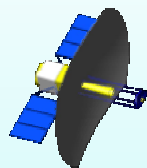


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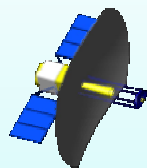


MISSÃO MAPSAR

Conclusões e Demonstração de Viabilidade

Fase A

***Mário Marcos Quintino
Coordenador do Programa de Satélites
De Aplicações da PMM - INPE***



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Task Division

National Institute for Space Research - INPE - Brazil

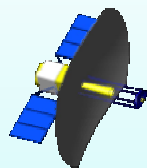
- **Satellite-Bus MMP (Multi Mission Platform)**
- **AIT (Assembly, Integration, Test)**
- **Systems Engineering**

German Aerospace Center - DLR - Germany

- **SAR Sensor**
- **Orbital Analysis**

Institute of Lightweight Structures – LLB, TU Munich - Germany

- **SAR Reflector Antenna**



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Conteúdo

1. Viabilidade

- **Objetivo**
- **Conceito de Fase A**
- **Abrangência**

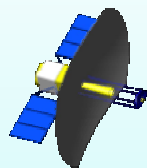
2. A PMM – Plataforma Multi-Missão

- **Descrição**
- **Desempenho**

3. Demonstração de Viabilidade

4. Conclusão

5. Perspectivas

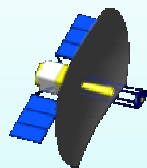


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1. Viabilidade

- ✓ ***Objetivo***
- ✓ ***Conceito de Fase A***
- ✓ ***Abrangência***
 - ✓ ***Aplicações***
 - ✓ ***Engenharia***

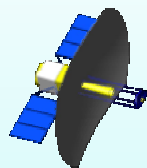


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✓ *Objetivo*

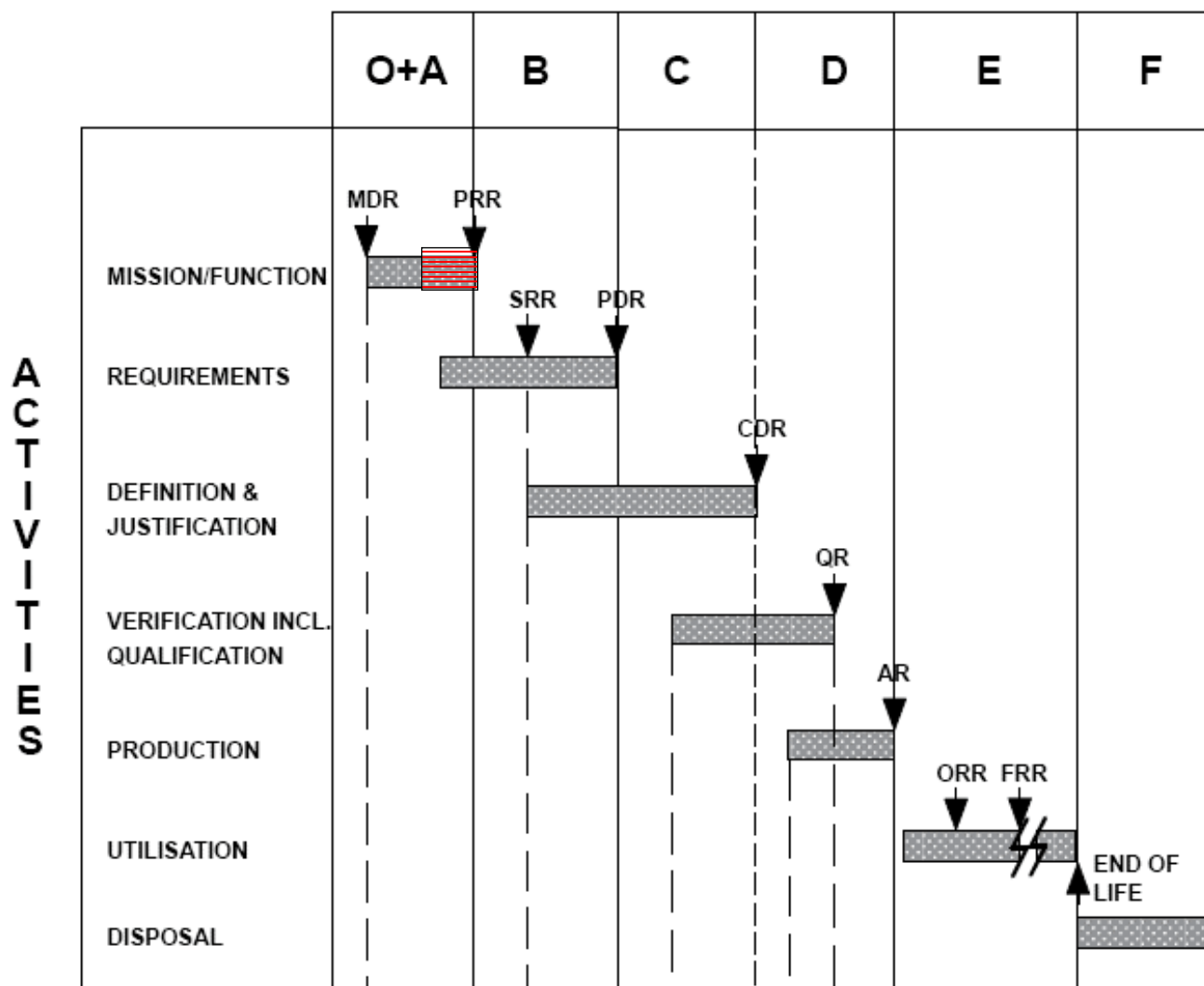
“ To verify the feasibility of a satellite on the 500 kg class mission with a SAR payload ”.

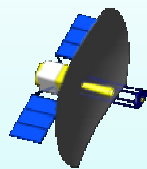


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✓ *Conceito de Fase A*





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✓ ***Abrangência da análise de viabilidade***

- ***Aplicações***

- ✓ ***Claramente demonstrada***

- ***Engenharia (compatibilidade com a PMM)***

- ✓ ***Massa***

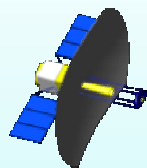
- ✓ ***Potência***

- ✓ ***Lançadores***

- ✓ ***Ambiente dinâmico***

- ✓ ***Sistema de Controle***

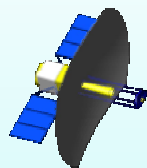
- ✓ ***Configuração***



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2. A PMM - Plataforma Multi-Missão



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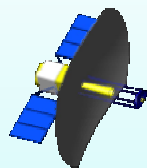
PMM - Plataforma Multi-Missão

✓ *Justificativa*

“ To provide a service module compatible with a set of payloads related to missions established on the PNAE, emphasizing applications on the Amazon Region ” .

