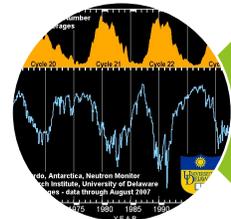
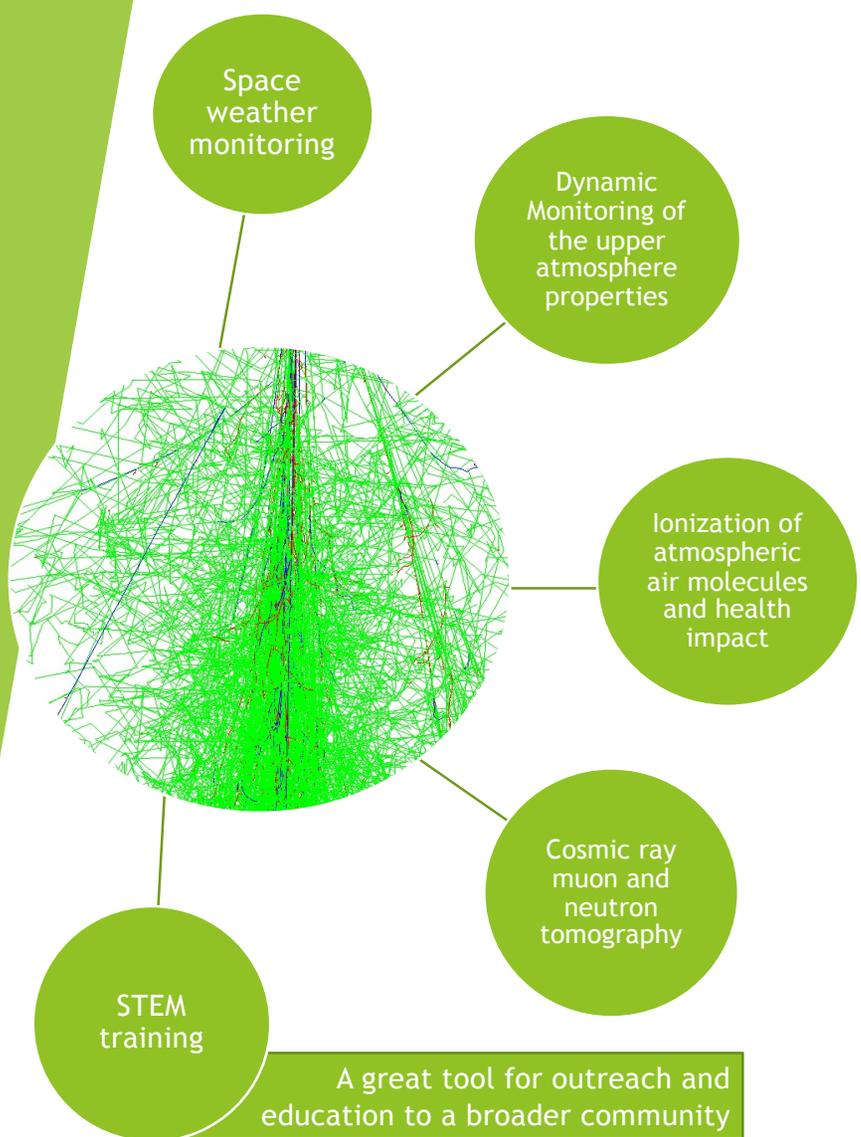
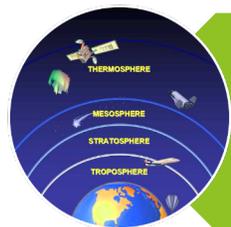


# Applications of Cosmic Ray Flux Measurements



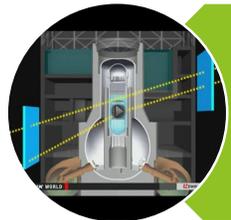
It has been well known for more than half a century that solar activities have a strong influence on cosmic ray flux reaching to the earth (anti-correlation). One could use cosmic ray flux measured at the surface of the earth to monitor the space weather and solar activities.



Since most of the cosmic ray showers are occurring between the upper troposphere and lower stratosphere, simultaneous cosmic ray flux measurement at the earth surface around the world could help to determine the dynamical changes of the air density in this region at global scale in real-time.



Secondary cosmic ray shower particles (electrons, gamma rays, muons, neutrons) are ionizing the atmospheric air molecules. These ionizations trigger lightning and seed cloud formation. They also ionize pollutants in air which could be a serious public health problem. Since neutron loses large fraction of its energy by scattering with hydrogen nuclei (i.e. protons), cosmic ray neutrons have been used for monitoring near the earth surface and soil moistures.



Near the earth surface, more than 80% of particles are muons which have been used for imaging hidden objects in non-destructive way known as muon tomography which is similar to X-ray imaging. Since muon particles are very penetrating, this technique has been used for monitoring volcanic activity, nuclear reactors, cargo containers inspection, and in archaeology.