



# WE HELP EARTH BENEFIT FROM SPACE

## BRINGING YOUR EXPERIMENT INTO SPACE

Science Service Division

SSC - Swedish Space Corporation

Space exploration with ESA: opportunities within the ESA  
programme E3P

Stockholm, 13 November 2018



# SWEDISH SPACE CORPORATION



SSC is a public company owned by the Swedish government  
500 employees in 20 locations in 10 countries

- 1962 Building of Esrange starts
- 1966 First rocket from Esrange
- 1972 SSC and SNSA founded
- 1974 First balloon from Esrange to the Ural mountains
- 1978 First satellite antenna station at Esrange
- 1986 First SSC developed satellite

# SSC – PART OF SWEDISH SPACE POLICY

## TWO ASSIGNMENTS



- **Public assignment**

Space services that supports science and technology development based on *Esrang Space Center*

- **Commercial assignment**

Global commercial business in the space domain

**The two assignments support each other:**

- Esrang is an integral and fundamental part of SSC's brand and position in the global space industry
- The commercial business contributes financially to the development of Esrang

## BUSINESS AREAS





# BRINGING YOUR EXPERIMENT INTO SPACE



- SSC is working in close cooperation with scientist and agencies to realise experiments in space
- SSC experience:
  - 50 experiment modules developed and flown on microgravity rockets since 1977
  - 10 complete payloads for national sounding rockets
  - 24 parabolic flight experiments
  - 12 stratospheric balloon payloads
  - 4 space shuttle experiments



*Preparation of experiment cell for MASER 12*



*XRMON X-ray facility on parabolic flight*



*BIOMICS blood cells*



*Isothermal solidification experiment furnace, using X-ray source as diagnostic system*

