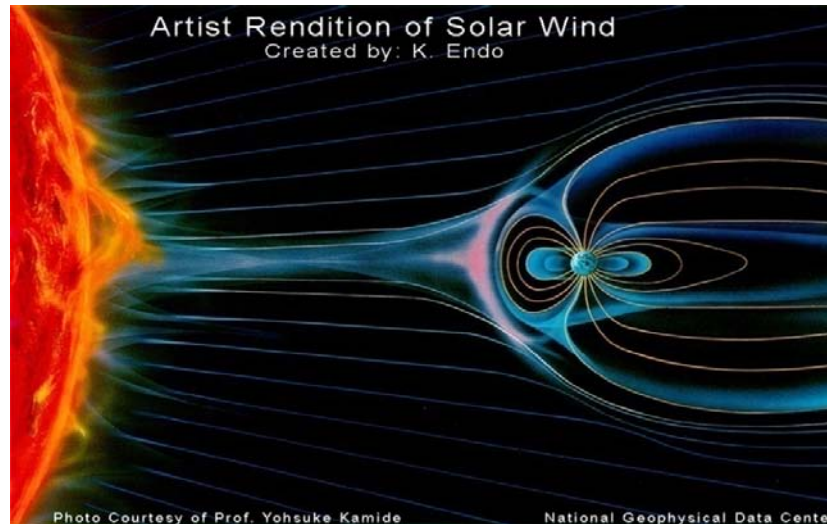


SPACECAST

Protecting space assets from high energy particles by developing European dynamic modelling and forecasting capabilities



Richard B Horne

Hannu Koskinen, Natalia Ganjushkina, Daniel Boscher,
Blai Sanahuja, Stefaan Poedts, Carla Jacobs,
and Daniel Heynderickx

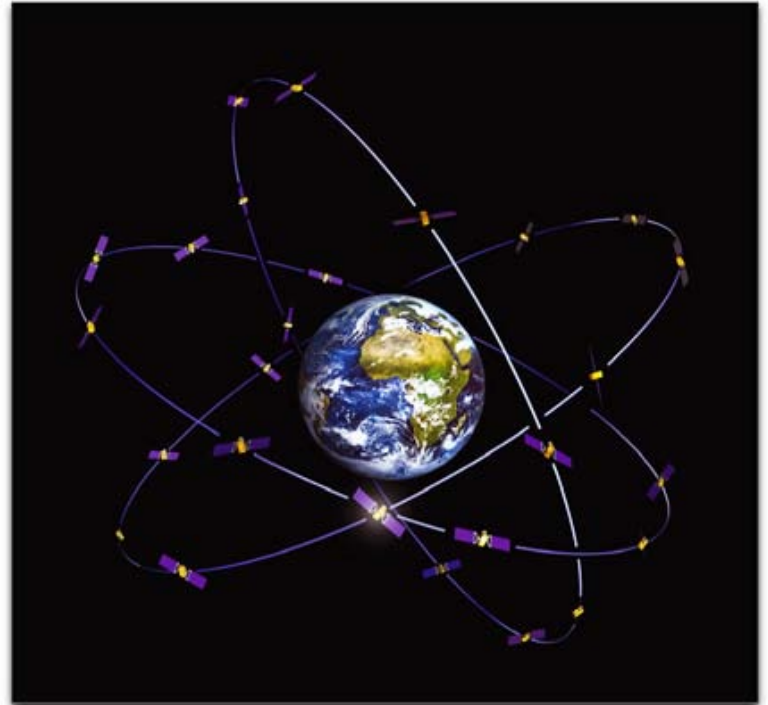


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SPACECAST

- Space is strategically important
- Europe is committed to Space
 - GMES, Galileo,.....
- Space assets are vulnerable to high energy particles
- Vulnerability increasing – new technology
- Europe needs to protect its space assets