✓ *Motivação*

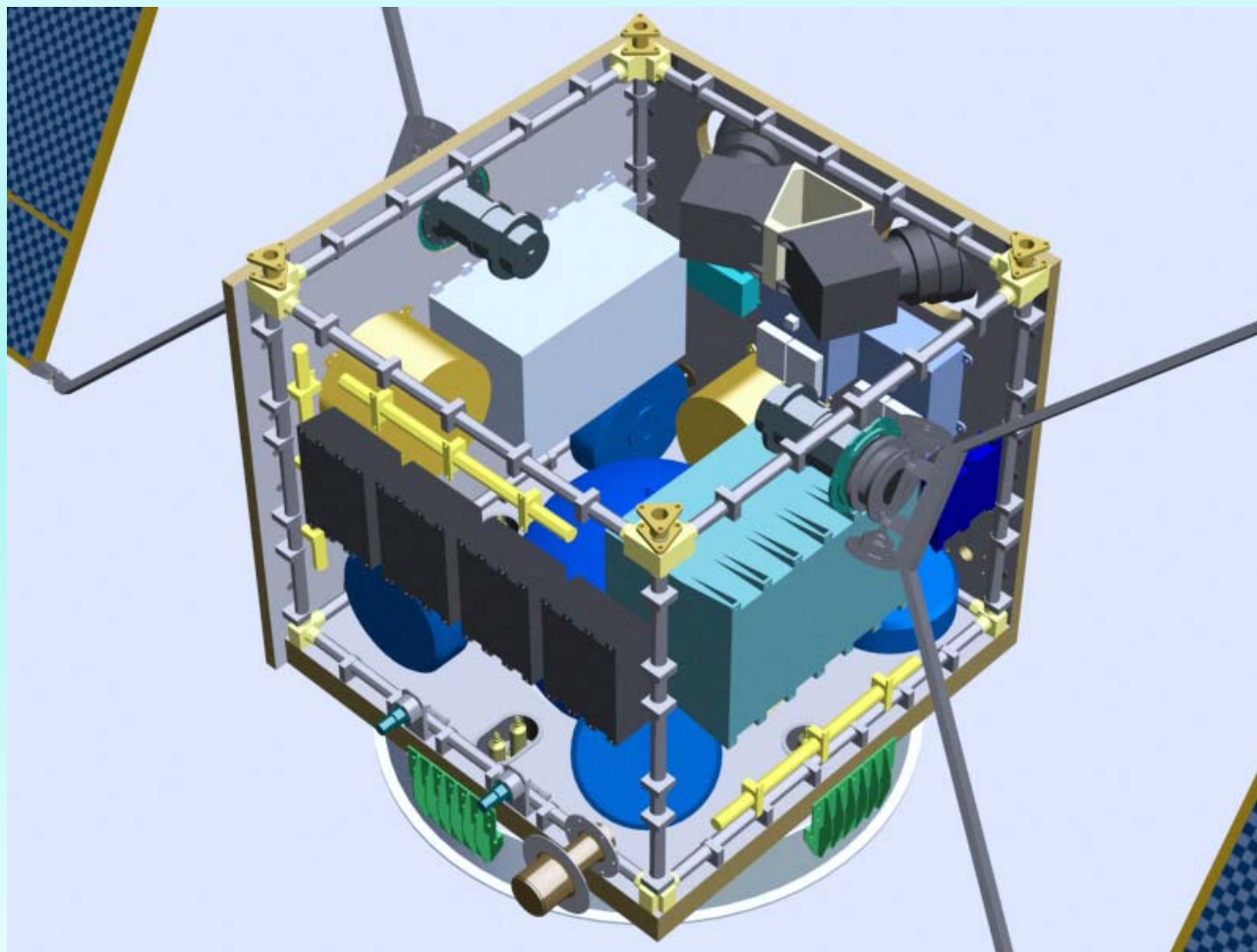
Custo & Prazo & Confiabilidade

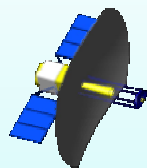


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Concepção artística da PMM

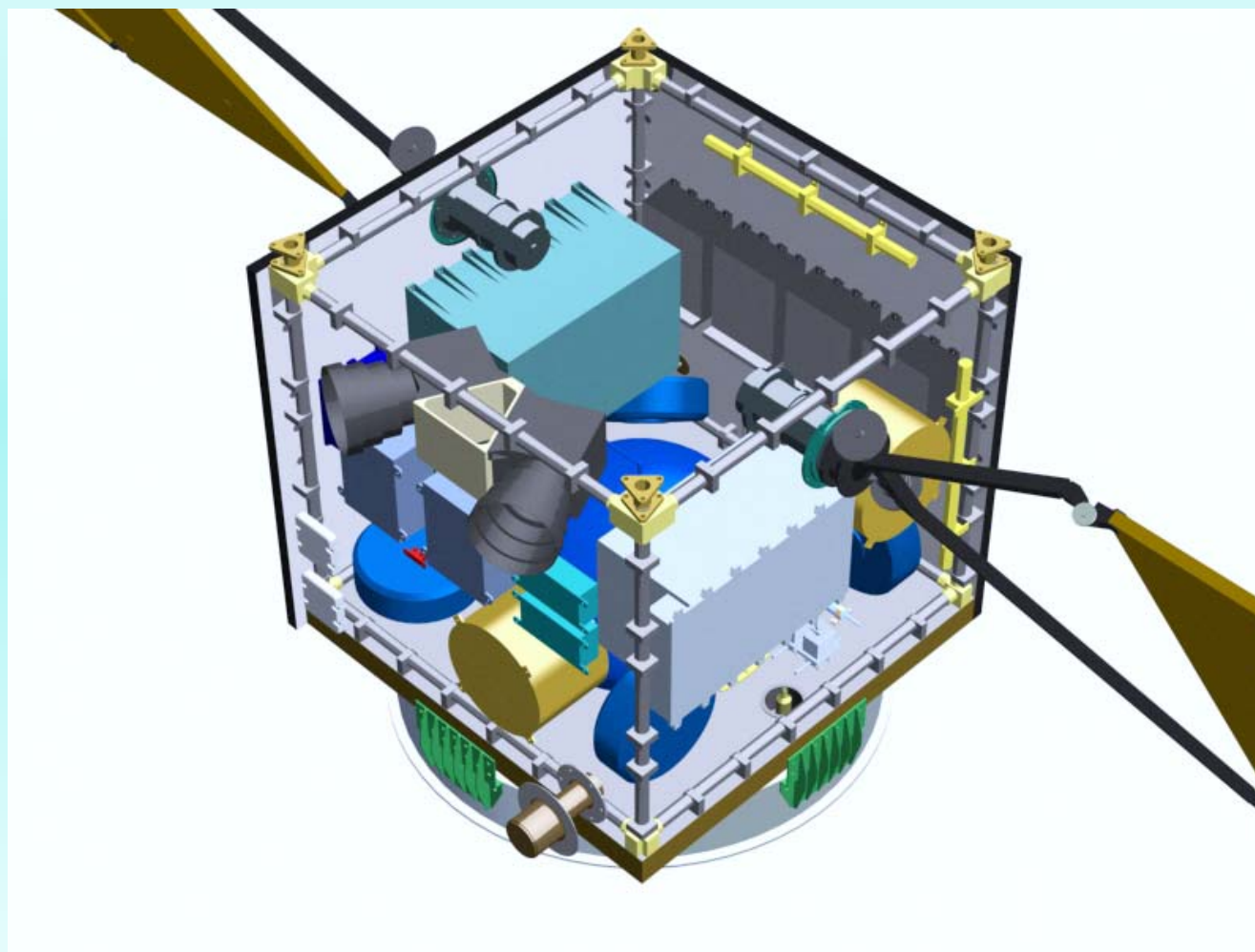


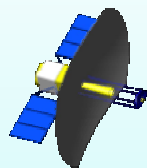


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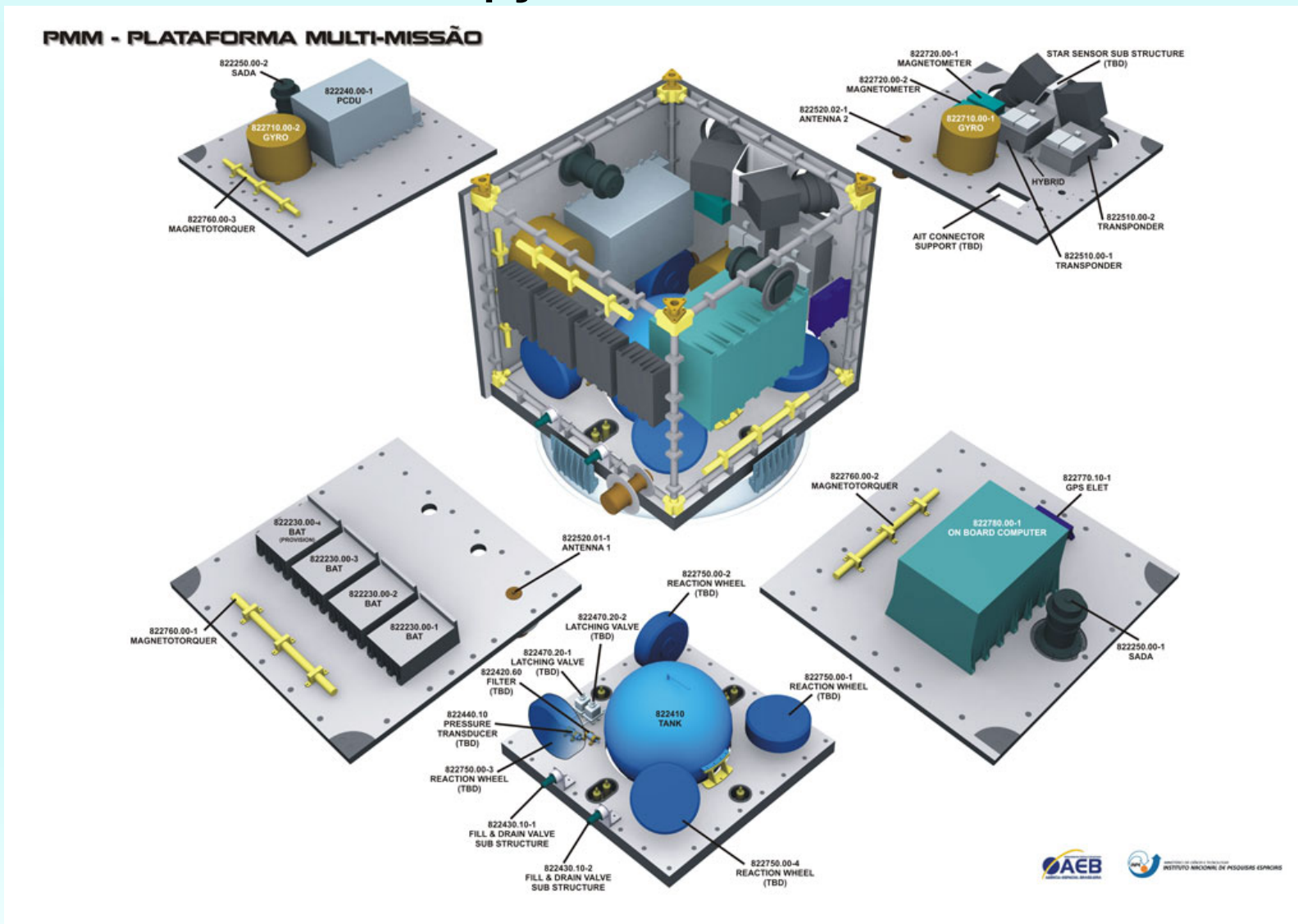


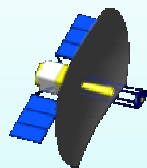
Concepção artística da PMM





Concepção artística da PMM



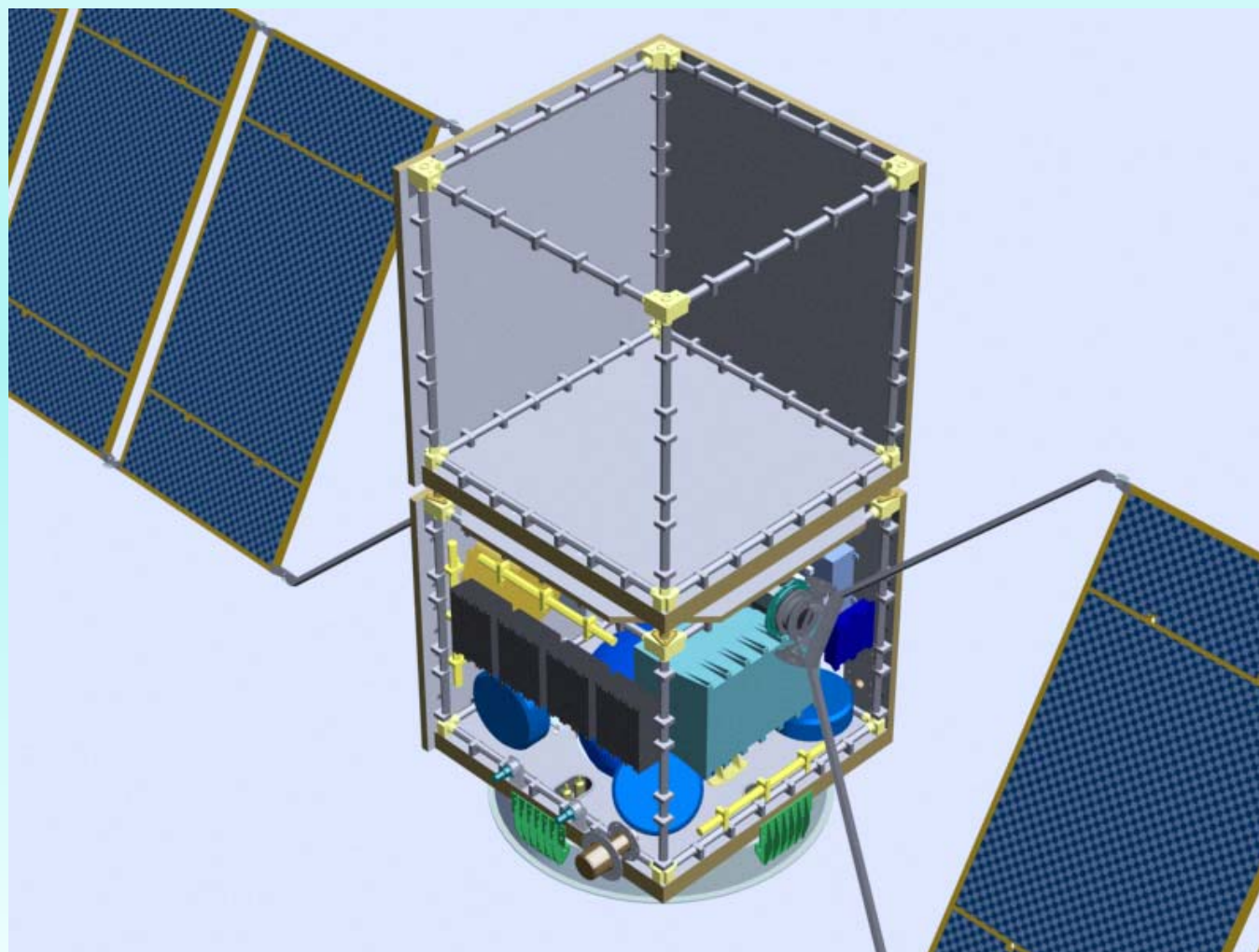


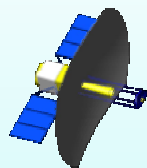
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✓ **Configuração do Módulo de Carga Útil**

