Dust Infrared Emission in an H2-Forming, Perseus-Arm Cloud

Using HIRES IRAS and Spitzer IRAC and MIPS imaging photometry, and computational dust emission modeling (via DustEM) to investigate a target cloud in the Perseus spiral arm in the which the HI-to-H2 transition appears to be underway.

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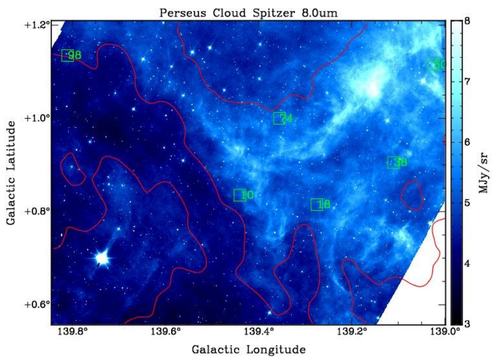
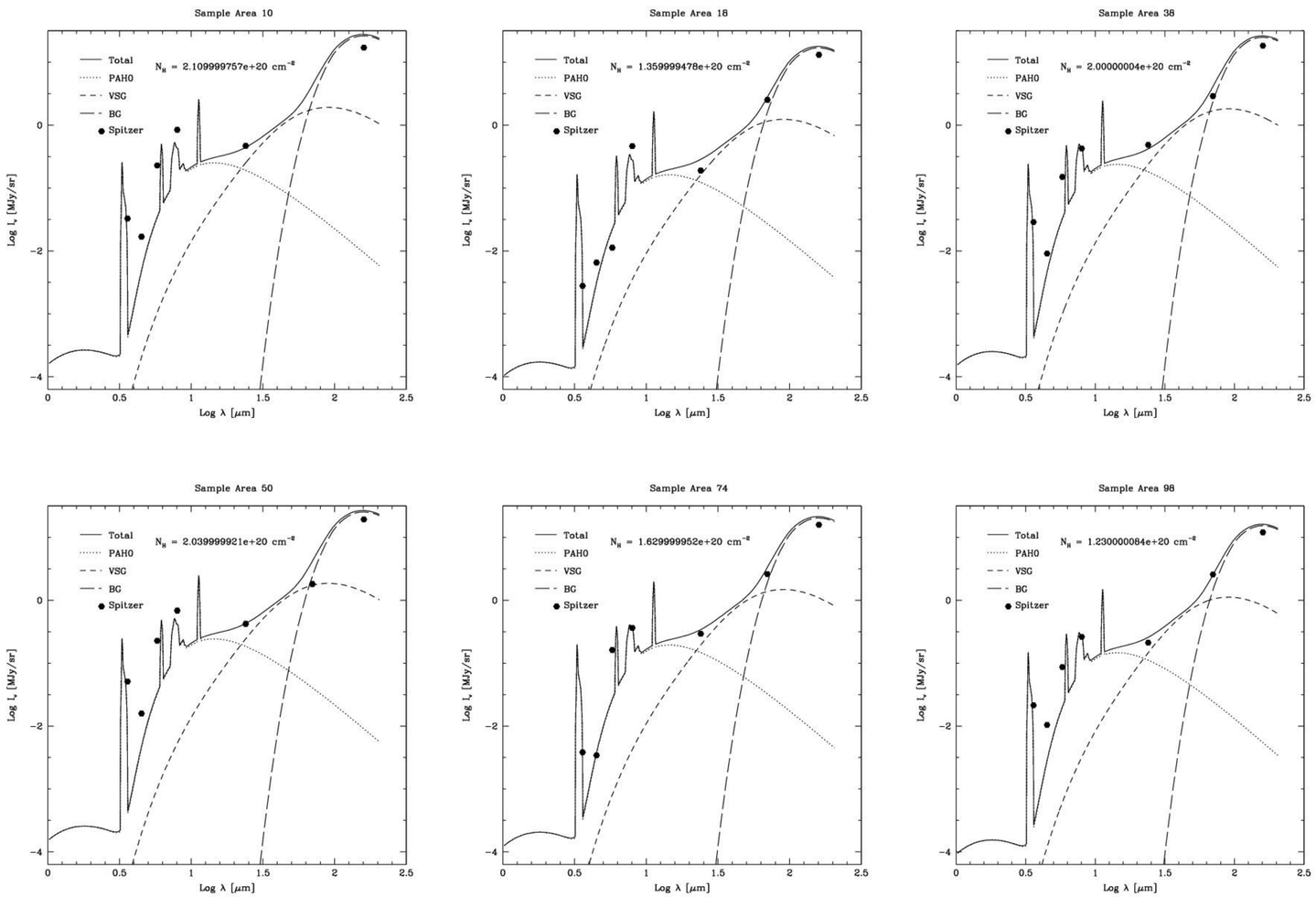
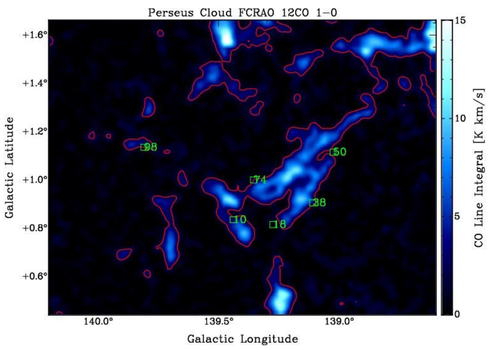