Galileo - Courtesy of ESA

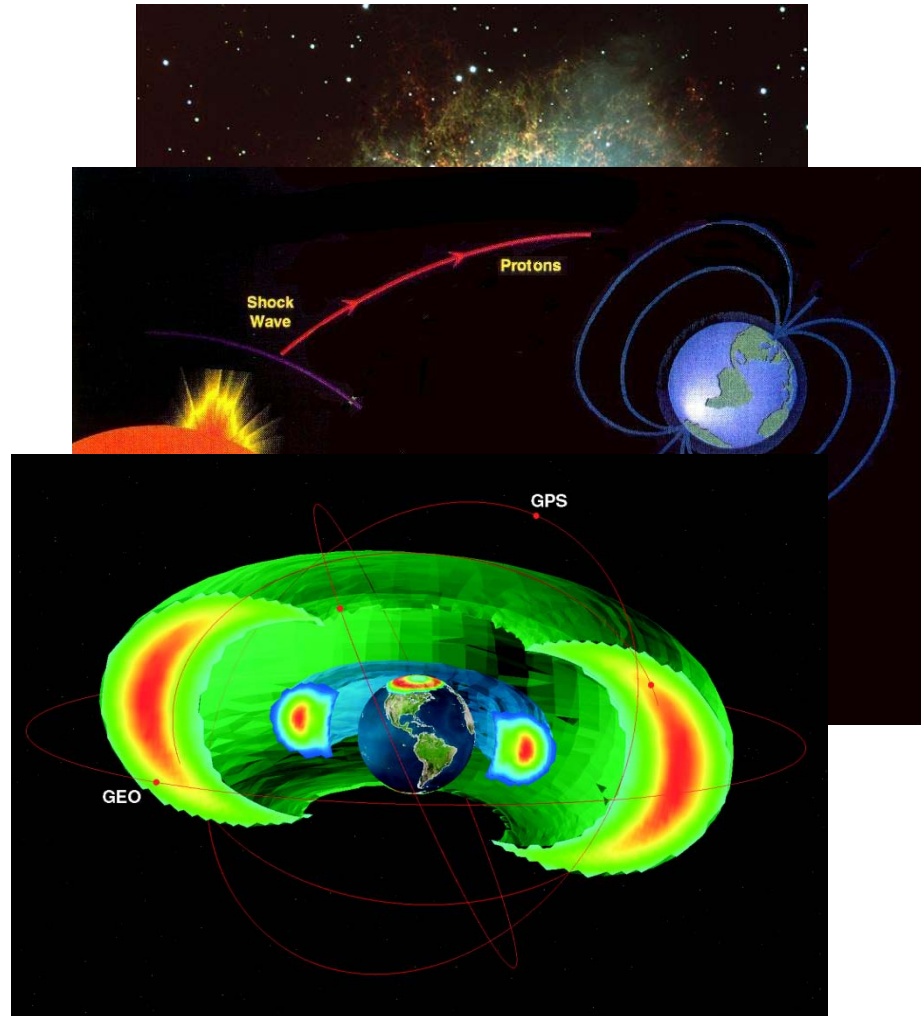


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Sources of Radiation

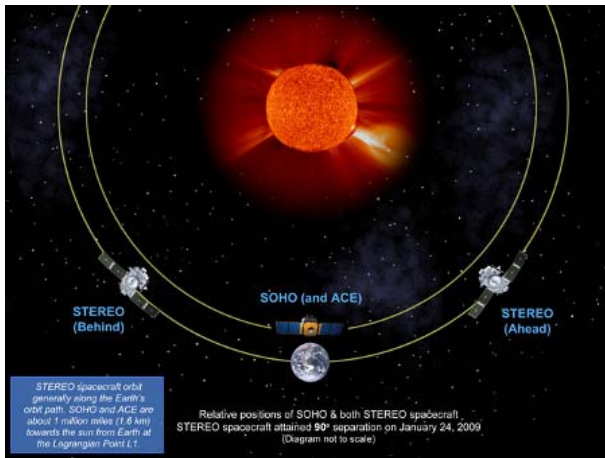
- Galactic cosmic rays
 - Solar cycle variation
 - Predictable
- Solar energetic particles
 - CME events
 - Difficult to predict
- Radiation belt particles
 - Magnetic storms
 - Fast solar wind
 - Difficult to predict