**envelope
para a carga útil**

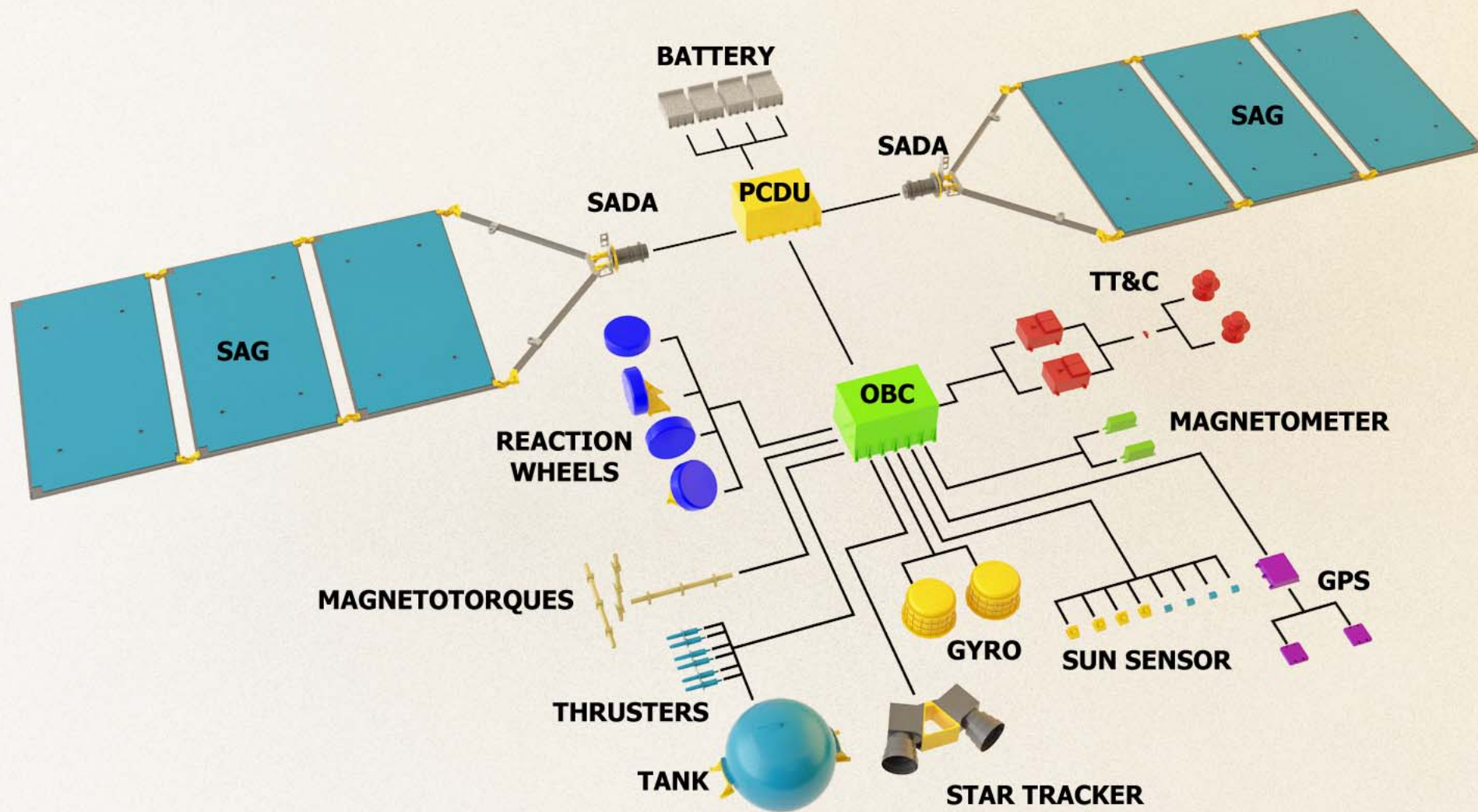


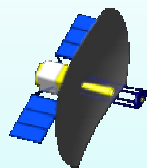


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Diagrama Funcional





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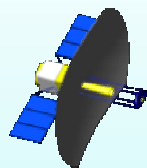
✓ Desempenho - PMM

ACDH:

- Precisão de apontamento: $< 0.05^\circ (3 \sigma)$
- Estabilidade (*Drift*): $< 0.001^\circ/s$
- Jitter: $< 0.0001^\circ$
- Determinação de Atitude : $< 0.005^\circ (3 \sigma)$
- Agilidade: 30° em 180 segundos

Capacidade de carga útil:

- Massa: até 280 kg
- Volume: compatível com classe de lançadores
- Potência: 225 W média
900 W pico
- Órbitas: quase-equatorial e polar
600 a 1200km de altura

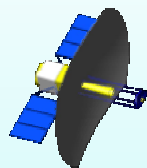


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Development Status - PMM

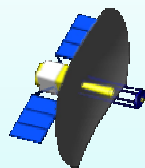
Industrial Contract	Structure Propulsion Power Supply TT&C ACDH
INPE development	Thermal Control AIT Systems Engineering
Cost estimation	13 – 15 MEuro 45 MU\$ development
Availability	Middle 2009



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3. Demonstração de Viabilidade

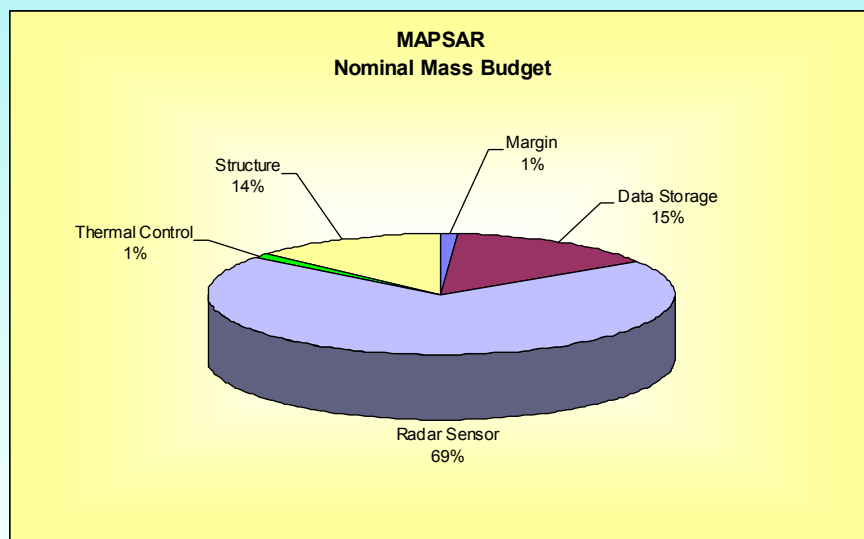


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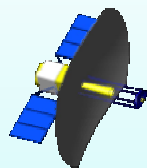


Sub-System	Mass [kg]
Mechanical Structure	38.2
Thermal Control	2.5
Radar Sensor & Data Acquisition & Reflector	194.6
Data Storage & Transmitter	41.6
Total Mass	276.9
Specified Mass	280.0
Nominal Margin	+ 3.1

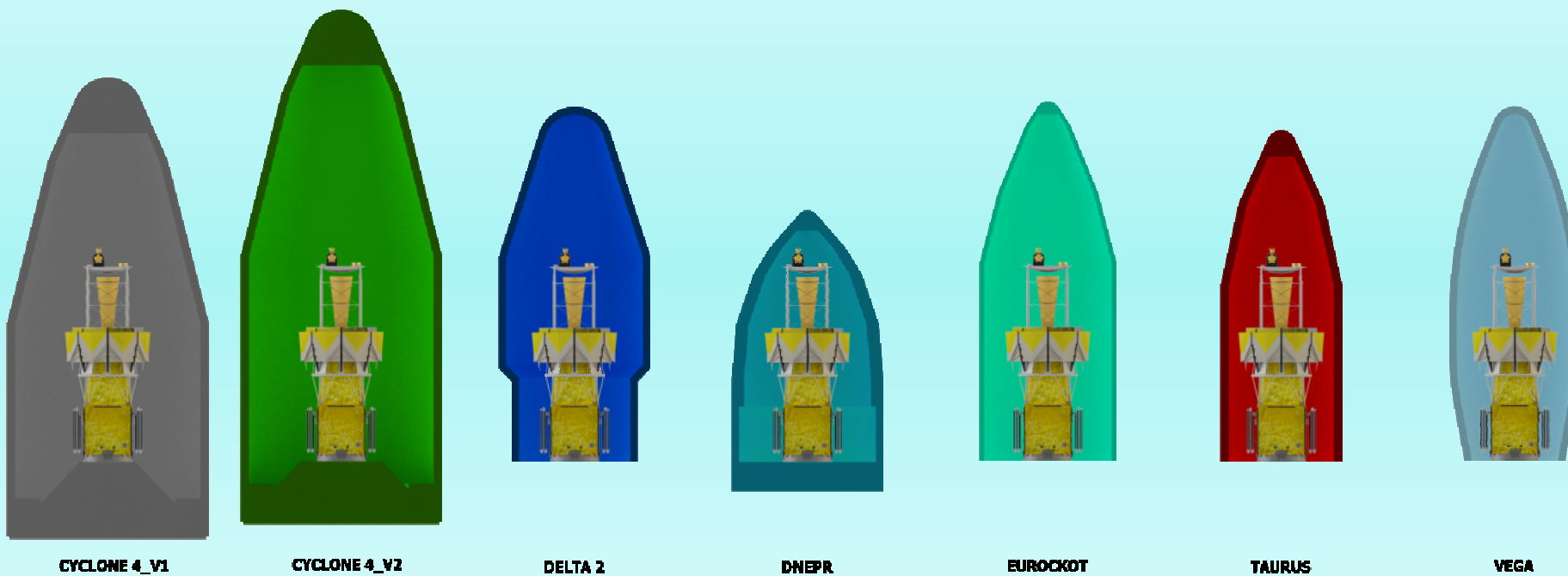
✓ **massa**

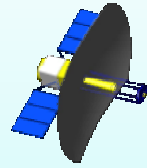


Item	Mass [kg]
MMP Bus Module	248.7
MAPSAR Payload Module	276.9
MAPSAR Satellite Mass	525.6

