



ACE Satellite Instrument Detects Clues to Origin and Spread of Heavy Elements



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What is the science question?

Where and when are heavy elements created and how are they spread throughout the galaxy?

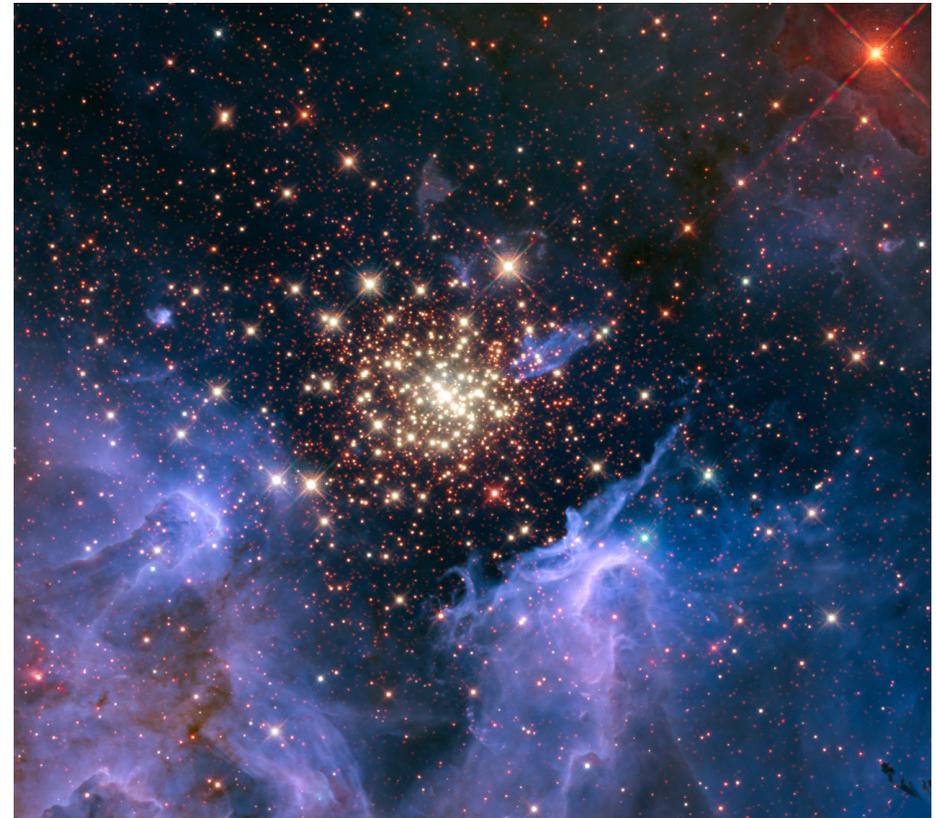
Why does it matter? Galactic Cosmic Rays are the bare nuclei of atoms that are accelerated to the speed of light and travel through space. Analyzing them helps us understand the origin and distribution of heavy elements that are essential to planet habitability, such as the iron in our blood and the Earth's core.

What are the findings?

The CRIS instrument on the ACE spacecraft has made the first observation of a primary radioactive isotope, particles that have travelled directly from their origin and acceleration site to the Earth. Since these particles have not decayed before reaching our planet, we know that the time between creation (called nucleosynthesis) in one supernova to acceleration in another supernova can't be more than a few million years. Clusters of massive stars, called "OB Associations," are the only galactic locations where multiple supernova occur in close proximity in time and space.

What is the impact?

With other results from ACE/CRIS, this helps cement OB Associations as the places where these heavy atoms are created and where they are accelerated.



"Observation of the ^{60}Fe nucleosynthesis-clock isotope in galactic cosmic rays" W. R. Binns, M. H. Israel, E. R. Christian, A. C. Cummings, G. A. de Nolfo, K. A. Lave, R. A. Leske, R. A. Mewaldt, E. C. Stone, T. T. von Roseninge, M. E. Wiedenbeck, *Science* 352 (6286), 677-680. [doi: 10.1126/science.aad6004]

