CENTRE NATIONAL D'ÉTUDES SPATIALES

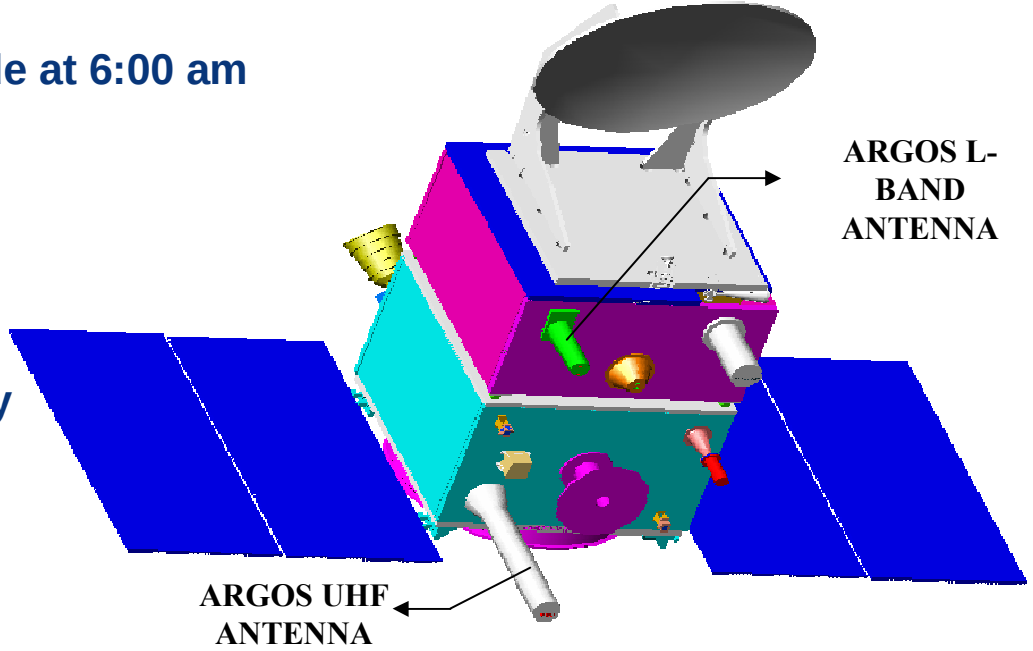
43rd ARGOS OPSCOM

New London, USA
June 2009

E13 –Argos DCS-3 / SARAL

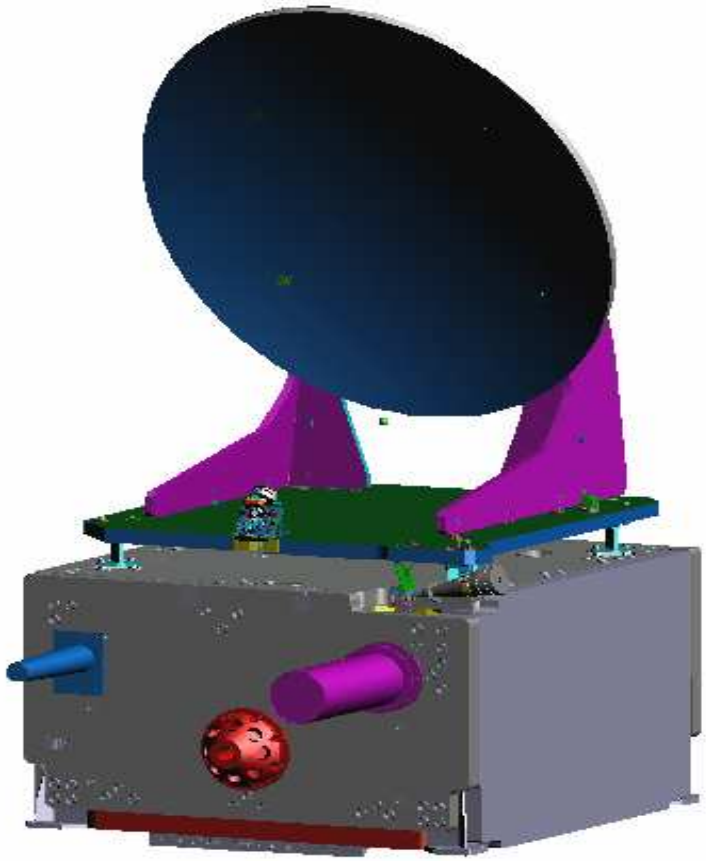
Argos-3 on SARAL

- French-Indian cooperation for one satellite with two missions: Argos-3 and AltiKa (altimetry in KA Band)
- Argos-3 payload mounted on the CNES payload module matted on the ISRO SSB platform
- Orbit:
  - Heliosynchronous orbit with ascending node at 6:00 am
  - 800 km altitude (100 minute orbit period)
- Satellite PDR planned in June 2009
- Ready to Launch in October 2010
- Argos instrument PFM1 with:
  - Hardware retrofit for TM corruption anomaly
  - New management software version 1.9

