Funded by the Horizon 2020 framework program of the European Union
GA 730970

HEMERA

Joint Research Activities
Balloons technologies

HEMERA Work Packages structure

WP 1 : Management **CNES**

WP 2: VA1: Virtual access to HEMERA data **CNRS**

VA

WP 12 : Ethics requirements **CNES**

WP 10: JRA1: Innovation for balloons infrastructures, standardization **CNES**

Task 10.1: Envelopes **AIRSTAR**

Task 10.2: Telemetry **ASI**

Task 10.3: Low cost, long duration, lightweight flight train **CNES**

Task 10.4: New launch methodologies, tools for safety **SSC**

WP 11: JRA 2: Innovation on sensors and algorithms for balloon-borne research **CNRS**

Task 11.1: Set of lightweight innovative instruments **CU**

Task 11.2: Tools/algorithms **CNRS**

Task 11.3: Infrared hyper spectral imagery **KIT**

JRA

WP 3: NA1: Call for ideas and proposals, experiments selection **SNSB**

WP 6: NA2 : Dissemination, outreach **INAF**

WP 7: NA3: Training, education **UHEI**

WP 8: NA4: Enlarging the community **KIT**

WP 9: NA5: Other potential launch sites **ASI**

NA

WP 4: TA1: TA to SSC installations **SSC**

WP 5: TA2: TA to CNES installations **CNES**

TA

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

Let us make a focus on WP dedicated to flights improvement

Better, faster, cheaper

How can we improve stratospheric balloons flights ?

BETTER

FASTER

CHEAPER

Better, faster, cheaper

How can we improve stratospheric balloons flights ?

BETTER

- Flight Duration
- Flight place
- Payload mass
- Payload telemtry
- Pointying accuracy
- Power available
- Enveloppe quality
- …..

FASTER

- Launch weather
- Launch method
- Recovery easiness
- …..

CHEAPER

- Hydrogen
- Flight chain simplification
- Paylod interface standardization
- ….

Better, faster, cheaper

How can we improve stratospheric balloons flights ?

BETTER

- Flight Duration
- Flight place
- Payload mass
- Payload TM/TC
- Pointyng accuracy
- Power available
- Enveloppe quality

FASTER

- Launch weather
- Launch method
- Recovery easiness
- …..

CHEAPER

- Hydrogen
- Flight chain simplification
- Paylod interface standardization
- ….

Joined Research Activities aims at improving balloons technologies and at fostering cooperation in balloonings technologies, at European level

New Launch site study

	ZPB size	Mass at hook	To	Float	Duration	Slow descent	Recovery
Brazil, Teresina & Palmas	5k m^3 to 800k m^3	150 kg to 2000 kg	East and West	30 to 40 km	38h max	Until 15 km	Brazil
Morocco, Guelmin	10k m^3 to 800k m^3	10 kg to 2000 kg	East	30 to 40 km	40 h max	NA	Morocco
Italy, Sicily	10k m^3 to 800k m^3	10 kg to 2000 kg	West to South of Spain	30 to 40 km	24 h max	Until 15 km	South of Spain
Kenya, Malindi	10k m^3 to 100k m^3	10 kg to 200kg	West and/or East (depending on year)	30 to 40 km	4-6dd max	Until 15 km	Sea / islands / Kenya / South America (e.g.
Antarctica, Troll & Zuchelli	10k m^3 to 1200k m^3	10 kg to 2000kg	Circumpolar	30 to 40 km	60dd max	Until 15 km	Antarctica
Svalbard	10k m^3 to 1200k m^3	10 kg to 2000kg	Circumpolar	30 to 40 km	40dd max	Until 15 km	Canada/ Greenland America

