Name_____ Date_____

Literacy Lab #1 - Supernovas Rate Earth Science - Breed - 2012/2013

Directions: Take a few minutes to read the article below either online (or on the back of this page.) Write responses to the statements or questions below. Cut/copy/paste is not allowed – use your own words and thoughts, based in research if needed.

Read more: http://www.dailygalaxy.com/my_weblog/2012/05/-30-supernovas-per-second-in-the-observable-universe-creators-of-life-death.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+TheDailyGalaxyNewsFromPlanetEarthBeyond+%28The+Daily+Galaxy+--Great+Discoveries+Channel%3A+Sci%2C+Space%2C+Tech.%29

Fact-finding: List three facts that you learned in this article.

1.

2.

3.

Vocabulary: List and define three unfamiliar words in the space below.

Implications: What are your feelings about this "discovery"? Express your feelings (tactfully) about whether this is an advancement of science or a bad idea.

30 Supernovas Per Second in the Observable Universe --Creators of Life & Death

Supernova 1987A, discovered in 1987, is the closest exploding star to Earth to be detected since 1604 and resides in the nearby Large Magellanic Cloud, a dwarf galaxy adjacent to our own Milky Way Galaxy. In addition to ejecting massive amounts of hydrogen, 1987A has spewed helium, oxygen, nitrogen and rarer heavy elements like sulfur, silicon and iron. Supernovae are responsible for a large fraction of biologically important elements, including oxygen, carbon and iron found in plants and animals on Earth today. Since the supernova is roughly 163,000 light-years away, the explosion occurred in roughly 161,000 B.C. (One light year is about 6 trillion miles).

While there is, on average, only one supernova per galaxy per century, there is something on the order of 100 billion galaxies in the observable Universe. Taking 10 billion years for the age of the Universe (it's actually 13.7 billion, but stars didn't form for the first few hundred million), Dr. Richard Mushotzky of the NASA Goddard Space Flight Center, derived a figure of 1 billion supernovae per year, or 30 supernovae per second in the observable Universe.

Many astronomers today believe that one of the most plausible reasons we have yet to detect intelligent life in the universe is due to the deadly effects of local supernova explosions that wipe out all life in a given region of a galaxy.
The University of Colorado Cosmic Origins Spectograph team using NASA's newly refurbished Hubble Space Telescope observed the supernova in optical, ultraviolet and near-infrared light, charting the interplay between the stellar explosion and the famous "String of Pearls," a glowing ring 6 trillion miles in diameter encircling the supernova remnant that has been energized by X-rays. The gas ring likely was shed some 20,000 years before the supernova exploded, and shock waves rushing out from the remnant have been brightening some 30 to 40 pearl-like "hot spots" in the ring -- objects that likely will grow and merge together in the coming years to form a continuous, glowing circle.

"The new observations allow us to accurately measure the velocity and composition of the ejected 'star guts,' which tell us about the deposition of energy and heavy elements into the host galaxy," said CU-Boulder Research Associate Kevin France of the Center for Astrophysics and Space Astronomy and a member of the Cosmic Origins Spectrograph science team since 2007. "The new observations not only tell us what elements are being recycled into the Large Magellanic Cloud, but how it changes its environment on human time scales."

Hubble is the only observatory in the world that can observe the brightening of the String of Pearls in ultraviolet light, said France. Most of the data for the study was gathered by the Space Telescope Imaging Spectrograph, or STIS, which was installed on Hubble in 1997 and was one of the workhorse instruments before its power supply failed in 2004. A faulty circuit board on STIS was replaced by astronauts on the final Hubble repair mission in May 2009.

The team compared STIS observations in January 2010 with Hubble observations made over the past 15 years on 1987A's evolution. STIS has provided the team with detailed images of the exploding star, as well as spectrographic data -- essentially wavelengths of light broken down

into colors like a prism that produce unique fingerprints of gaseous matter. The results revealed temperatures, chemical composition, density and motion of 1987A and its surrounding environment, said France.

"To see a supernova go off in our backyard and to watch its evolution and interactions with the environment in human time scales is unprecedented," he said. "The massive stars that produce explosions like Supernova 1987A are like rock stars -- they live fast, flashy lives and die young."

France said the energy input from supernovae regulates the physical state and the long-term evolution of galaxies like the Milky Way. Many astronomers believe a supernova explosion near our forming sun some 4 to 5 billion years ago is responsible for a significant fraction of radioactive elements in our solar system today, he said.

"In the big picture, we are seeing the effect a supernova can have in the surrounding galaxy, including how the energy deposited by these stellar explosions changes the dynamics and chemistry of the environment," said France. "We can use this new data to understand how supernova processes regulate the evolution of galaxies."