

# Swedish Space Corporation

**Olle Persson**

**Head of Flight Safety & Operation**



# 50 years in space



- 1961 The first rocket launch from Sweden
- 1962 Building of Esrange starts
- 1966 First rocket from Esrange
- 1972 SSC founded



# A comprehensive space industry



## Space Systems

- Satellite systems
- Satellite payloads



## Science Services

- Rocket systems
- Payloads
- Rocket & balloon launch services



## Aerospace Services

- Flight test services



## Satellite Operations

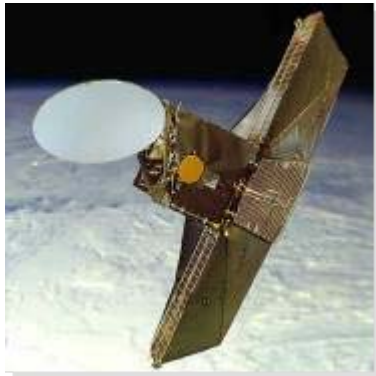
- Satellite control
- Satellite communication
- Data reception
- Teleport services
- Engineering services



## Airborne Systems

- Airborne maritime surveillance systems
- Economic zone protection
- Environmental protection
- Border/fishery control
- Ship traffic management
- Search and rescue
- Ice patrol

# Innovation and reliability since 1972



**6 scientific  
satellites**



**60 rocket  
systems**



**60 experiment  
modules**



**500 rocket  
launches**



**550 balloon  
launches**



**60 maritime  
surveillance  
systems**



**communication  
with more than  
100 satellites**



# Future



## Circum Polar Flights

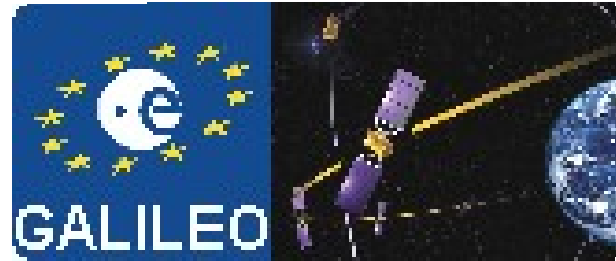




# Future



# Important Customer & Project



European Union Satellite Centre



# A German-Swedish Collaboration for

## Student Experiments at Esrange/Sweden



Rymdbolaget/Swedish Space Corporation





# REXUS / BEXUS

vision



- **Attract young people in Space activities by promoting sounding rocket and balloon activities**



# REXUS/BEXUS

## Programme



- A cooperation between Germany (DLR) and Sweden (SNSB) signed on 4 June 2007

Providing German and Swedish/  
European university students the  
opportunity to every year launch  
experiments on:

- 2 sounding rockets
- 2 stratospheric balloons



# REXUS / BEXUS

## BEXUS



- Balloon: Zodiac 12SF
- Size: 12 000 m<sup>3</sup>
- Gondola: 1,5 x 1,5 x1,5 m
- Payload mass: up to 400kg
- Experiment mass: 40 – 100 kg
- Float altitude: 25 – 35 km
- Flight duration: 2 – 5 hours
- Up & downlink: Up to 2Mbit via Ethernet
- Position data: GPS
- Power: as requested by the experimenters *but may be limited due to payload mass limitation*



# REXUS / BEXUS

## BEXUS flight ticket

- General management and planning of the BEXUS project
- Balloon and subsystems necessary for a flight mission of 2 – 5 hours with recovery
- Integration of participating modules into the flight configured payload and testing of payload
- Transport of modules from the integration facility to Esrange
- Payload assembly and testing at the range
- Laboratory facilities at the range
- Launch and recovery
- Data acquisition of real time, quick-look and playback data from gondola and payload subsystem
- Disassembly of recovered payload and return of experiment
- Post flight report



# BEXUS





# REXUS / BEXUS

## REXUS



- One stage improved Orion rocket
- Payload capacity: 100 kg
- Experiment mass: 35 kg
- Experimental space: two 14 inch modules ejectable nosecone
- One pop out hatch
- 5 experiment uplink channels
- 5 experiment downlink channels
- 3 axis accelerometer
- Roll, pitch & yaw gyros
- One video channel with possibility to switch between 2 experiments
- Power: 28V, 1 A per experiment
- Apogee: 90 – 105 km



# REXUS / BEXUS

## REXUS flight ticket



- General management and planning of the REXUS project
- Provision of launch vehicle and subsystems necessary for a spaceflight mission with recovery
- Lift-off signals
- Integration of participating modules into the flight configured payload and testing of payload
- Transport of modules from the integration facility to Esrange
- Payload assembly and testing at the range during 5 days (nominally)
- Laboratory facilities at the range
- Launch and recovery
- Data acquisition of real time, quick-look and payload data from modules and payload subsystem
- Disassembly of recovered payload and return of modules for retrieval of processed samples
- Post flight report





# REXUS / BEXUS

## Programme milestone



- **September:** Call for Experiment Proposals on the ESA Education Website
- **November:** Deadline for submission of proposals
- **December:** Notification of all proposing teams regarding their pre-selection or non-selection
- **Mid January:** Workshop with presentation by pre-selected teams
- **End January:** Final selection of proposals (primary and backup)
- **February:** Student training week at Esrange
- **May:** Student experiment Design Review for BEXUS and REXUS
- **Mid September:** Delivery of BEXUS experiment flight hardware to Esrange. Experiment Acceptance Review
- **Early October:** Flight Readiness Review Launch Campaign
- **October:** Critical Design Review for REXUS
- **December:** Submission of BEXUS final report
- **Mid February:** Delivery of REXUS experiment flight hardware to Esrange, Experiment Acceptance Review
- **March:** Flight Readiness Review launch Campaign
- **September:** Submission of REXUS final report



# REXUS / BEXUS

## Flown in BEXUS



### Timepix@space

Luleå University of Technology, Sweden  
Charles University Prague and Czech Technical University, Czech Republic

### Description of the experiment

- Detection of particles in the stratosphere using a hybrid imaging pixel detector from CERN
- Using innovative nanofilters combined with a strong airflow from a power-effective air pump to gather dust particles for study with advanced sample-return analysis techniques





# REXUS / BEXUS

## BEXUS



### Low Cost Inertial Navigation System

La Sapienza University of Roma, Italy

### Description of the experiment

- Design and validation of an inertial measurement unit with low cost sensors and components

### Icarus

Warsaw University of Technology, Poland

### Description of the experiment

- A study of lifting body technology by releasing a glider from the balloon and piloting it to a designated landing zone by remote control



# REXUS / BEXUS

## Flown with REXUS



### NISSE

University of Bergen, Norway

### Description of the experiment

- Water will be released into the ionosphere to form a cloud of ice crystals that will be visible from the ground. The water molecules will be ionized by solar radiation and travel along the magnetic field lines, forming patterns that will be analyzed using the EISCAT radar

### Itikka

Tampere University of Technology, Finland

### Description of the experiment

- A test of an inertial measurement unit. They will analyse its performance in the high acceleration, high angular velocity and high vibration environment and search for unexpected sources of errors



# REXUS / BEXUS

## REXUS

### VIB-BIP

Universitat Politecnica de Catalunya, Spain

### Description of the experiment

- A study of the behaviour of biphasic fluid in a microgravity environment when vibrations are applied to the system



# REXUS/BEXUS

## Conclusion



- The programme has so far been a success and the European students are enthusiastic with this new initiative
- We are having great fun
- See more at [www.rexusbexus.net](http://www.rexusbexus.net)



