



## The Compositional Profile of the Enceladian Ice Plume

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### Abstract

Data obtained by the Cassini spacecraft during recent close flybys of Enceladus will be presented. Prior compositional measurements of E ring grains with Cassini's Cosmic Dust Analyser (CDA) suggested salt-rich water as the dominant source of Enceladus' famous plume. Although the E ring dust population is dominated by ice particles stemming from Enceladus it was unclear how representative the E ring particles were of the original plume grain ensemble. During 2008 and 2009 Cassini passed deep into the plumes on several occasions, allowing the CDA team to analyse the compositions of freshly ejected plume particles for the first time. From this information a compositional profile of the plume has been inferred, showing that close to Enceladus' surface its composition differs significantly from that of the E ring. Our refined numerical modelling, including gas and dust dynamics and production, successfully reproduces the measured compositional profile of the plume, allowing new insights into Enceladus' subsurface processes. The observations can only be reproduced with a liquid water plume source.



