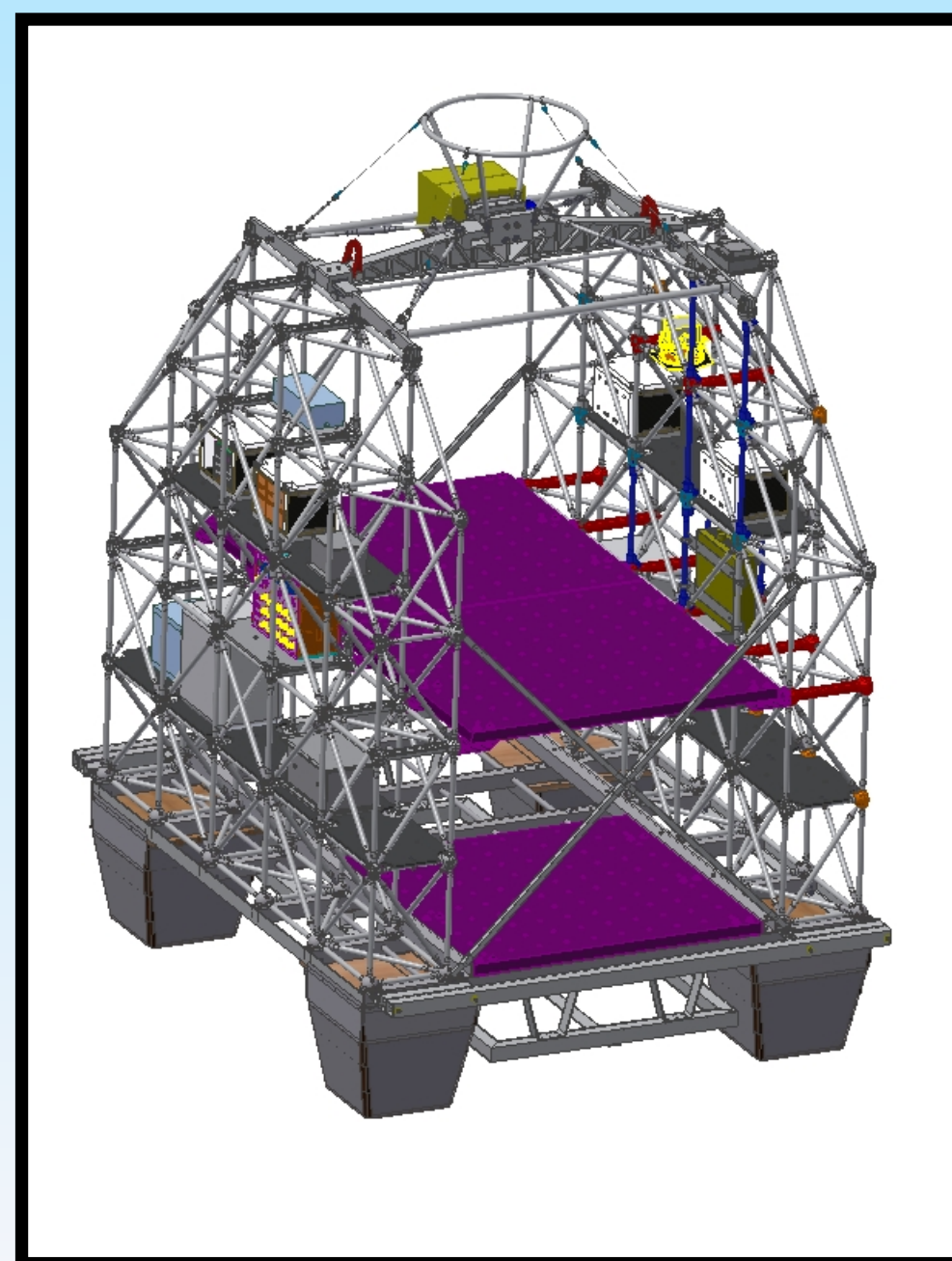




Zero Pressure Balloons (ZPB)



CNES gondolas up to 150 kg





What can you achieve with a stratospheric balloon payload?

