

Physics-based space weather forecasting based on high performance computing

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Space exploration is no gala dinner. Space is full of threats for humans and for their technology. Radiation from the Sun and from the Cosmos, magnetic storms, sudden emission of energetic particles are examples of the fascinating phenomena that besides being of great scientific interest are also a grave danger.

Modeling these processes is a grand challenge that modern scientific computing based on new emerging paradigms for parallel supercomputers can meet. New mathematical methods, new software developments and new computer hardware need to match the new data feeds from new space missions to reach this grandiose goal.

We describe the progress made in this field by the successfully concluded Soteria, Swiff and eHeroes projects and by the ongoing DEEP and DEEP-ER projects as well as the activities relative to the NASA four spacecraft mission MMS.

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