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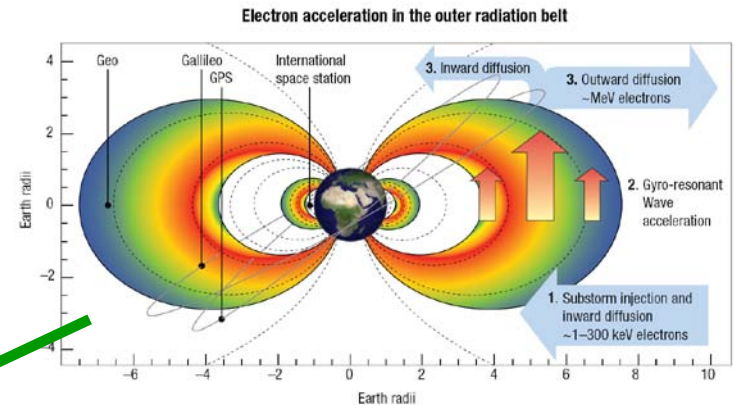
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SPACECAST – will Forecast the Radiation Belts

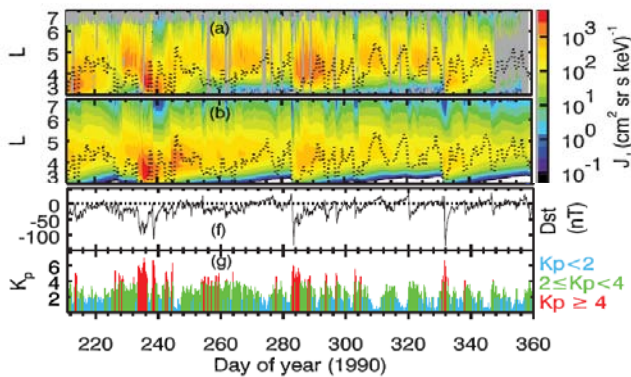


Access satellite data

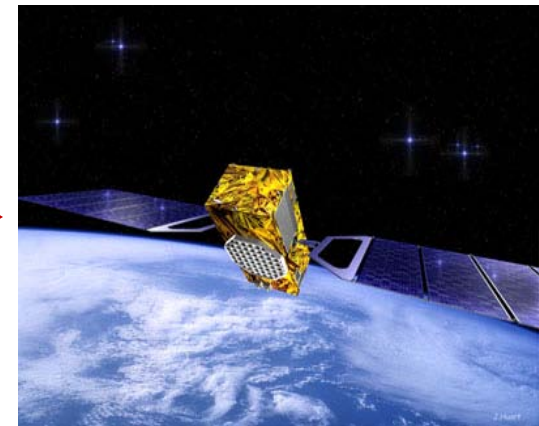
Run radiation belt models



Deliver forecasts

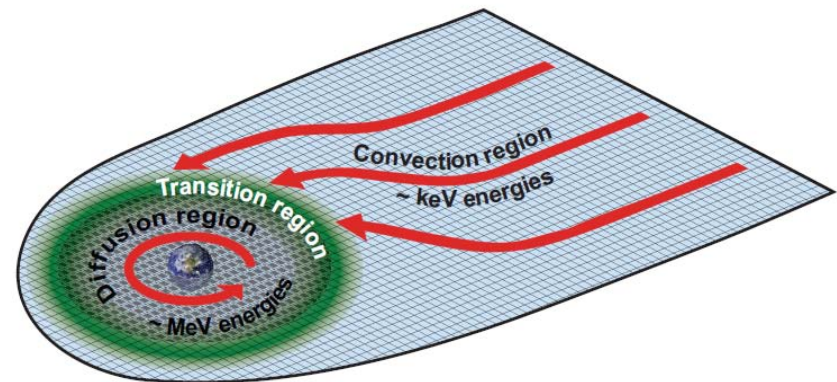
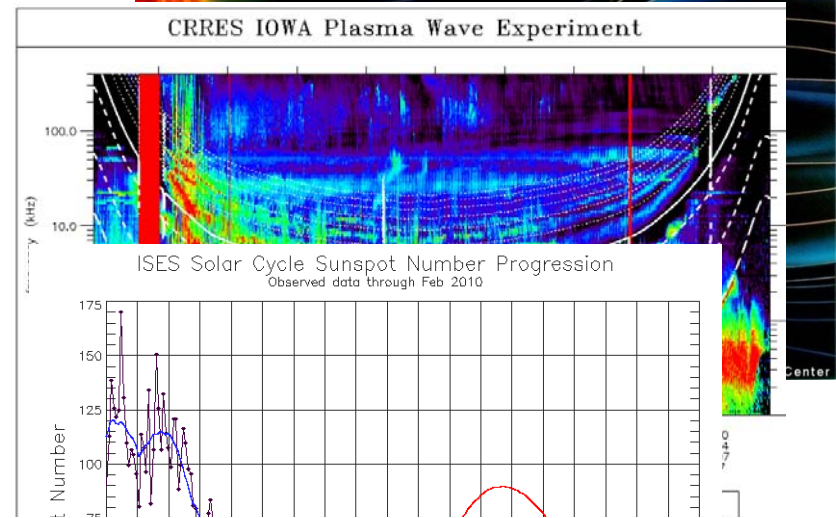
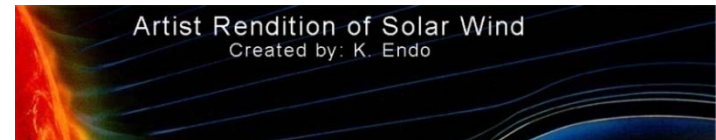