- Useful in all science fields where a stratospheric vantage point is needed
- Contribute to Earth observation:
 - e.g. to atmospheric science in the fields of stratospheric chemistry and dynamics
 1. Upper Troposphere and Lower Stratosphere (UTLS) chemistry and dynamics
 2. lower atmosphere & remote boundary layer
- Contribute to astronomy and astrophysics in the fields of e.g.
 1. solar physics and cosmic ray physics
 2. infrared and microwave (CMB) measurements
 3. gamma ray astronomy



HEMERA LAUNCH SITES

Timmins (ZBP)

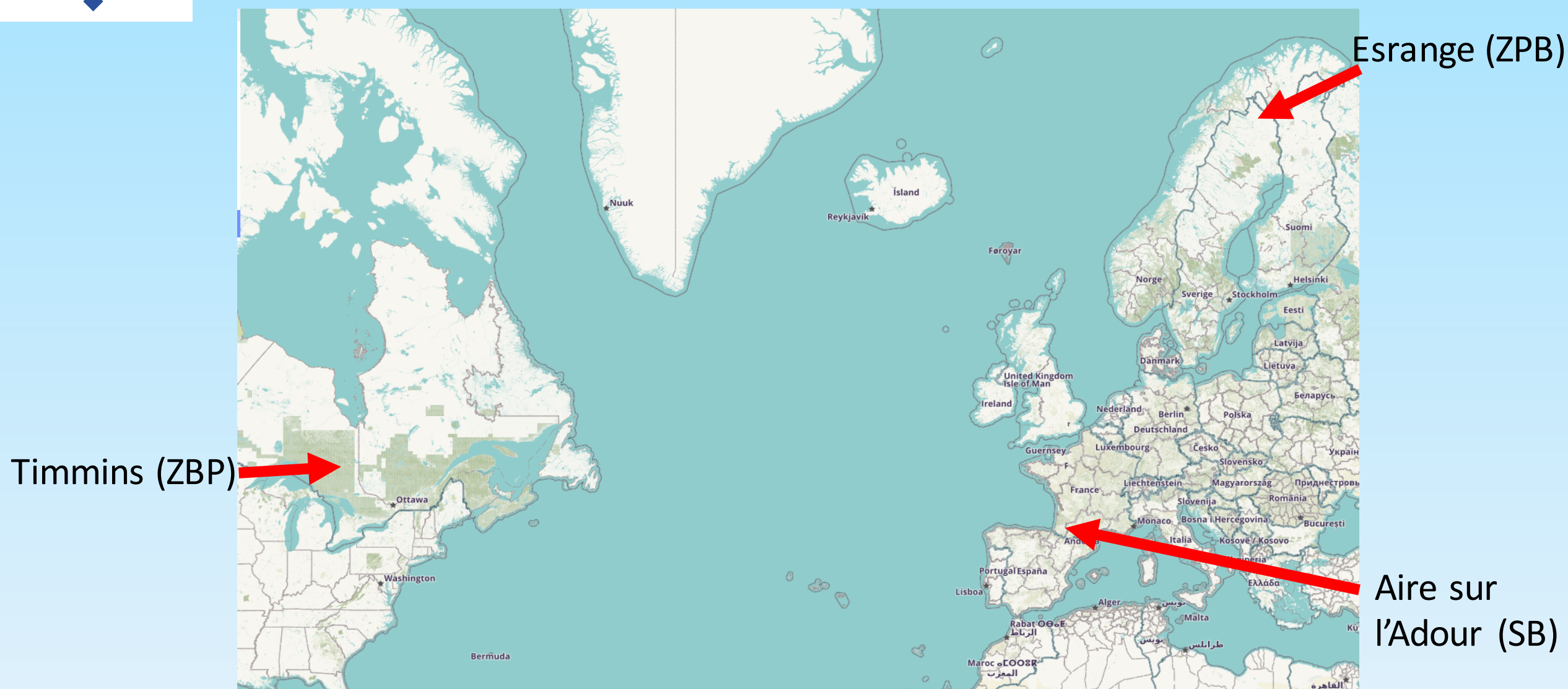


Esrange (ZPB)

Aire sur
l'Adour (SB)