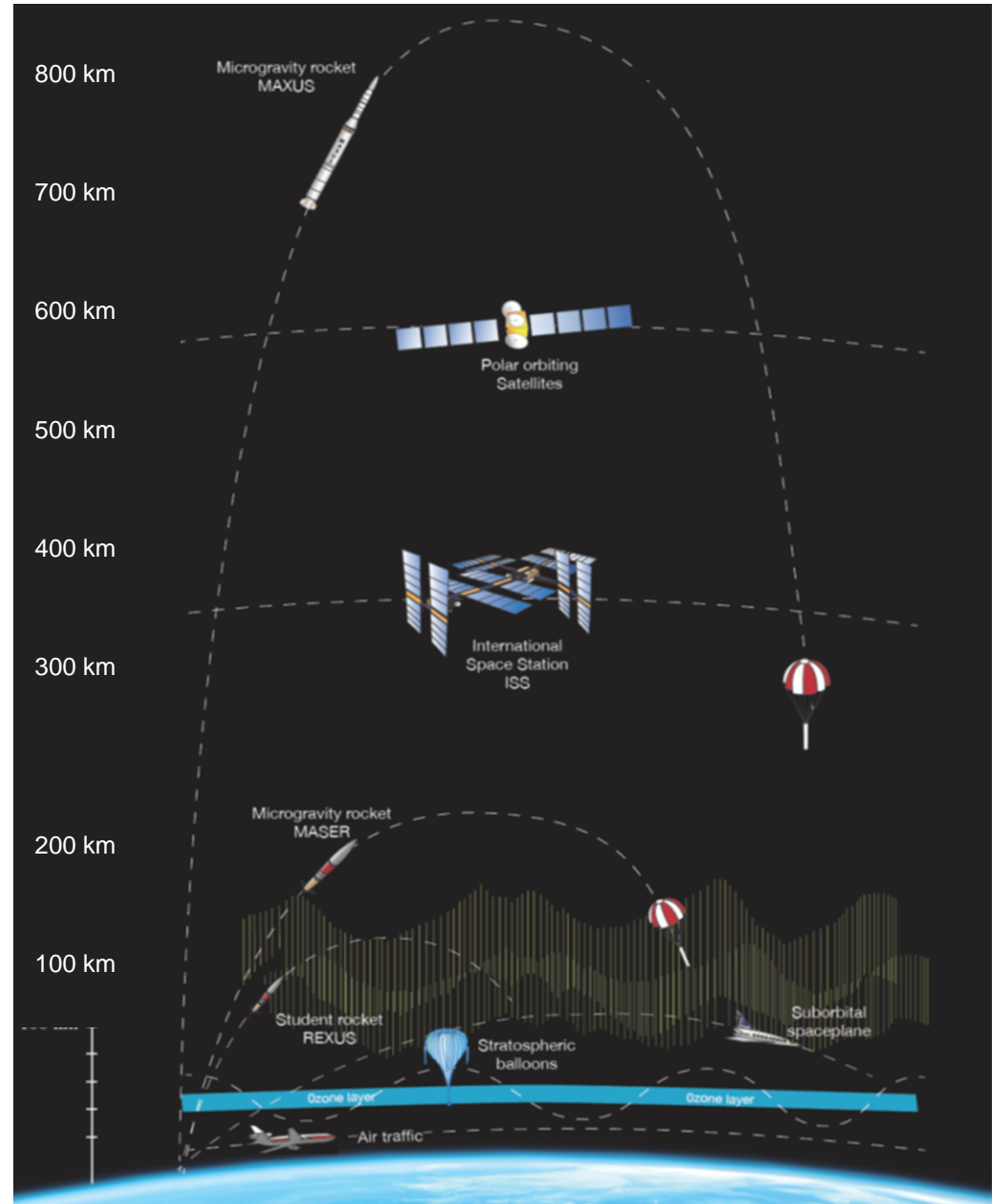
# SOUNDING ROCKETS

## CAPABILITIES

- Altitude between 60 – 1000 km, (flight time 3-15 min.)
- Payload mass up to 700 kg
- Late access (30 min. before lift-off)
- Fast and reliable land recovery (1-2 h)
- Few safety constraints
- Short lead time from idea to flight
- Dedicated flight opportunities
- Excellent  $\mu\text{g}$  levels ( $\sim 1 \times 10^{-6} \text{ g}$ )
- Low cost

