PROBA
Project for On-board Autonomy

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PROBA Introduction

Project for On Board Autonomy

July 2000
• **ESA GSTP/TDP PROJECT**

• **Prime Contractor**: Verhaert Design & Development (BE)

• **Subcontractors**: Spacebel (BE), Space Application Services (BE), Space Systems Finland (Fi), SIL (UK), Université de Sherbrooke (Can), Officine Galileo (It)

• **Suppliers**

• **Instruments**: Agency Provided Items
Program kicked off 3/1998:
- Demonstration of on board autonomy
- In orbit validation of advanced spacecraft technologies
- Demonstration of scientific and application missions potential of a small spacecraft
Following initial spacecraft design, decision of a payload complement in 1998:

- **CHRIS**: Compact High Resolution Spectrometer
- **DEBIE**: DEBris In orbit Evaluator
- **SREM**: Standard Radiation Evaluation Monitor
- **MICRO-IMAGERS**
Mass : 100 kg
Volume :
   80cm x 60cm x 60cm
Mission life time 1 year
   (design for > 2 years)
• **Compact High Resolution Imaging Spectrometer**
  - 25 m resolution
  - 19 spectral bands (415 - 1050 nm)
  - Bi-directional Reflectance Distribution Function measurements
Imaging with CHRIS (BRDF measurements)

Earth Elevation:
- 0, +/-25, +/-44
• Earth Environment Instruments

SREM: Earth radiation environment

DEBIE: Sub millimeter debris population
PROBA Imagers

• High Resolution Camera
  • Panchromatic
  • 10 m ground resolution
  • 3D Packaging Technology CCD

• Wide Angle Camera
  • Miniaturised (7x7x6 cm)
  • CMOS Active Pixel Sensor
• All star agile spacecraft with on board GPS navigation
• Nadir and off Nadir pointing + manoeuvring (e.g. BRDF)
• On board flight dynamics (orbit, fly-by, …)
• No propulsion, natural drift away from SSO 2 deg/year
ACNS Components

- GPS receiver
- Redundant star tracker with dual head
- 4 Miniature Reaction Wheels
- 2 Magnetometers
- 4 Magnetotorquers

Performance objectives:
- 10 " over 10 s
- 150 " absolute (excluding thermo-elastic and navigation)
• S-Band, CCSDS TC/TM
• 2/3 visibilities every 12 hours
• Light out
• Imagers data distribution via network/web
• Interface to on board flight dynamics
• Raw data (level 0) stored in archive + quick look
• No science data processing

Redu (Belgium)
Integration of platform
August : integration of CHRIS
Currently unstable situation:
Nominal launch on PSLV: SSO at 817 km, I=98.7, end 2001, 2002
Earlier launch on PSLV: options SSO at 560 km, non SSO higher but < 700km
Other launchers
Objectives for the support of the CHRIS mission on PROBA:

• Set of 5 images per day
• Requests sorted by committee of PI
• Raw data (PPU format) available for retrieval on line
• Evaluation of performances and “tuning” during first 3 months of operations