

ESA R&D plans

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Time-dependent charging and discharge simulation

- On-going ARTES-5 activity
- ONERA / Artenum

Standard plasma and UV monitor

- GSTP, German financed
- Astrium / Fraunhofer Institute
- SEPS
- Innovative, small, light and low resources plasma detector as standard detector for different types of spacecraft and orbits.



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Energetic Electron Models for MEO

- Started under TRP
- ONERA/Surrey/QinetiQ/CNES
- Objective: To develop, implement and validate WWW-based electron environment models for MEO orbits.



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Galileo evolutions programme

- Preparing for the next generation of Galileo + EGNOS
- Period 2 starting in 2009
- Final approval for the programme due in Nov 2008 at Ministerial conference
- Programme presently under consideration in PB(NAV) including national representatives
- Includes 5 space environment monitoring proposals from ESA.



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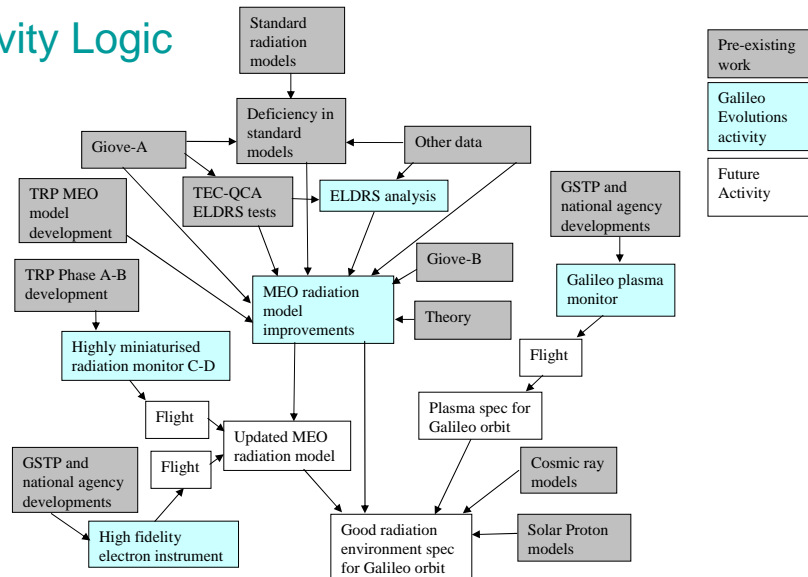
Proposed Space Environment Activities

1. Enhanced low dose rate sensitivity analysis (€ 250k)
2. MEO radiation model improvements (€ 500k)
Use Giove-A and -B, other sources and theoretical modelling to improve MEO models
3. Highly miniaturised radiation monitor – phases C+D (€ 1500k)
4. High fidelity electron instrument for in-flight calibration (€ 3000k)
Develop accurate instrument to calibrate and remove ambiguity from simpler monitors
5. Galileo plasma monitor (€ 1000k)
Produce a low mass plasma monitor for the Galileo orbit



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Activity Logic



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GSTP-5 proposals

- Building blocks:
 - Flexible Standard Plasma Monitor
 - Next Generation Radiation Monitor
- In-orbit-demonstration
 - Space Environment Effects on New Technologies Mission
 - Space Based Technologies for Space Weather Applications
 - Long wire electrodynamics



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DEVELOPMENT OF A PREDICTIVE DISCHARGE NUMERICAL MODEL ON SOLAR PANELS

- TRP 100-200kEuro
- Intended
- TEC-EE
- ... new activity will consist in the development of a predictive numerical model to simulate the effects from primary and secondary arcs on various designs solutions (network and cells). This model can be validated by the laboratory test results.



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SIMPLIFIED STANDARD MEO/GEO TOOLS FOR SPACECRAFT CHARGING

- TRP (100-200kEuro)
- TEC-EE
- Intended
- Objectives: To develop a tool for the evaluation of surface electrostatic charging that can be used without specialized training and which guides user in making appropriate choices for GEO/MEO



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ENERGETIC ELECTRON SHIELDING, CHARGING AND RADIATION EFFECTS

- TRP 200-500kEuro
- Intended
- TEC-EE
- Objectives : Develop and apply new shielding models. New physics models with related easy-to-use engineering interfaces to treat radiation shielding, deep charging and dose effects problems specific to the MEO environment will be developed.



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ESD/ELECTRICAL TRANSIENTS MONITOR

- Artes-5, 200-500kEuro
- Intended
- TEN-TT
- Objective: To develop, manufacture and test an engineering model of an equipment to monitor the electrical transients and electro magnetic interferences induced onto the spacecraft power bus as a result of electro static discharges (ESDs) on the spacecraft.



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EMITS

- ACTIVE CHARGING COMPENSATOR issued (closed)
- ELECTROMAGNETIC INTERFERENCE CAUSED BY PLASMA PLUMES issued
- TECHNIQUES FOR RADIATION EFFECTS MITIGATION IN ASICS AND FPGAS intended
- SPACE WEATHER WARNING FOR SPACE SYSTEMS AVOIDANCE OF MEMS DIELECTRIC CHARGE TRAPPING intended
- ASSESSMENT OF THE INTERACTION BETWEEN SPACECRAFT AND ELECTRIC PROPULSION SYSTEMS intended



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END



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