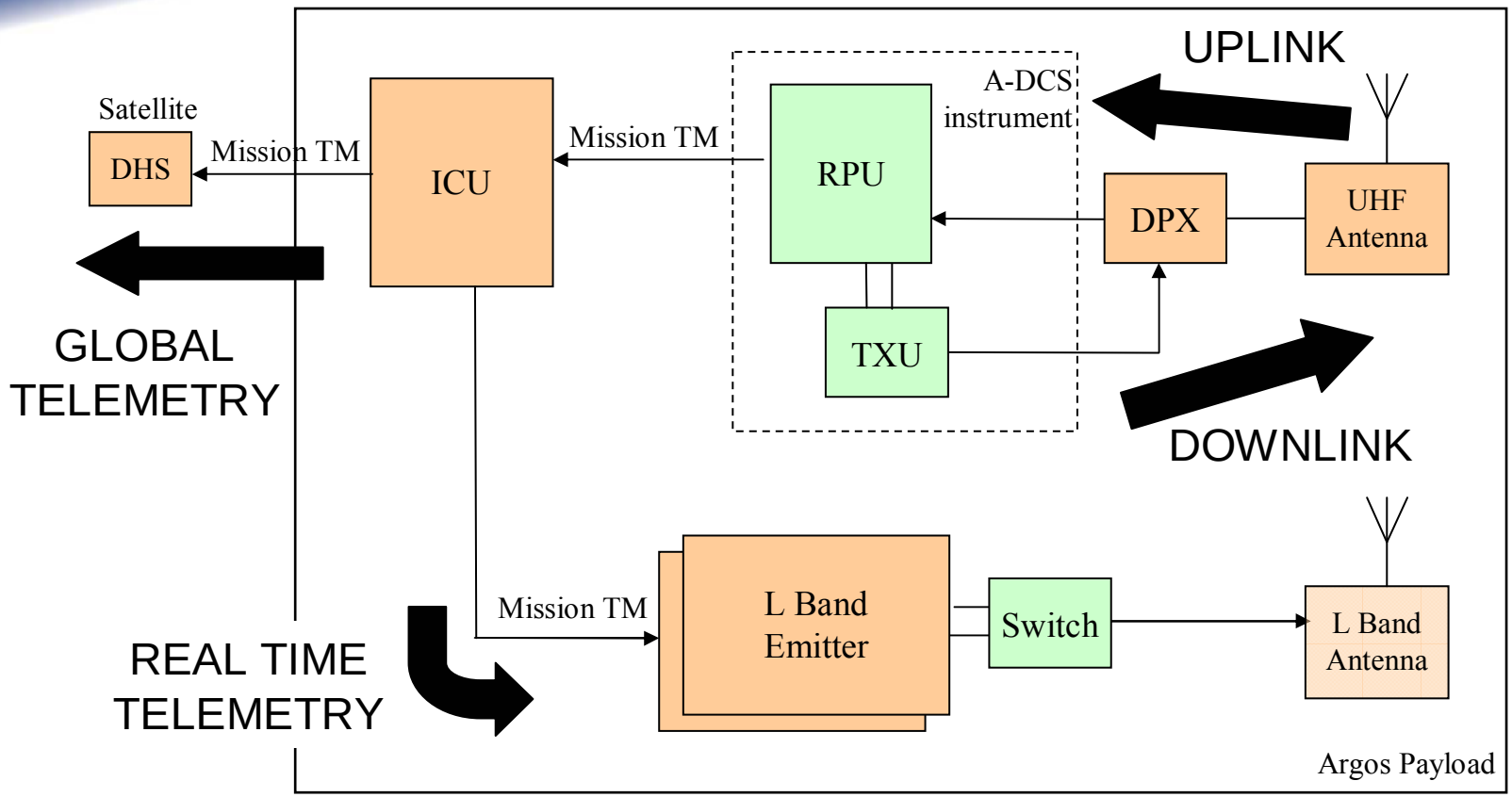


Argos-3 on SARAL

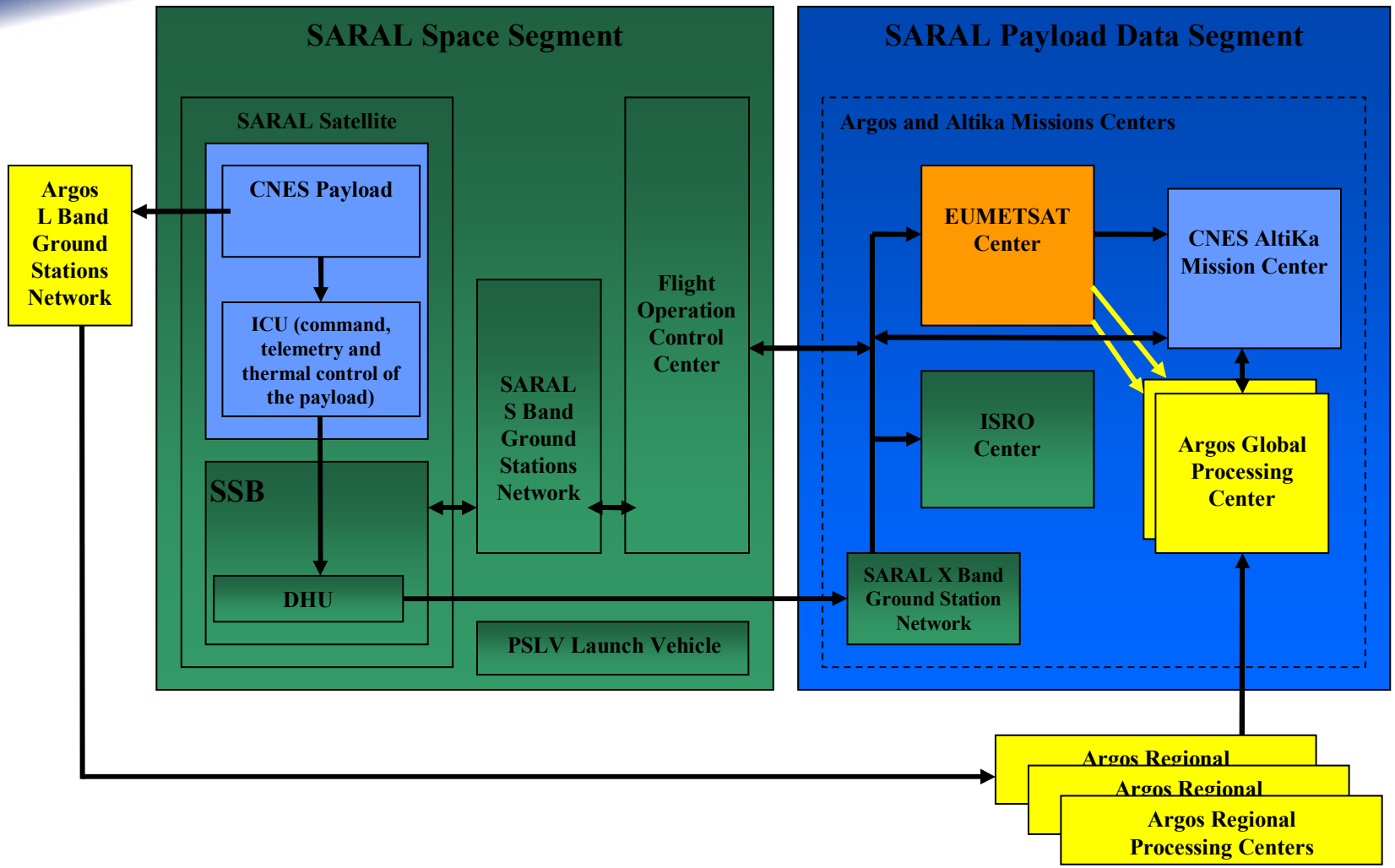
- Payload Integrated Module manufacturing by Thales Alenia Space Toulouse
- CDR planned in July 2009
- To be delivered early 2010
- UHF antenna will be accommodated on SSB platform



Argos-3 payload on SARAL



SARAL Project Organisation



Global Mode on SARAL

- The global mode is achieved by data dump over a high latitude ground station. All AltiKa and Argos data are dumped at <u>each</u> orbit