HEMERA LAUNCH SITES

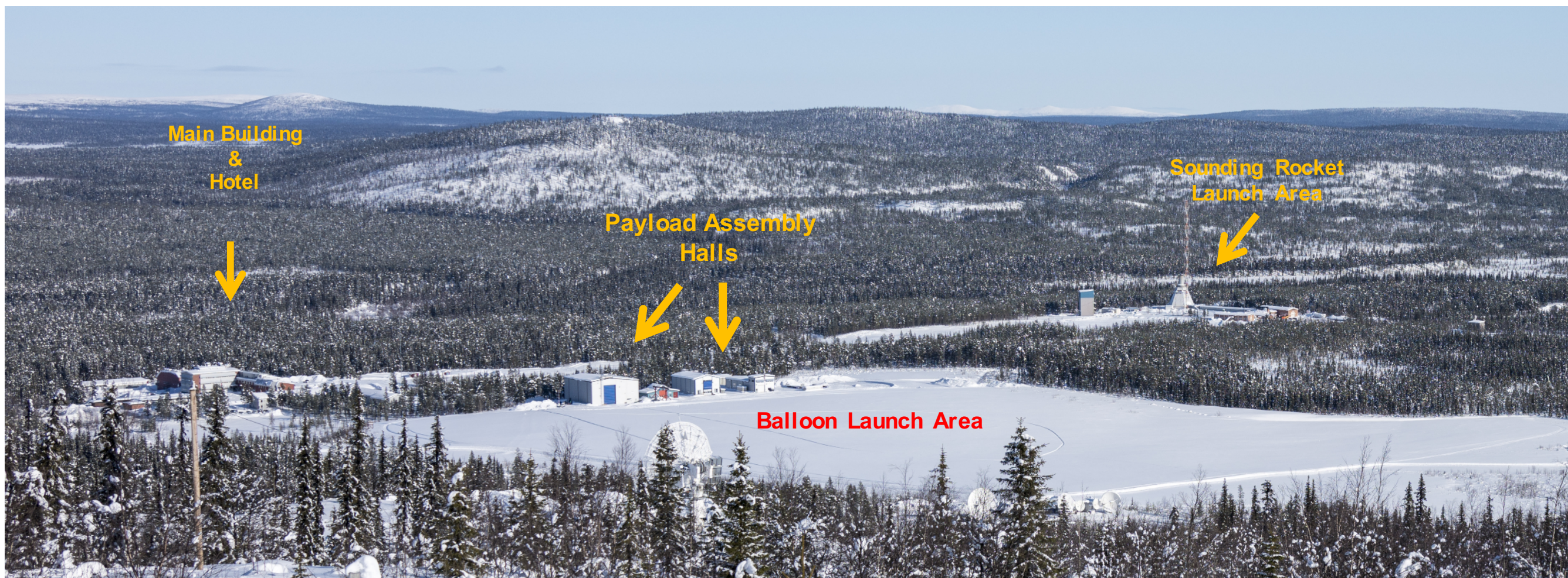


HEMERA is considering a new launch site in Trapani-Milo, Italy in order to perform medium latitude flights of 24 h. The direction of those flights will be to Spain in summer and to Turkey in winter.



Esrange Launch Site

Esrange is the space operations centre for SSC and it has been conducting balloon flights since 1974. The launch facility offers flights in air space with low air traffic density and over sparsely populated areas.





Timmins, Ontario, Canada

Timmins was selected in March 2012 as the Canadian ZPB launch site because of its favourable latitude, wind and weather conditions, low population density in areas surrounding the city and optimal on-site infrastructure.





Aire-sur-l'Adour, France

only for SB

Flights from Aire sur l'Adour have been conducted since the early 1960s. Aire sur l'Adour, located in southwestern France, is the main launch base of CNES and is also the home base for the CNES balloon operations team.



Aire-sur-l'Adour :

- Operational base for SB
- Facilities available for scientists
- Flights are performed all the year
- Compliant with safety rules
- Flight monitoring
- Recovery for all the experiments
- Actually, 2 scientific flights per month





HEMERA flights plan



- **6 flights** with ZPBs for up to 150 kg payload
 - 3 flights will be performed by SSC from Esrange near Kiruna, Sweden
 - 3 flights will be performed by CNES (1 x Esrange, 1 x Timmins, Canada, 1 x TBD)
- **20 flights** with SBs for up to 3 kg payload performed by CNES from Aire sur l'Adour, France
- **Gondolas** will be provided by CNES/SSC
 - several instruments will fly on one gondola
 - light instruments are preferred to allow more users to fly
 - all instruments/gondolas will be recovered
- **Flight levels** from 38 km down to 15 km can be reached
 - depends on total mass of payload and gondola