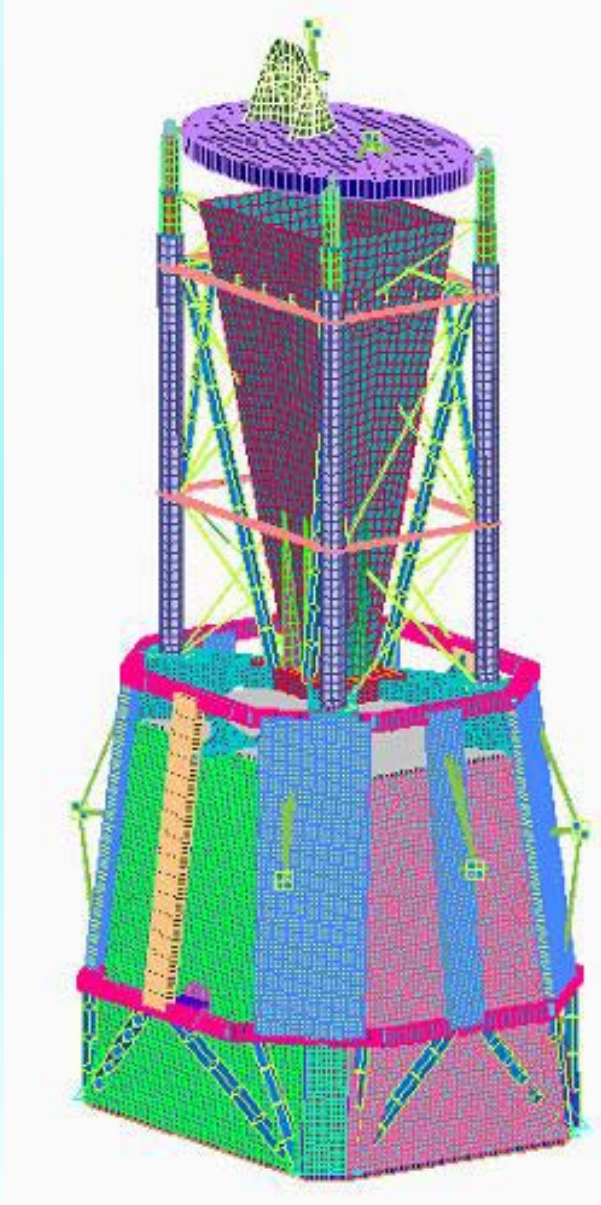


✓ *Veículos lançadores*



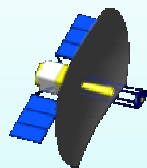


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✓ *dinâmica*

First bending mode at 40.61 Hz .

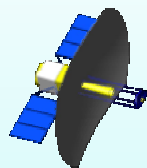


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✓ *potência*

- Simulação realizada para final de vida (4 anos);
- Pior caso de iluminação com 97 minutos de órbita e 36 minutos de eclipse;
- Utilizando fatores padrões de eficiência;
- Tempo de imageamento/ gravação/ Playback: 12 minutos;

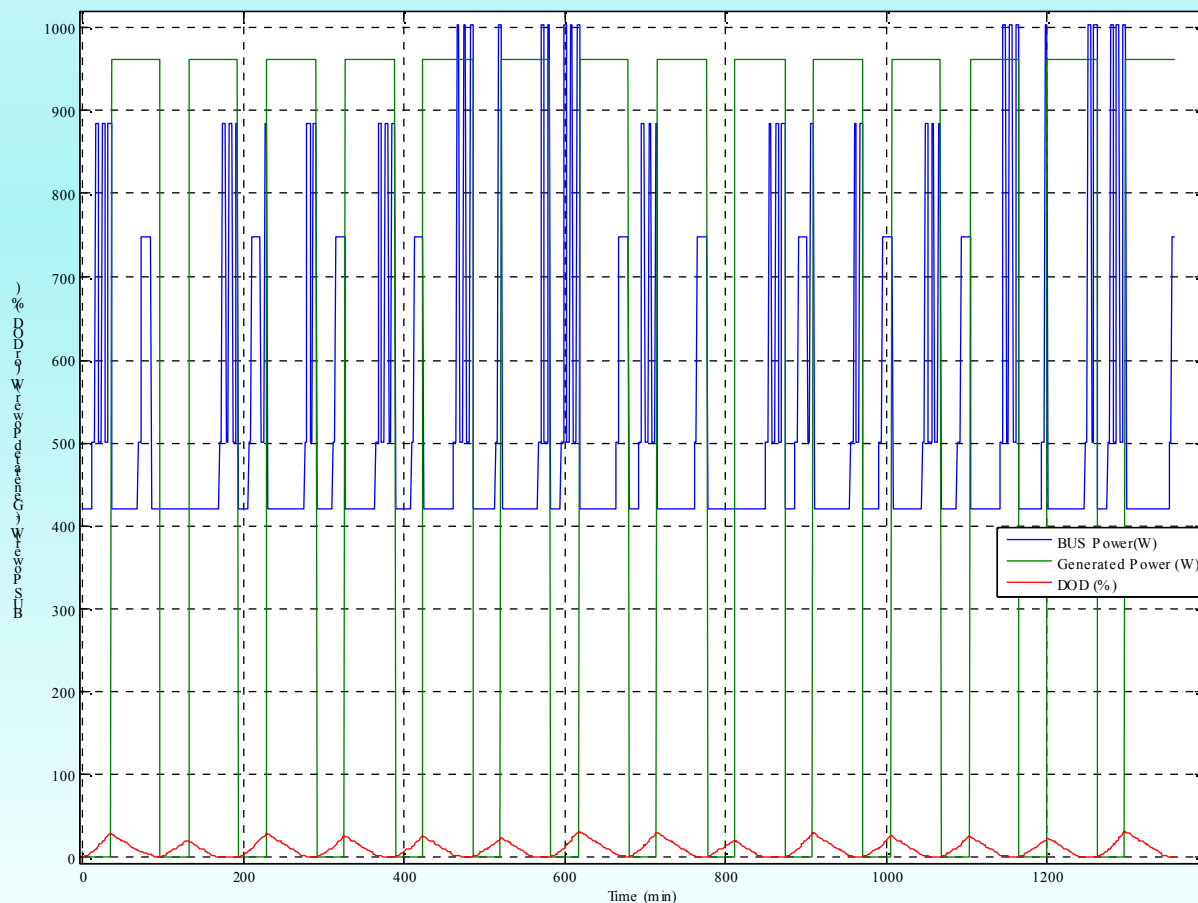


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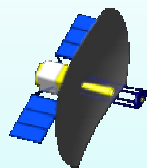
SUBSYSTEMS	STAND-BY	IMAGING	RECORDING	PLAYBACK	MANEUVER
MMP Consumption	292,30	310,78	293,18	310,78	372,36
SAR payload Consumption (20% uncertainty)	129,60	692,40	592,80	438,00	129,60
TOTAL	421,90	1003,18	885,98	748,78	501,96

✓ *potência*



Resultados

- DOD: menor que 27% (médio);
- Balanço fecha na mesma Órbita;
- Visada para a direita 85% do tempo.