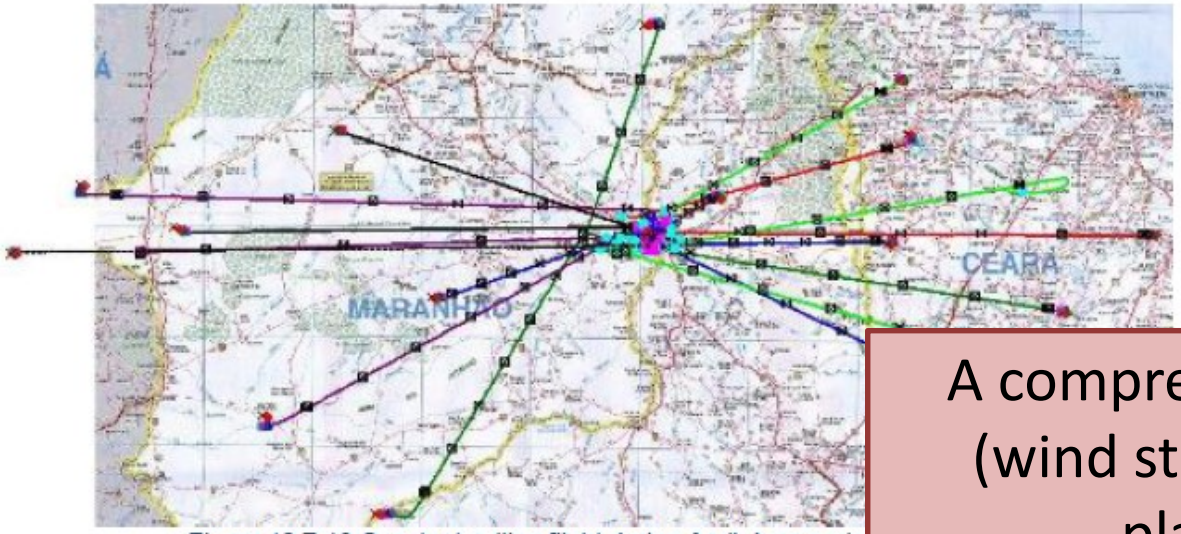


Figure 12.7.10 Constant ceiling flight during April-June perio

A comprehensive study (wind study, recovery places, …)

Launch Place

Launch method

Balloons Enlarging

Flight strain simplification

TM/TC Improvement

Pointying accuracy

New Launch method review

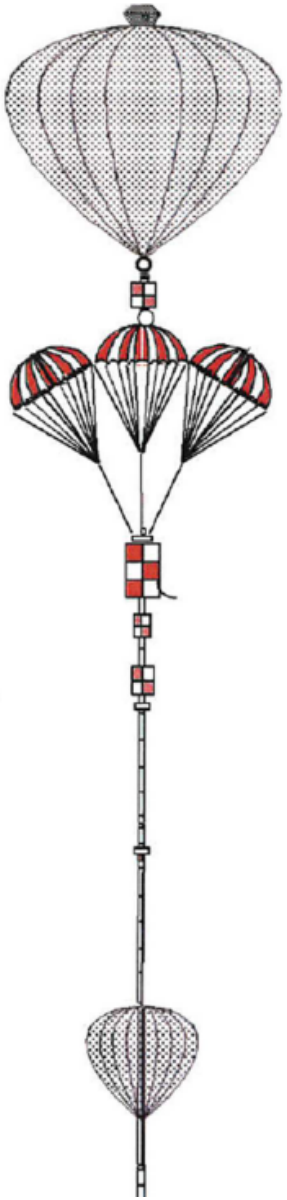
Launch with Hercules Vehicle

Balloon enveloppe : range enlarging

ENIM Air Space

A large balloon (900 000m3) developed for the European scientists

Flight train standardization



70 m

Ballon 150 OOO m^3
- 460 kg
- Ø 70 m

Envelope Gondola
- GPS localization
- ATC beacon

30 m

Tri-parachutes
- 420 m^2
- 60 kg

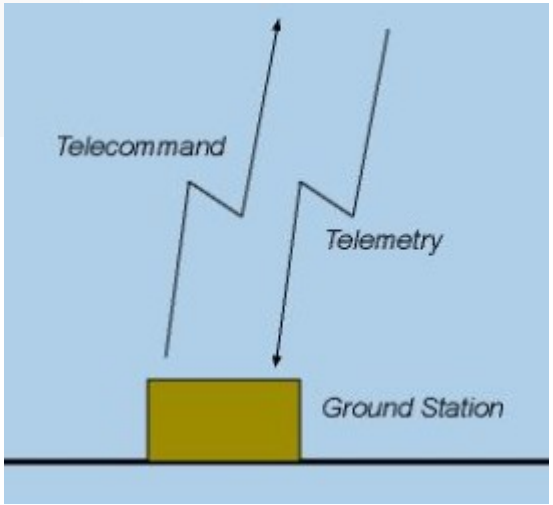
House-keeping gondola (170 kg without ballast)
- Band-S antenna gondola
- Strobe light gondola

100 m

Fly train simplification aims at improving the infrastructure efficiency

Telemetry System Improvement

LEN
SCIENTIFIC LABS
Laboratori Scientifici



- Launch Place
- Launch method
- Balloons Enlarging
- Flight strain simplification
- TM/TC Improvement
- Pointying accuracy

New telemetry to ease the communications with scientific payloads

Gondola : Pointying accuracy improvement

Pointying accuracy is a key factor in Astrophysics Balloon experiment

CONCLUSION

Thanks to HEMERA R&D Work Packages,

balloon technologies were improved **on the whole balloon chain**,

from the launch method to the gondola improvement