

Cosmic ray interaction with the atmosphere

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Cosmic rays originate from different places within the Universe. Of special interest for the interaction with planetary atmosphere thereby are solar/stellar energetic particles (SEPs) as well as galactic cosmic rays (GCRs). An energetic charged particle entering the top of the atmosphere will lose energy mostly due to collisions, leading to ionisation and dissociation of the most abundant species in the upper layers below approximately 10 g/cm^2 . Deeper in an atmosphere energetic primary particles may lose energy efficiently due to hadronic interaction building cascade which consists of secondary particles. On the one hand the number of secondary particles is increasing due to the increasing probability for an energetic particle to collide with atmospheric species but on the other hand the energy is decreasing of each secondary particle leading to a maximum of the cascade and ionization at about 70 g/cm^2 . An important process is the generation of neutrons, which can interact with atmospheric atoms leading to the formation of radioisotopes. These isotopes are stored in archives and can be used to deduce information about the historical cosmic ray environment. In our presentation we summarize the basic observations as well as the fundamental processes of particle interaction with matter.