Evidence for depletions in the heavy silicon isotopes measured at comet 67P/Churyumov-Gerasimenko

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The Rosetta Orbiter Spectrometer for Ion and Neutral Analysis (ROSINA) on the European Space Agency's Rosetta spacecraft characterized the neutral gas environment around comet 67P/Churyumov-Gerasimenko (67P). Apart from volatiles, ROSINA also detected Na, Si, K, and Ca sputtered off the surface of the comet by impacting solar wind protons (Wurz et al., A&A, 583, 2015). Furthermore, ROSINA observed all three stable Si-isotopes, 28Si, 29Si, and 30Si and the obtained measurements hint at a deficiency of the heavy with respect to the lighter Si-isotopes when compared to solar abundances (i.e. δ29Si = (-145 $\pm$ 98) ‰ and δ30Si = (-214 $\pm$ 115) ‰).

We will discuss different possible explanations for this depletion taking into account that solar abundances, within the 1 to 2-σ range of the measured ratios, cannot be fully excluded. However, together with non-solar sulfur isotope ratios (Calmonte et al., MNRAS, submitted) and D/H in water ice similar to interstellar ices (Altwegg et al., Philos. Trans., in press) we find growing evidence that the material from which 67P formed was not fully homogenized in the early solar system.