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It has been suggested that magnesium and sodium salts may occur on Europas surface [1], and Europa is known to possess an extended sodium atmosphere [2] that can interact with the surface. Radiolysis of sodium and magnesium compounds, in the presence of ice, is predicted to produce metal oxides and hydroxides [3]. We investigated NaOH and $Mg(OH)_2$ (brucite) on Europas surface by searching for characteristic O-H absorption features at ~1.4 microns in spectra obtained by the Galileo Near Infrared Mapping Spectrometer (NIMS).

NIMS normally employs a scanning mirror for "push-broom" spatial scanning of the target, obtaining a swath of 20 pixels in each instrument cycle. A small number of NIMS observations of Europa have been obtained using a special instrument mode in which spatial scanning is disabled ("Long Spectrometer," LS mode). In this mode spatial coverage is sacrificed in exchange for a 20-fold redundancy of spectral information for each pixel imaged. Subsequent processing of the 20 values obtained for each wavelength excludes radiation spikes and produces one optimal spectral intensity value. Spectra produced in this fashion show improvements in S/N by factors of 4 or more. Further reductions in noise levels may be attained by co-adding adjacent (or spectrally similar) groups of pixels, at the cost of some spatial resolution. The resulting spectra have the highest S/N so far attained for certain regions of Europas near-infrared spectrum.

Co-added LS mode spectra from the observations 14ENSUCOMP03, 15ENSUCOMP01, and 17ENSUCOMP02 were employed in our search for the ~1.4-micron spectral absorption features associated with NaOH and $Mg(OH)_2$. The imaged surfaces include a variety of icy plains units, dark mottled terrain, and dark linea. No evidence of O-H absorption features near 1.4 microns is found in our spectra, permitting us to place upper limits of 10% for $Mg(OH)_2$ and 5% by number for NaOH for the imaged regions on Europa. These results do not yet allow us to place constraints on the abundance of parent compounds on Europas surface, as radiolytic production rates are not known. Additional work is needed to address this important question.

[1] McCord et al., Science 280, 1242 (1998); [2] Brown, M. E., R. E.

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