Gemini NorthNIRI Spectra of Pluto and Charon: Simultaneous Analysis of the Surface and AtmosphereJason C. Cook1, Dale P. Cruikshank2, Leslie A. Young1 Southwest Research Institute, 1050 Walnut St, Suite 300, Boulder, CO 80302, 2NASA Ames Research Center, MS 245-6, Moffett Field, CA, 94035We report on our analysis of blended Pluto and Charon spectra over the wavelength range 1.4 to 2.5 m as obtained by the NIRI instrument on Gemini North on June 25-28, 2004. The data have a resolving power () around 1500 and a SNR around 200 per pixel. The observed blended spectra are compared to models that combine absorption from the solid ice on the surface using Hapke theory, and absorption from the gaseous atmosphere. We assume the spectrum is a combination of several spatially separate spectral units: a CH4-rich ice unit, a volatile unit (an intimate mixture of N2, CH4 and CO), and a Charon unit (H2O, ammonia hydrate and kaolinite). We test for the presence of hydrocarbons (i.e. C2H6) and nitriles (i.e. HCN) and examine cases where additional ices are present as either pure separate spatial units, mixed with the CH4-rich unit or part of the volatile unit. We conclude that 2-4 of Plutos surface is covered with pure-C2H6 and our identification of C2H6 is significantly strengthened when absorption due to gaseous CH4 is included. The inclusion of Plutos atmosphere demonstrates that low-resolution, high-SNR observations are capable of detecting Plutos atmosphere during a time when Plutos atmosphere may have been undergoing rapid changes (1988-2002) and no high-resolution spectra were obtained. In particular, we identify features at 1.665 and 2.317 m as the Q-branch of the 23 and 3+4 bands of gaseous CH4, respectively. The later band is also evident in many previously published spectra of Pluto. Our analysis finds it is unnecessary to include 13CO to explain the depth of the 2.405 m, which has been previously suggested to be a spectral blended with C2H6, but we cannot definitively rule out its presence. Funding for this work (Cook) has been provided by a NASA-PATM grant.