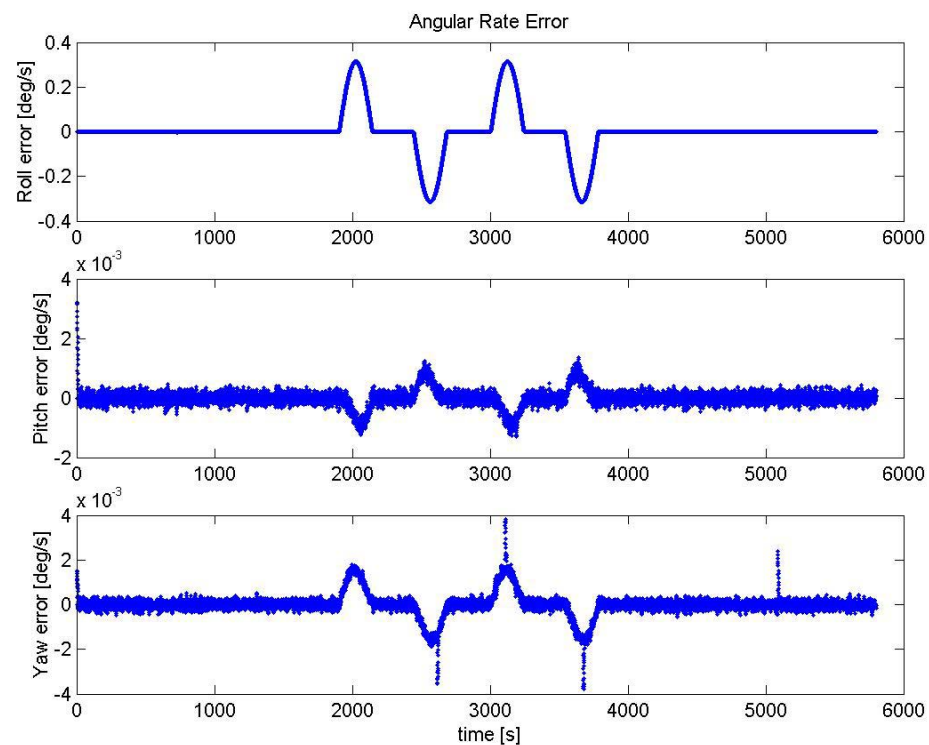
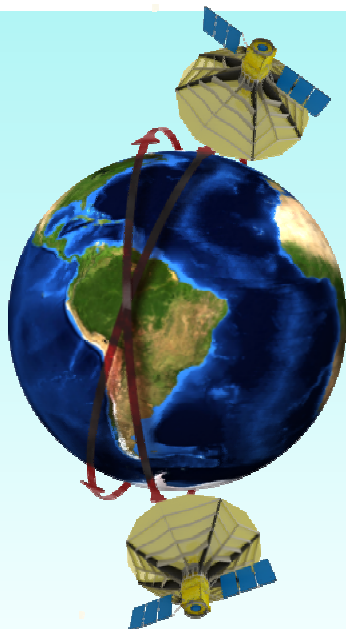
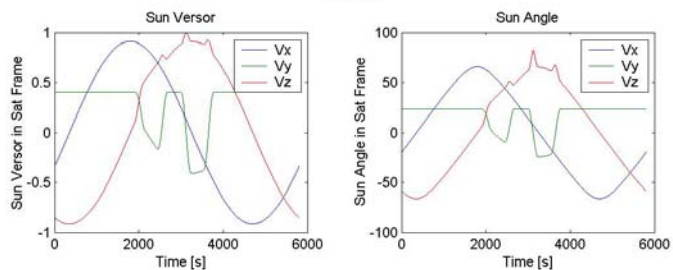
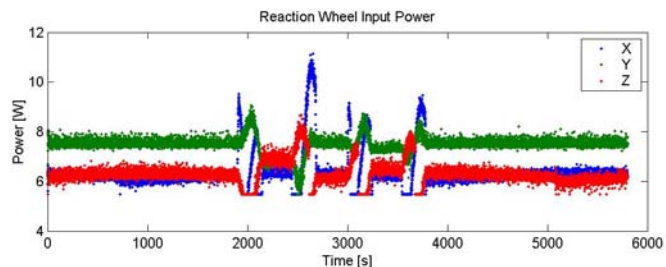
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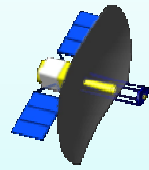
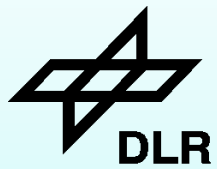