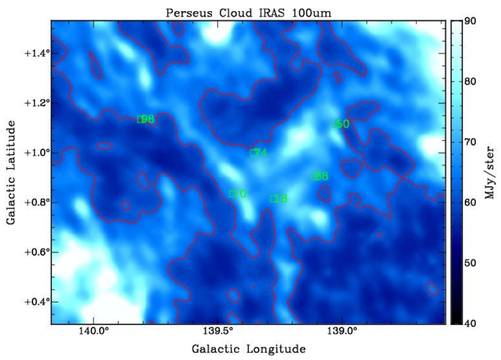
Above we see the target cloud as viewed by the Spitzer Space Telescope using the 8um band. The numbered boxes in this image indicate the sample areas used to create the observed spectral energy distributions, at right. Note the decreased resolution here as compared to the Spitzer image. This is one of the advantages of using SST data for our study.

These plots show how the observed spectral energy distribution curves (the black points on each plot) compare to the spectral energy distribution generated by the DustEM model. Each plot corresponds to a characteristic sample area (6 of 72) within our target dust feature. To fit the DustEM SED to the observed values, the column density of the dust was optimized. Also shown in each plot are the component dust grain types that are responsible for the total thermal emission. The current model parameters account for polyaromatic hydrocarbons (PAH), "very small grains" (VSG), and "big grains" (BG)

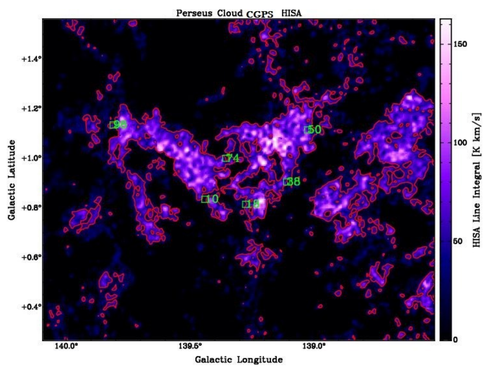




Here we see the 12CO emission features within our target cloud, revealed by the Five College Radio Astronomy Observatory . For this image the HISA image below), brightness was integrated over the full velocity range of the Perseus-arm gas. The CO emission above, as well as excess dust emission, are factors which helped us select our target cloud as a potential H_2 region.



This image shows our target region as resolved by the IRAS space telescope, using the 100um band. The IRAS data is useful to us, despite its lower resolution, in that it offers three wavelength bands that the SST does not (12um, 60um, and 100um). The IRAS data also includes a larger area than the current SST selection (note the gaps in the SST image above).



This image shows the HI Self-Absorption features within the target cloud, from the Canadian Galactic Plan Survey. One goal of the study is to evaluate HISA as tracer of H_2 formation.