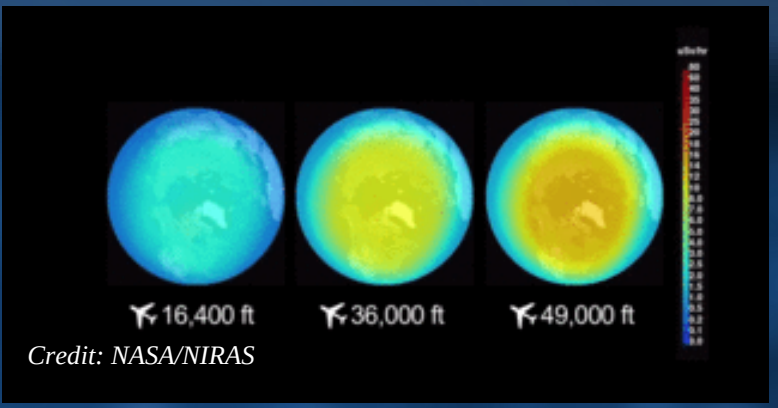
SCIENCE MISSION DIRECTORATE

Results using data from the NASA Radiation Dosimetry Experiment (RaD-X) showcase some of the first spectral dose measurements of cosmic radiation at high altitudes in Earth's stratosphere. These results were featured in a special December 2016 issue of the AGU Journal *Space Weather.*

Right: Rad-X payload ascended into the stratosphere. Credit: NASA



Credit: NASA/NIRAS

Seven different altitudes between 26,000-120,000 feet above Earth were sampled. High-energy (primary) particles can penetrate Earth's magnetosphere and atmosphere, and if they collide with nitrogen and oxygen, can cause decay into different (secondary) particles. A concentrated layer of decaying radiation particles, known as the Pfotzer maximum, occurs at 60,000 feet due to the density of the atmosphere at this altitude. *Left: Radiation dose rates were found to increase with altitude and latitude, and can vary from hour to hour. These rates were taken from Rad-X on 14 November 2012. Warmer colors indicate higher amounts of radiation.*

Even though the total number of radiation particles reaches a maximum at 60,000 ft, analyzing the RaD-X data, ***scientists found a steady increase in the dose equivalent rate – a measurement of how cosmic radiation can harm biological tissue – with increased altitude. This was true at altitudes above the 60,000 ft level*** because the primary particles found in greater concentrations at higher altitudes have a much more damaging effect on tissue than the more numerous secondary particles found at lower altitudes. Scientists found that the **there is a greater risk of cosmic radiation affecting life at high altitudes than previously thought.**

This data and analysis provides greater insight into how and where hazardous cosmic radiation forms in our near-Earth environment, which in turn help protect our astronauts and aviation industry crew and passengers at these altitudes.

The Rad-X data helps us understand part of the picture but real-time monitoring using in-situ data from instrument payloads orbiting Earth's upper atmosphere, is needed.