✓ **Controle**

Apontamento

Manobras

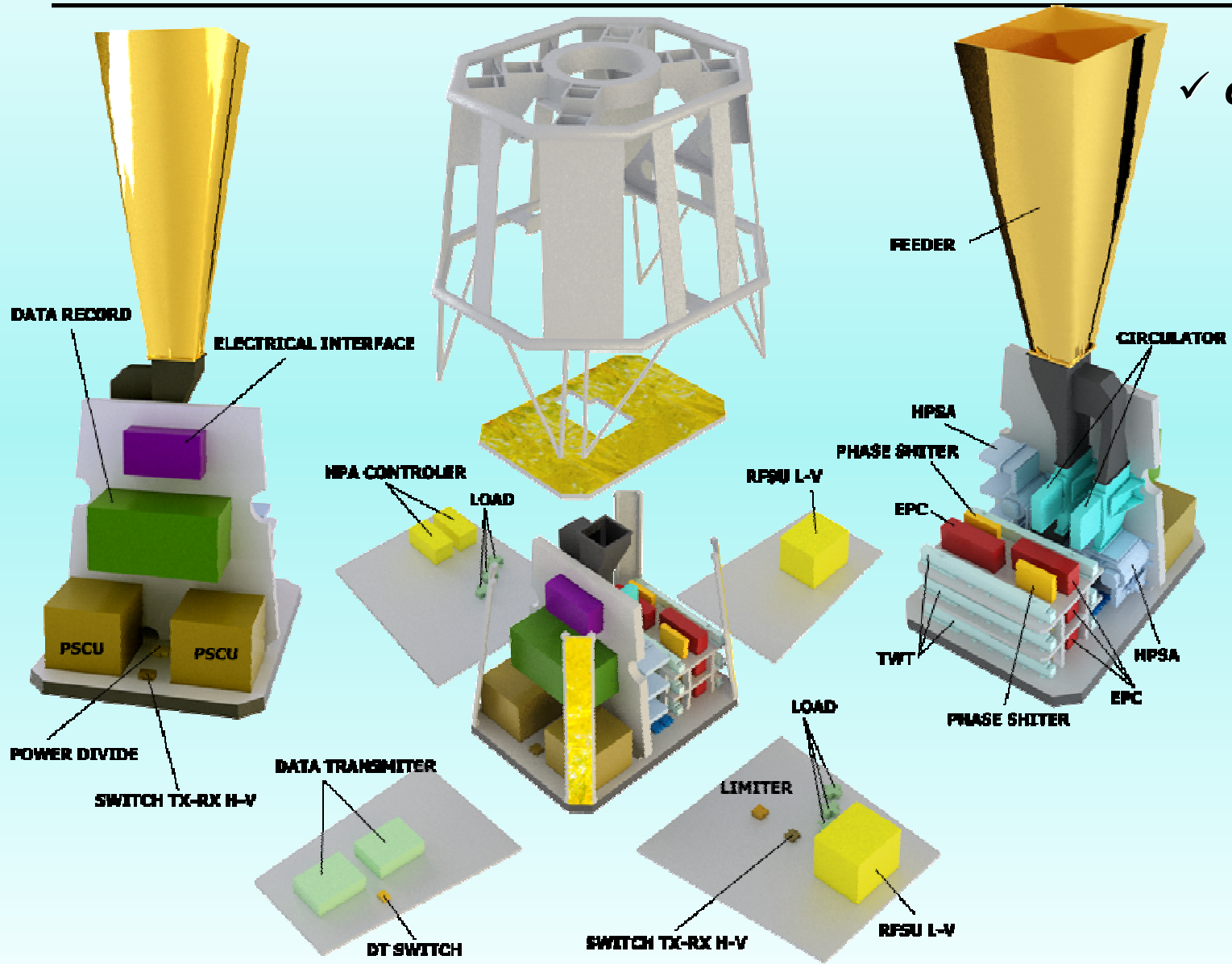


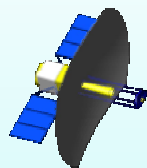


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✓ *configuração*



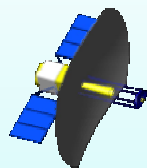


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✓ *configuração*

