

Space Ops 101

An Introduction to Spacecraft Control

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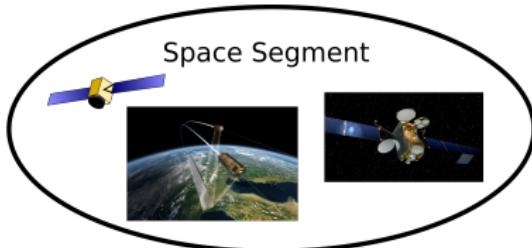
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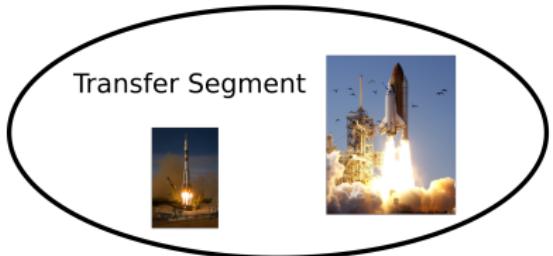
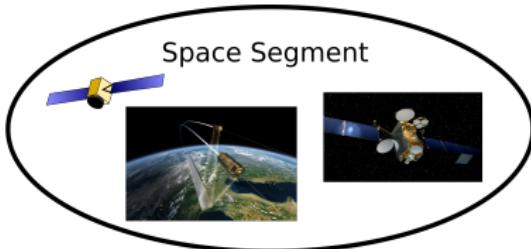
What we will not talk about ...



... but instead



... but instead



Outline

1 Basics of Spaceflight

- Orbits
- Communications
- Phases of Mission Operations

2 Procedures

- TC, TTC and Telemetry
- Flight Procedures
- Ground Procedures

3 Subsystems

4 Contingencies

What are we doing here?

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- Gravity Recovery And Climate Experiment

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- Gravity Recovery And Climate Experiment or
- Euglena and Combined Regenerative Organic-Food Production in Space.

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Next, we need a purpose:

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Next, we need a purpose:

- Scientific?

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Next, we need a purpose:

- Scientific?
- Technology Demonstration?

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Next, we need a purpose:

- Scientific?
- Technology Demonstration?
- Communications?

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Next, we need a purpose:

- Scientific?
- Technology Demonstration?
- Communications?
- TV?

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- Scientific?
- Technology Demonstration?
- Communications?
- TV?
- GNSS?

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- Scientific?
- Technology Demonstration?
- Communications?
- TV?
- GNSS?
- Espionage?

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Next, we need a purpose:

- Scientific?
- Technology Demonstration?
- Communications?
- TV?
- GNSS?
- Espionage?
- ...

Why does a satellite not fall down?

Why does a satellite not fall down?

TODO add planet + satellite picture

LEO, MEO, GEO

LEO, MEO, GEO

TODO add picture on distances

Some Statistics

Some Statistics

TODO add overview on number of satellites etc.

Pass

Pass

TODO add picture showing pass

Link Budget

Link Budget

TODO add picture link budget

Frequency Range

Frequency Range

TODO add picture absorption in atmosphere

Up- and Downlink

Up- and Downlink

TODO explain purpose of up- and downlinks

LEOP

LEOP

TODO explain purpose of LEOP

Commissioning or IOT

Commissioning or IOT

TODO explain purpose of IOT

Routine

Routine

TODO explain purpose of Routine (mention monitoring + machine learning)

EOL

EOL

TODO explain EOL

TCs and TTCs

TCs and TTCs

TODO explain TCs and TTCs

Examples for TTCs

Examples for TTCs

TODO example TTC

Telemetry

Telemetry

TODO example TTC

Purpose of Flight Procedures

Purpose of Flight Procedures

TODO explain purpose of flight procedures

Example of a Flight Procedure

Example of a Flight Procedure

TODO picture of a flight procedure

Example of a Ground Procedure

Example of a Ground Procedure

TODO picture of a ground procedure

FDS and AOCS

FDS and AOCS

TODO explain purpose FDS and AOCS, mention Fortran

Safe Modes

Safe Modes

TODO add picture for various modes

Data and TM/TC

Data and TM/TC

TODO explain purpose Data and TM/TC

SCOS

SCOS

TODO add picture SCOS

PTR

TODO explain PTR, show heat curve, mention MLI

MIPL

TODO explain purpose

SoE

TODO add picture sample SoE

Flight and Engineering Model

Flight and Engineering Model

TODO explain purpose of engineering model

Procedure in Case of Contingency

Procedure in Case of Contingency

TODO add picture contingency procedure

Example Contingency: TvSat-1

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TODO add picture and explanation TcSat-1

Questions?

Thank you and enjoy the rest of the congress!