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60Fe and 244Pu in deep-sea archives - a link to nearby supernova activity and r–process sites

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%%% Authors and affiliations are next. The presenter should be
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%%% Abstract proper starts here.
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The Interstellar Medium (ISM) is continuously fed with new nucleosynthetic products. The solar system moves through the ISM and collects dust particles. Therefore, direct detection of freshly produced radionuclides on Earth, i.e. before decaying, provide insight into recent and nearby nucleosynthetic activities [1,2]. Indeed, a pioneering work at TU Munich [3,4], which applied the ultra-sensitive single atom counting technique of accelerator mass spectrometry (AMS) to an ocean crust-sample, showed an enhanced ^{60}Fe signal possibly of extraterrestrial origin.

Within an international collaboration [5-7] we have continued to search for ISM radionuclides incorporated in terrestrial archives. We have analyzed several deep-sea sediments, crusts and nodules for extraterrestrial ^{60}Fe ($t_{1/2}$=2.6 Myr), ^{26}Al ($t_{1/2}$=0.7 Myr) and ^{244}Pu ($t_{1/2}$=81 Myr) [5-8] which are complemented by independent work at TU Munich [9-11]. All the data demonstrate a clear global ^{60}Fe influx that is interpreted as exposure of Earth to recent ($\leq${10} Myr) supernova explosions. Furthermore, the low concentrations measured for ^{244}Pu suggest an unexpectedly low abundance of interstellar ^{244}Pu [5]. This finding signals a rarity of actinide r−process nucleosynthesis which is incompatible with the rate and expected yield of standard core collapse supernovae as the predominant actinide-producing sites.

In this talk I will also present additional new results for ^{60}Fe and ^{244}Pu measured with unprecedented sensitivity. These data provide new insights into their concomitant influx and their ISM concentrations over a time period of the last 11 million years.

\bigskip
{\small

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