Issue warnings and alerts



SPACECAST - Research to Improve Dynamic Models

- Use solar wind data to drive the models
- Develop better wave models
- Better radial diffusion models
- Include solar cycle effects
- Develop low energy electrons models
- Couple low and high energy electron models

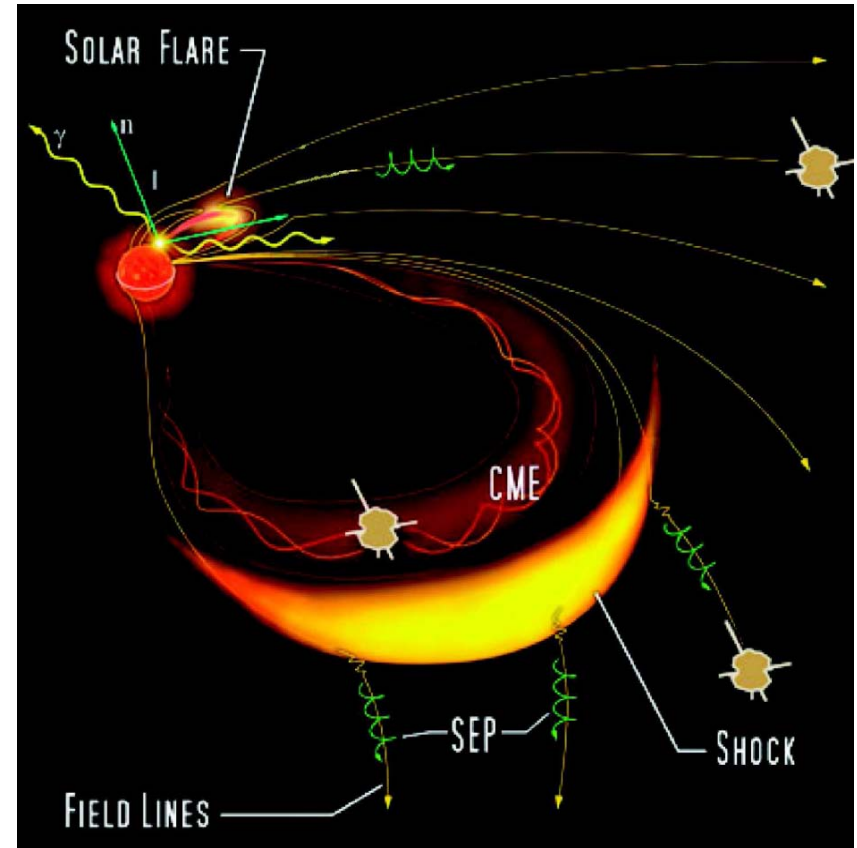


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SPACECAST - Research on Solar Energetic Particles