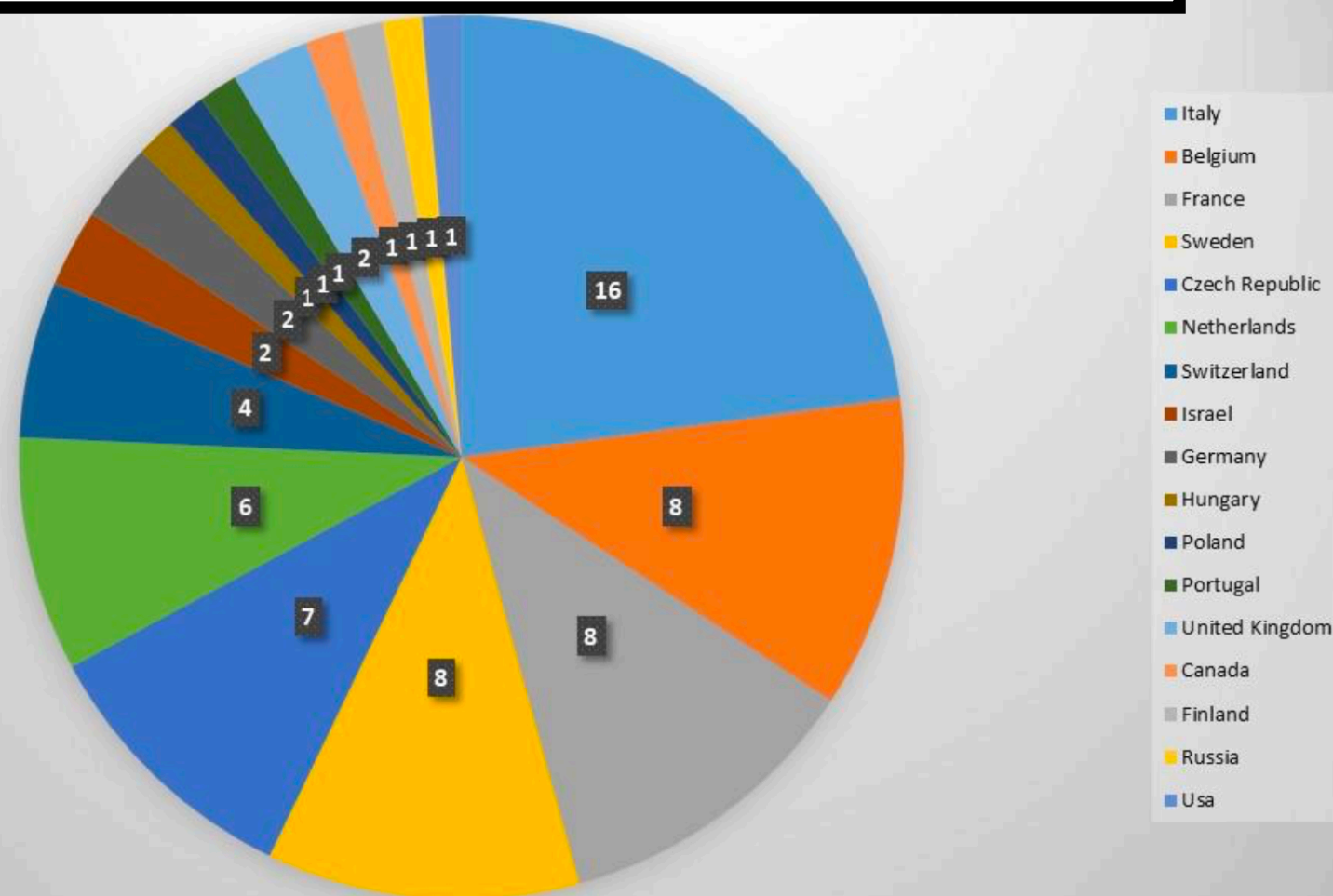


Call For Ideas

The CFI objectives were to assess the user needs and to support the definition of the following Call for Proposal issued in July 2018, for the experiment selection.

The CFI was open to all scientists and users from the European Union member states, from countries associated to Horizon 2020 and from Canada.

70 responses from 17 different countries





HEMERA Timeline

- July 2018: First Call for Proposals
- October 2018: Submission of Proposals
- January 2019: Selection of Payloads
- **August/Sept. 2019: First flight possibility with CNES and SSC**
- September 2019: HEMERA Summer School
- December 2019: Second Call for Proposals
- **From Jan. 2020: Second flight possibility with CNES and SSC**
- February 2020: Submission of Proposals
- May 2020: Selection of Payloads
- Summer 2020: HEMERA dedicated workshop in Rome
- End 2020/2021: Flight possibility with CNES and SSC



HEMERA Event

- **Summer School** in Heidelberg, Sept. 9 to 13, 2019 for Students, Scientists and Engineers

Themes:

1. Fundamental aspects of relevant atmospheric physics & meteorology
2. Balloon-related technology and safety
3. Scientific and industrial applications astronomy, meteorology, air chemistry and physics material design and space qualification of instrumentation

- **HEMERA Workshop** in Autumn 2020 in Rome





Conclusions

- HEMERA is a new European Infrastructure for scientific ballooning
- It offers stratospheric flights for small to medium payloads at no cost
- Second Call for Proposal will be issued in December 2019

**More information at Hemera website:
www.hemera-h2020.eu**



Thank you