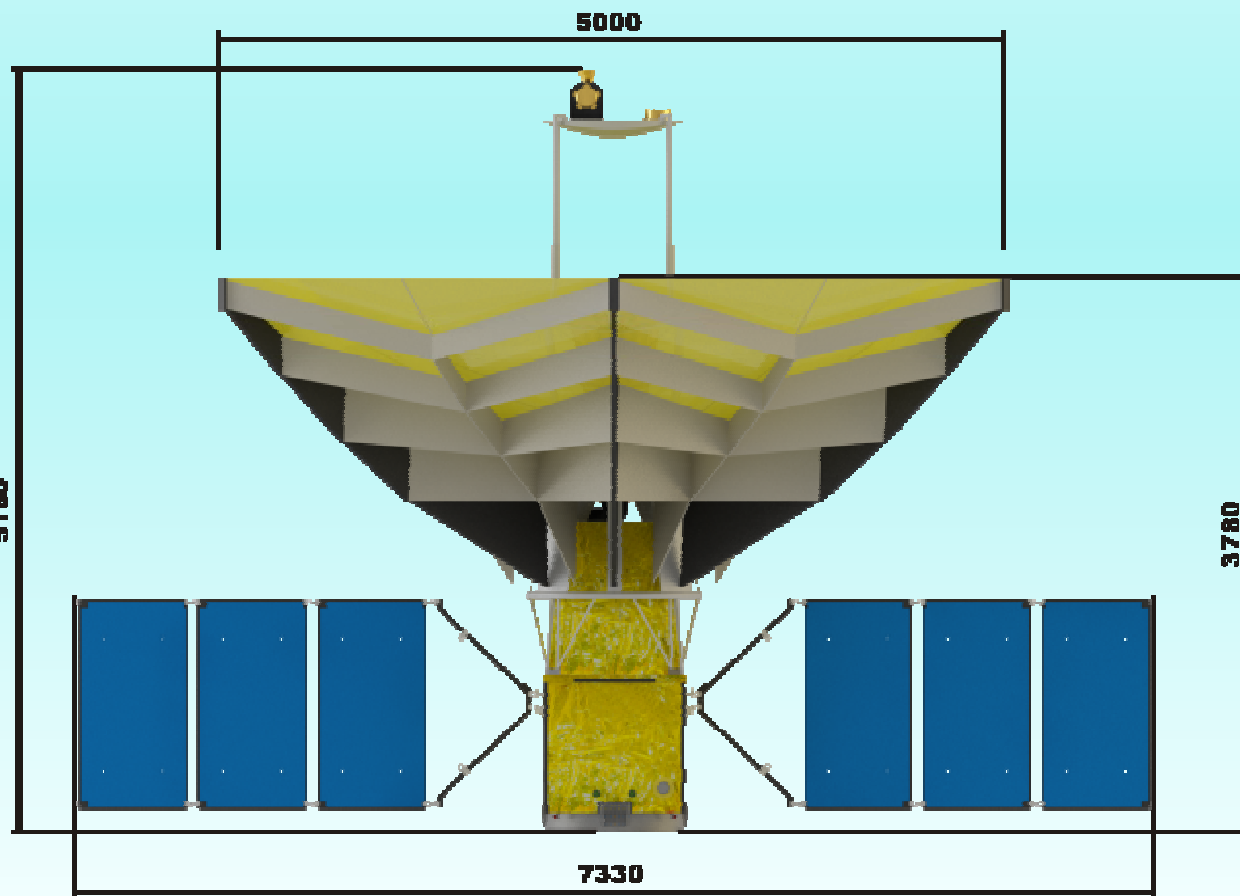
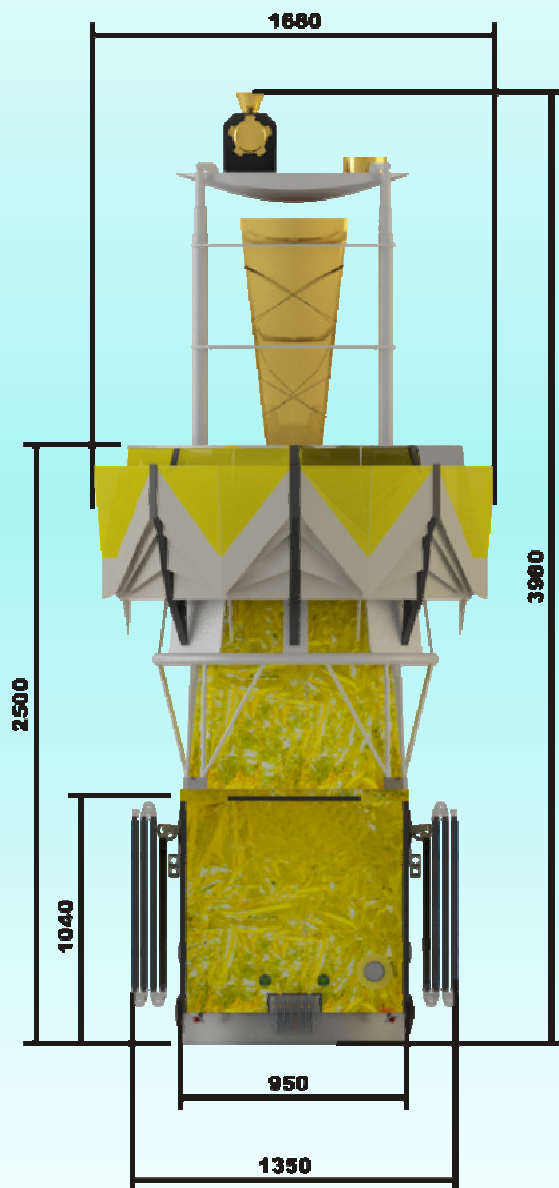


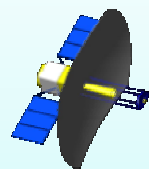
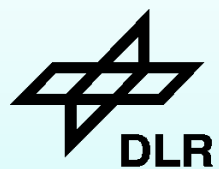


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✓ *configuração*

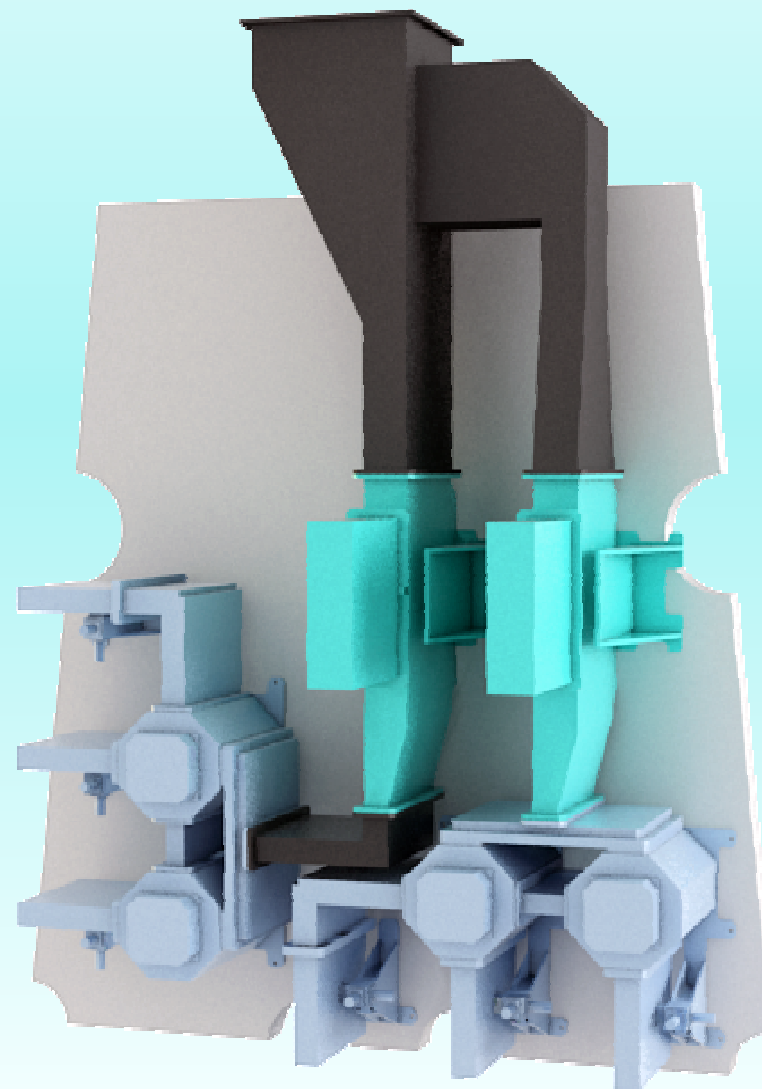
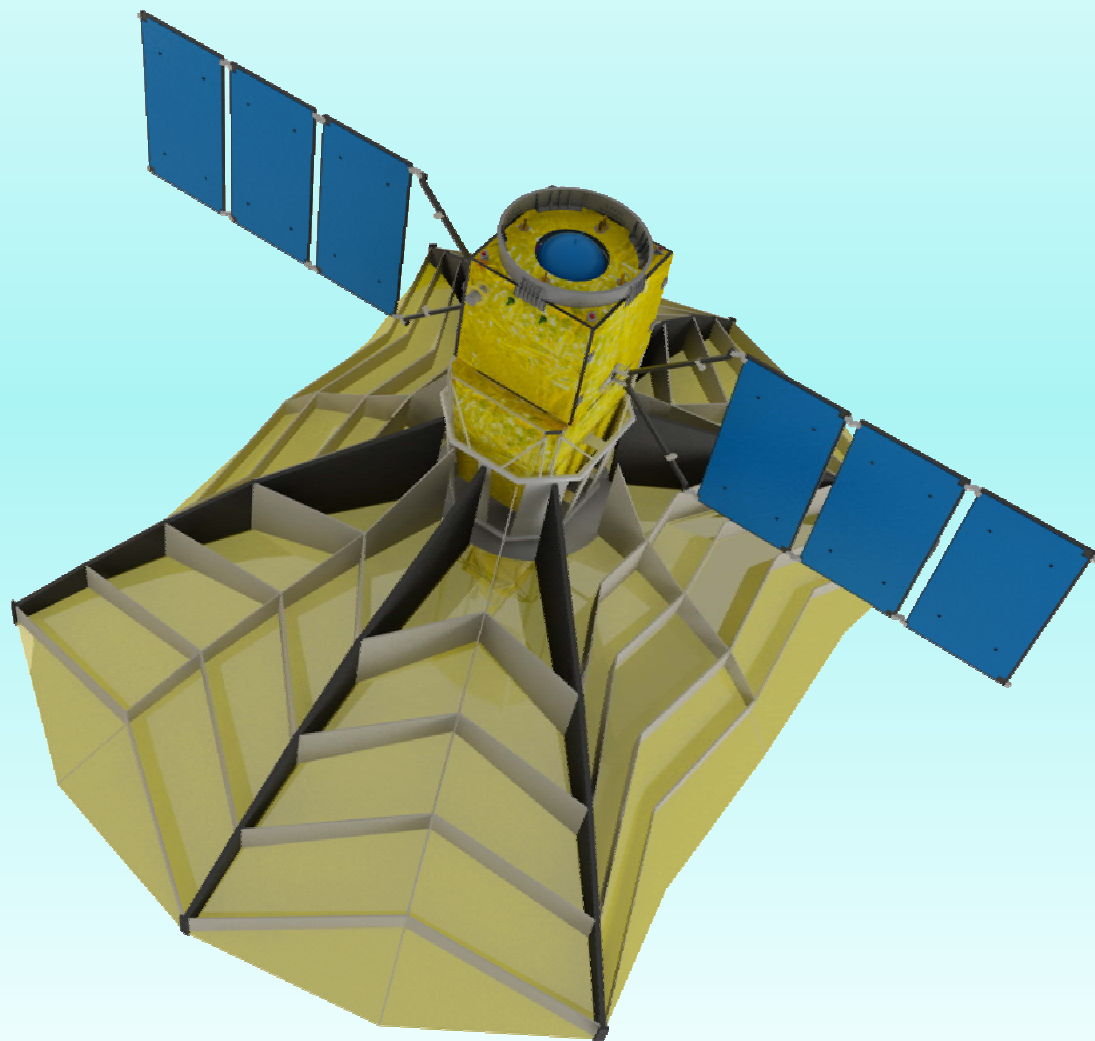