**Frequent, fast and easy  
access to space !**

Public



# SOUNDING ROCKETS

## TYPE OF MISSIONS

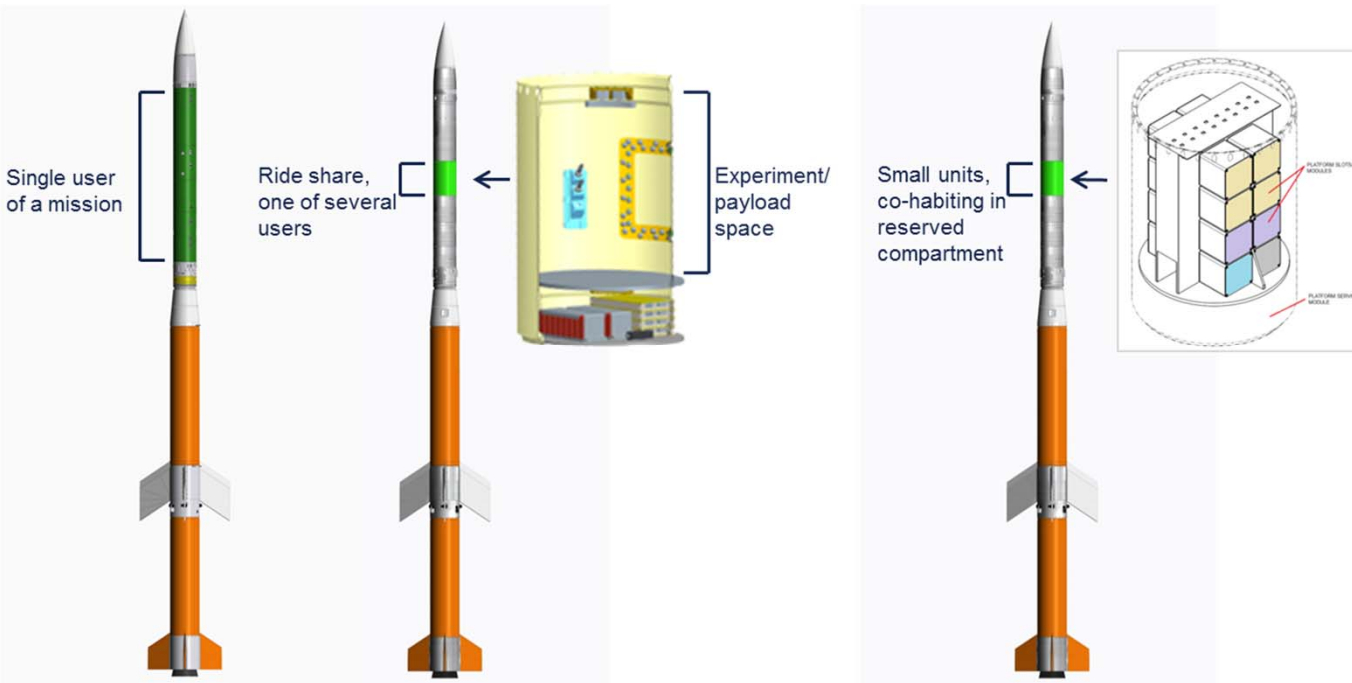
- Ionospheric physics
- Astronomy
- Plasma physics
- Atmospheric physics
- Astrobiology
- Research using microgravity
  - Fluid
  - Biological
  - Fundamental physics
  - Material,...
- Technical tests
- Drop and re-entry tests, Exploration





# BOOK YOUR FLIGHT TICKET!

## LAUNCH OPPORTUNITIES ON MASER OPEN NOW



## World class flight ticket concept for your space mission!

SSC offers frequent flight ticket opportunities on the MASER sounding rocket for your scientific experiment, technology demonstrator or your choice of payload

## Launch Opportunities

MASER 14	May 2019	Fully booked
MASER 15	Nov. 2020	Open
MASER 16	May 2022	Open
MASER 17	Nov. 2023	Open

# STRATOSPHERIC BALLOONS

## TYPE OF MISSIONS & CAPACITY

### Type of missions:

- Atmospheric physics
- Astronomy/astrophysics
- Astrobiology
- Climate research
- Drop and re-entry tests, Exploration

### Capacities:

- >2000 kg lift capacity
- 20-42 km flight altitude, low temp and pressure, dry air, high radiation levels – analogue to Mars surface conditions.
- 1-14 days flight time
- Real time data and commanding





