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Space Climate: What can we learn from Cosmic Rays in the "New" Heliosphere about more general scenarios?

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Abstract: In the first part of this review an overview of recent ground- and spacecraft based cosmic ray observations will be given. The impact of solar energetic particles to space weather and of galactic cosmic rays on space climate will be discussed. Special attention will be put on the deep space missions in this context pick-ions and anomlaous cosmic rays will be discussed.
In the second part contemporary heliospheric transport theories and models will be presented. Here the emphasis will be put on the latest insights in the structure of the diffusion tensor and on advanced acceleration mechanisms in deep space. The relation to the magnetized heliospheric plasma envirnoment and its role in propagation of energetic particles is stressed.
Finally, the expansion of these theories and models to more general scenarios will discussed, i.e. accleration scenarios in astrospheres and for galactic propagation. Especially, the potential influence of the galactic structure and the connection to astrospheres is pointed out.

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