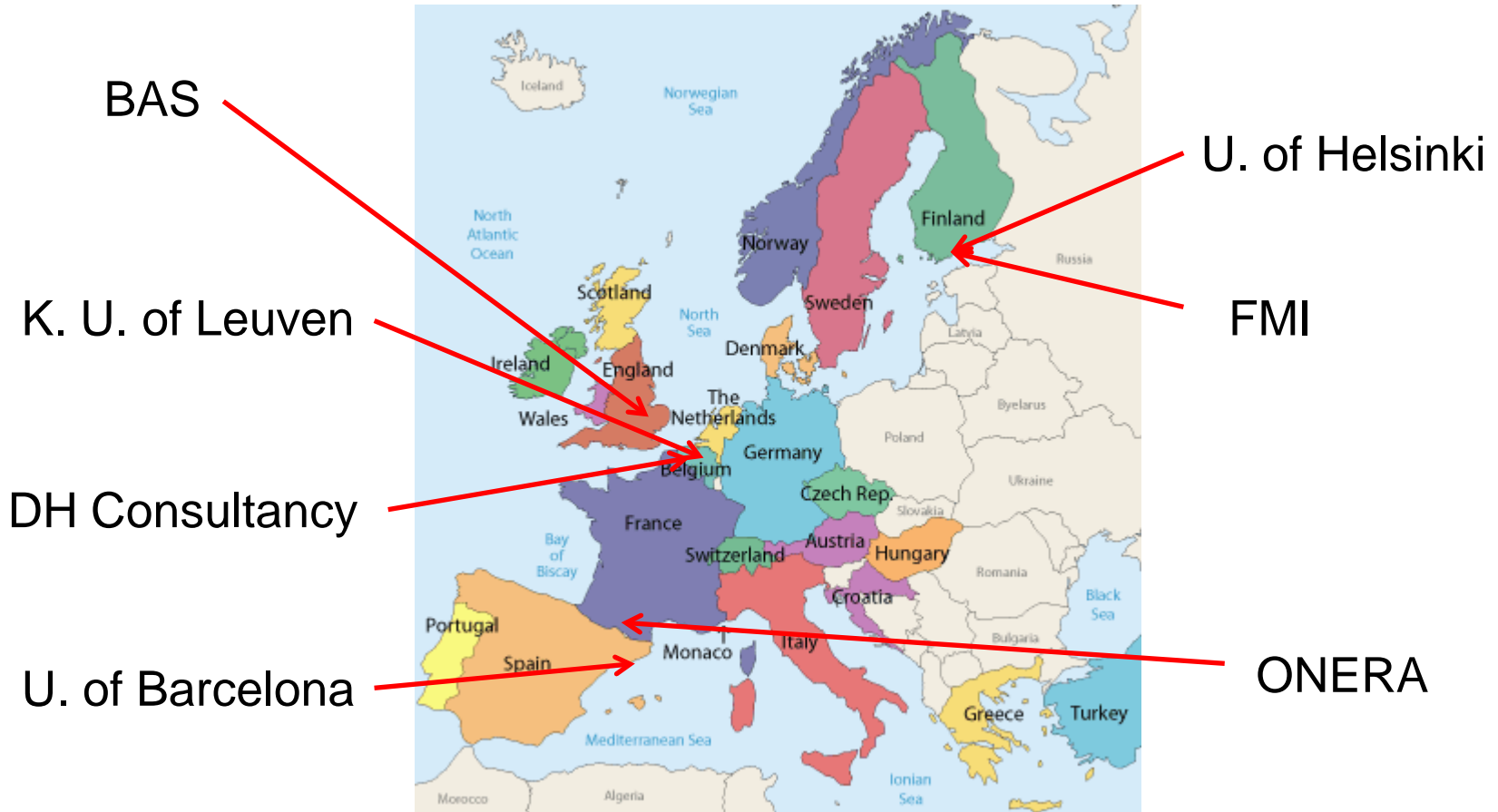
- Extend SEP models to higher energies ~ 200 MeV
- Simulate shocks with MHD models
- Model the transport of shock accelerated protons
- Use in the shock and transport model to predict proton flux
- Construct better parameterisations for SEP prediction models
- Determine the radiation dose



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The SPACECAST Team



And many other international collaborations common for research projects



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International Collaborators



UCLA

Johns Hopkins

NASA Goddard

Los Alamos

Exploration Physics Inc.

**And many other international collaborations
common for research projects**



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SPACECAST - Develop a Stakeholder Community

- Spacecraft Operators
- Satellite designers
- Space Insurance

- Policy makers
- The public
- Other scientists

- Paola and Rene at the REA



- We will deliver a European space weather forecasting capability that will last beyond the project and which will lay the foundation for an operational system



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