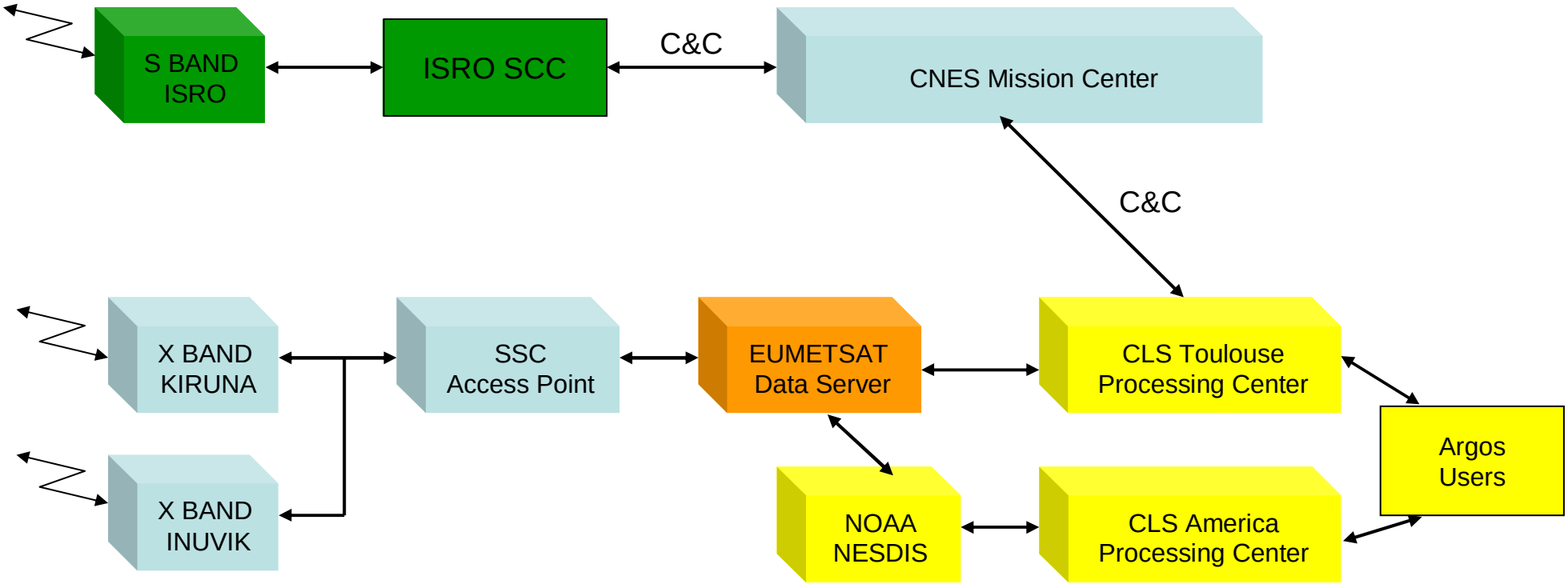
- X band transmitter is provided by the ISRO platform

- The high latitude X band receiving station is under CNES responsibility
  - Contract with SSC (Swedish Space Corporation) to get 14 pass every day
  - One station in Kiruna (Sweden), one in Inuvik (Canada)
  - One of the station will be owned by CNES and could be used for other programs.
  - At the beginning, CNES will buy a Service for SARAL .

- Data transmission from ground station to Eumetsat facilities (Darmstadt) should be done through existing data link

- Data transmission from Darmstadt to Argos processing centers should be done through existing data link .

SARAL Command and Telemetry Flew



Argos Local Mode on SARAL (real time telemetry)

- The local mode of the Argos-3 mission is achieved thanks to a L band downlink dedicated to Argos telemetry
- The L band downlink provides simultaneously regional data (real time) and the last 100 minutes of data (stored on board in a circular buffer of the ICU). This additional feature allows to reduce the latency time of the global data.
- The definition of the link is similar to
  - Metop HRPT for the data format (Advanced Orbiting System link protocol)
  - NPOESS for the channel coding and modulation TBC
- Data formatting and transmission is achieved by the Argos payload (Interface Control Unit and L band emitter)
- The frequency bandwidth is within the Metrological L Band.
  Frequency coordination has been done through CGMS and ITU-R.
- The L band frequency filing is now OK.

Real time downlink specifications

- Dedicated link at 1698,4 MHz with back up frequency at 1703 MHz
- 400 kbps downlink with QPSK modulation, convolutional (7,1/2) coding and differential coding
- CCSDS packet format with AOS frames data, Reed-Solomon encoding and CCSDS scrambling
- Three virtual AOS channels are transmitted
  - Real time data
  - Last 100mn of data corresponding to the last orbit of data transmitted every 3 minutes
  - Idle data for padding
- Link Budget is achieved for a 2,4m diameter antenna

=>Compatible with exiting L band receiving ground stations with minor upgrades

Impact of SARAL on the present L band network

- CNES contract for ugrading the L-band network with SARAL
  - Compatibility study has been done for the 3 Kongsberg CLS ground stations.
  - Development of a multi-receiver (handling POES-SARAL-METOP and NPOESS modulation coding and format) has started
  - Upgrade of the 3 CLS stations has started
  - Plan to upgrade up to 10 ground stations (with CLS partners)
  - 2 new stations will be developed (compatibility POES-METOP-SARAL-NPOESS)
- Need to establish network and processing upgrades to take into account SARAL in the Argos ground segment and in particular the "last 100 mn of data" transmitted with the L band downlink