Ancient star explosions revealed in the deep sea
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Iron-60 is radioactive and completely decays away within 15 million years, which means any iron-60 found on the earth must have been formed much later than the rest of the 4.6-billion-year old earth and arrived here from nearby supernovae before settling on the ocean floor.

Professor Wallner previously found traces of iron-60 at about 2.6 million years ago, and possibly another at around 6 million years ago, suggesting earth had traveled through fallout clouds from nearby supernovae.

For the last few thousand years the solar system has been moving through a denser cloud of gas and dust, known as the local interstellar cloud, (LIC), whose origins are unclear. If this cloud had originated during the past few million years from a supernova, it would contain iron-60, and so the team decided to search more recent sediment to find out.

Sure enough, there was iron-60 in the sediment at extremely low levels—equating to radioactivity levels in space far below the Earth's natural background levels—and the distribution of the iron-60 matched earth’s recent travel through the local interstellar cloud. But the iron-60 extended further back and was spread throughout the entire 33,000 year measurement period.

The lack of correlation with the solar system’s time in the current local interstellar cloud seems to pose more questions than it answers. Firstly, if the cloud was not formed by a supernova, where did it come from? And secondly, why is there iron-60 so evenly spread throughout space?

"There are recent papers that suggest iron-60 trapped in dust particles might bounce around in the interstellar medium," Professor Wallner said.

"So the iron-60 could originate from even older supernovae explosions, and what we measure is
some kind of echo. More data is required to resolve these details."

Scientists from ANU, the Australian Nuclear Science and Technology Organization, HZDR, the University of Vienna and the TU Berlin were involved in the study.

The findings have been published in the journal *PNAS*.

**More information:** A. Wallner et al. 60Fe deposition during the late Pleistocene and the Holocene echoes past supernova activity, *Proceedings of the National Academy of Sciences* (2020). [DOI: 10.1073/pnas.1916769117](https://doi.org/10.1073/pnas.1916769117)

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