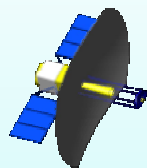


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✓ *configuração*

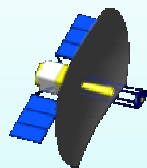




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4. Conclusão



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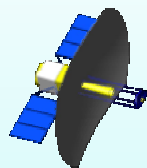
✓ ***Objetivo proposto:***

“To verify the feasibility of a satellite on the 500 kg class mission with a SAR payload”.

✓ ***Resultado***

Foi demonstrada a viabilidade !

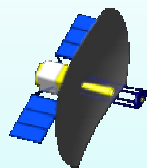
- **Aplicações**
- **Engenharia**



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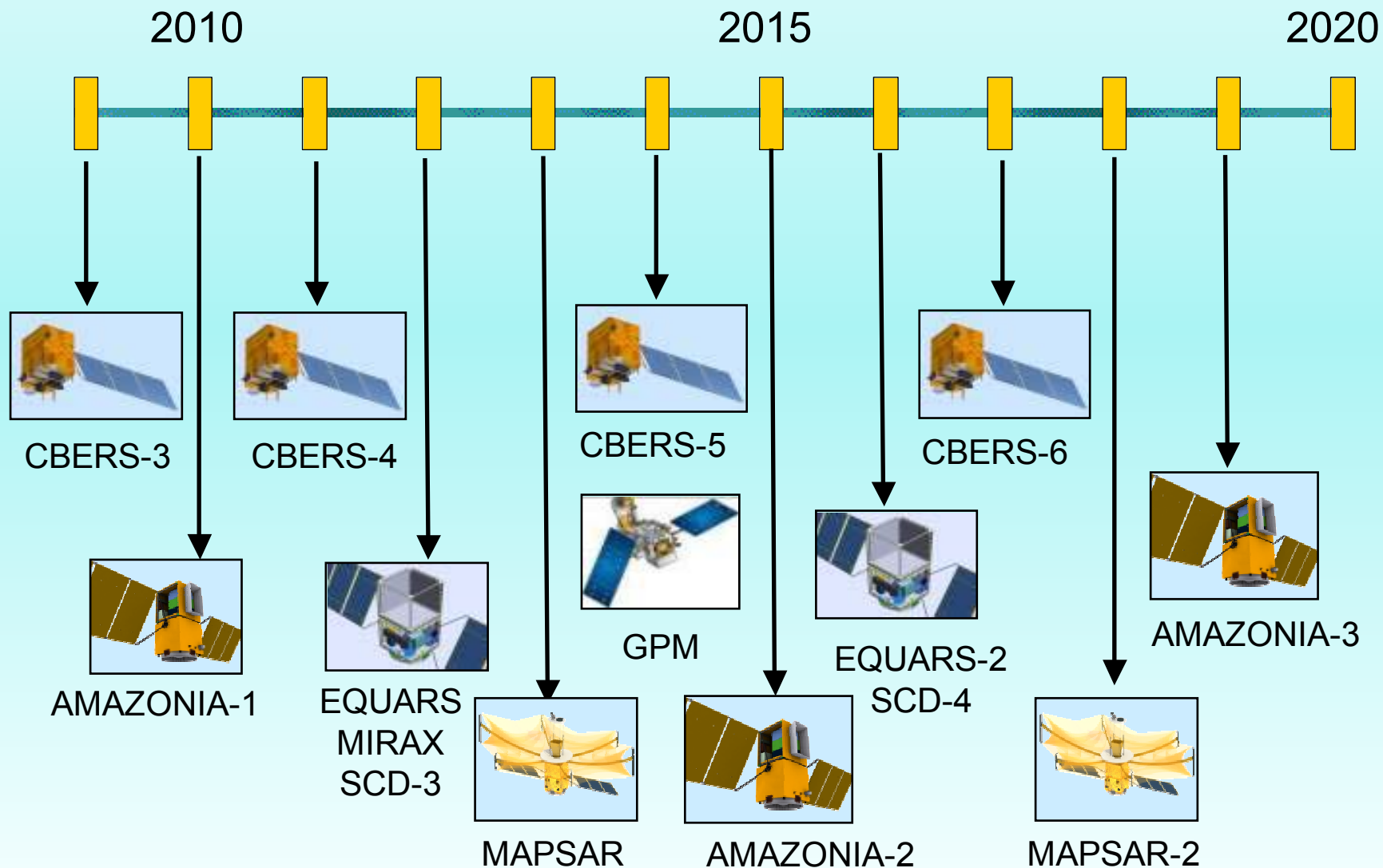
5. Perspectivas

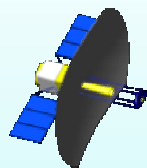


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Plano “Brasil como Global EO”

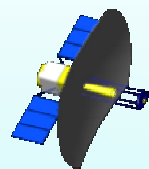




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-
- ***Finalização da Fase com o DLR – junho 2007***
 - ***Consolidação das fontes de financiamento***
 - ***Início da Fase B***
 - ***Estimativa de custo:***
 - ***100 MEuros***
 - ***50% / 50%***
 - ***Prazo: 5 anos***



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