# STRATOSPHERIC BALLOONS

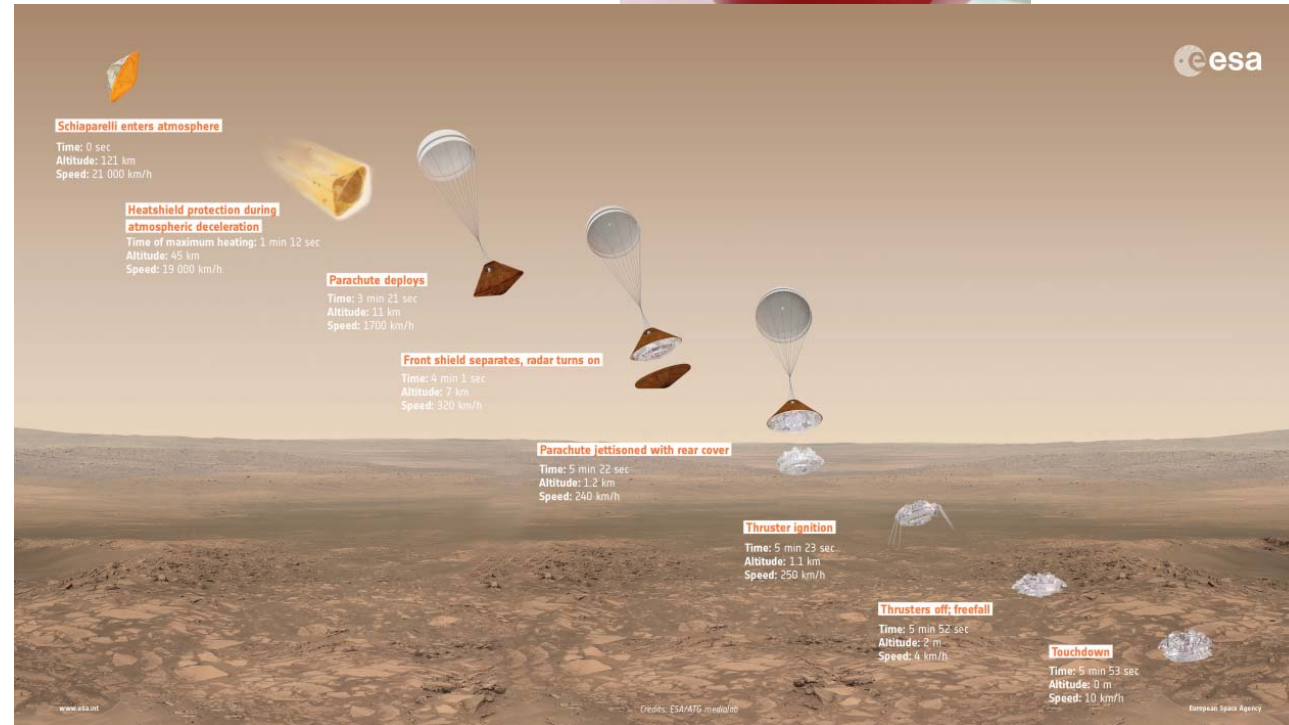
## FLIGHT TRAJECTORIES



# EXPLORATION

**ESRANGE an ideal site for drop and re-entry tests using rockets and balloons, for planetary exploration**

- Utilizing restricted airspace and large land impact area, uninhabited
- Testing of reentry capsules, landers and parachutes
- Examples of Exploration tests:
  - ExoMars HADT 2018
  - Super-MAX 2017
  - ERC 2015
  - SHADT 2014





# REXUS / BEXUS

## ROCKET AND BALLOON EXPERIMENTS FOR UNIVERSITY STUDENTS



- Bilateral program by DLR and SNSA with ESA collaboration.
- 20 European university student teams each year
- Unique opportunity to develop and fly experiment on balloon or rocket
- Technical execution, student support and program management performed by SSC and ZARM
- Vision to attract and educate young people in Space activities



### REXUS

- 2 Sounding Rockets each year
- Project Cycle approx. 15 month
- 70-80km alt. / <2,5min reduced g

### BEXUS

- 2 Stratospheric Balloons each year
- Project Cycle approx. 10 month
- 25-30km alt
- 3h flight





# ESRANGE

THE MOST VERSATILE SPACE CENTER IN THE WORLD



## SCIENCE & LAUNCH SERVICES



Sounding Rockets



Technology Demonstrations

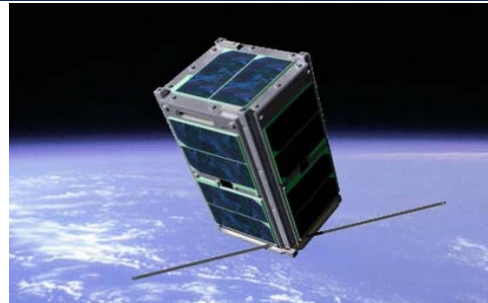


Stratospheric Balloons

## UNDER DEVELOPMENT



Reusability Test-Bed



Launching of Small Satellites

## SATELLITE GROUND NETWORK SERVICES



Satellite Ground Network

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