

Title:

Distribution of alkali gases in Io's atmosphere

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Abstract

Thanks to high-sensitivity (sub)millimeter spectroscopic observations, KCl and NaCl in gas phase have been detected at low concentration levels in Io's atmosphere. These molecules are likely to be the main potassium and sodium carriers from the moon to its environment. Indeed, potassium and sodium are known to be present in Io's neutral clouds and plasma torus, which are believed to be fed from the moon itself. The immediate sources of gaseous NaCl and KCl in Io's atmosphere are still unknown. Based on thermochemical arguments, both molecules could be present in volcanic plumes. Their lifetime in gaseous form is predicted to be rather low (a few hours), and a large portion of the emitted gas should quickly condense on the ground. Sputtering of surface condensates by high-energy particles may re-inject some of the condensates back in the atmosphere. The efficiency of this process is highly dependant on the local atmospheric column density. We present maps of NaCl and KCl emission distribution, obtained in 2012 and 2015 with the Atacama Large Millimeter Array (ALMA). The distribution maps will be compared to the distribution of volcanic centers and Io's bulk atmosphere (SO₂), in an attempt to characterize their immediate sources.

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