Title: A Model for the Ganymede Atmosphere
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Category: Europa, Callisto, and Ganymede (including Galileo)

Abstract text: The presence of an atmosphere around the icy Jovian satellite Ganymede
suggests the efficacy of mechanisms to provide a neutral source from sputtering and from
sublimation. The model presented here is a preliminary look at processes within the
atmosphere near the surface, including feedback with the surface. The magnitude of the
neutral atmosphere source from both sublimation and sputtering is calculated as a function
of latitude and local hour angle, and these neutral sources are used as input to an
atmospheric photochemical model to provide diurnal variations in water group ion/neutral
mixing ratios. The surface-thermal model is an integration of a 1-D heat conduction
equation over a diurnal cycle, subject to a surface boundary condition. The temperature
distribution of the satellite surface, as well as the depth of a frosty, or silicate/icy overlayer,
and the magnitude of volatile sublimation, is calculated. Surface brightness temperatures
from the Galileo PPR experiment, as well as albedo variations and morphology conditions
measured by the Galileo NIMS experiment are used to constrain the thermal model. A
functional dependence of volatile production from sputtering is assumed, with latitude and
longitude dependencies incorporated into the model. The photochemical model employs a
diffusion factor to simulate the effects of a coronation wind upon the photochemical ion
production, and accounts for adsorption of atmospheric molecules by the surface.
Temperature measurements from the Galileo PLS experiment are used with some
temperature dependent reactions of the photochemical model. Preliminary results from this
model include a maximum (noon) subsolar surface temperature of 153 K, total global water
production from (upward) sublimation of 1.1×10^{27} molecules/s, and a ratio of
atmospheric $[H]/[H_2O] = -500$.

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