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木星・土星の赤外オーロラ発光モデリングと観測データ解析への適用
Modeling of infrared auroral emission from Jupiter and Saturn and its applicability for observation data analysis

垰 千尋 [1*], Sarah V. Badman[1], 宇野 健 [2], 藤本 正樹 [1]
Chihiro Tao[1*], Sarah V. Badman[1], Takeru Uno[2], Masaki Fujimoto[1]

[1]ISAS/JAXA, [2] 東北大学・理・地球物理
[1]ISAS/JAXA, [2]Tohoku Univ.

Aurorae represent plasma environments around a planet. Outer planetary aurorae are observed in various wavelength from radio emission, infrared (IR), visible, ultraviolet, to X-ray. Since IR wavelength is observable from the ground with spatial information, it would be good tool for monitoring to investigate the variable environment. Recent observation by Cassini spacecraft provides spatially-resolved Saturn's IR auroral image. Since the IR emission relates with thermally excited H_3^+ ion, it reflects atmospheric temperature in addition to ionization by auroral electron and solar EUV. Previous modeling study relates the IR emission and H_3^+ column density and atmospheric temperature. This study newly attempts to test its applicability for monitoring not only atmospheric condition but also auroral electron. We investigate the dependence of IR emission spectrum on temperature and electron energy spectrum using an IR emission model accounting for ionization by auroral electron with various energy flux, ion chemistry, and H_3^+ non-LTE effects. IR emission increases with increasing electron energy for $<$10 keV and then decreases. This decrease reflects low temperature at low altitude and hydrocarbons which reduces H_3^+ by dissociative recombination. Emission line ratio varies by a few 10s% depends on electron energy and by a factor depends on atmospheric temperature. We will discuss its applicability to observed data analysis and requirement for observations.
Keywords: Jupiter, Saturn, infrared, aurora, spectrum