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Ice and Dust in Comets

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The origin of the water ice and dust in comets and other icy bodies remains obscure. This puzzle can be usefully investigated by combining studies of the solar nebula with investigations of the composition of comets. As one aspect of a larger study of the solar nebula, we will show that the stable isotopes of hydrogen and nitrogen provide a remarkably helpful guide. The isotopes neatly divide the solar system into three distinct domains. All three were established in the early solar nebula; two of these primitive sign posts are present in cometary materials. This conclusion is supported by ground-based observations and results from the Stardust Mission. Further tests will be described.