

South Pole Observations of Extended PAHs Emission in NGC 6334

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We have used the 60-cm SPIREX telescope at the South Pole to conduct a wide-field thermal infrared imaging study of the star formation complex NGC 6334 in the southern galactic plane. Using the Abu camera with a 1024×1024 InSb array, images can be obtained with $0.6''$ pixel scale over a $10'$ FOV through broad band filters for L ($3.5\mu\text{m}$) and M ($4.8\mu\text{m}$), and through narrow band filters for the lines of the H₂ Q-branch ($2.42\mu\text{m}$), PAHs ($3.3\mu\text{m}$) and Br α ($4.05\mu\text{m}$). We imaged a $30'$ region (15 pc) along the main star forming ridge of NGC 6334 through these filters during the winter of 1998¹. The images reveal the spectacular, complex structure of the photodissociation regions (PDRs) that pervade the region, with enhanced line emission around each of the 7 sites of massive star formation along the ridge. Bubbles and loops of PAHs emission, typically 1-1.5 pc across, have been carved out of the parent molecular cloud by the intense UV radiation from the massive stars, and surround HII regions (seen in Br α) typically 0.2-0.3 pc across. The PAHs emission regions coincide with both (low spatial resolution) maps of [CII] $158\mu\text{m}$, indicating it is excited in PDR gas, and with extensive H₂ emission, which is therefore fluorescent. However the texture of the emission regions in PAHs and H₂ are different, attributable to variations in the physical environment in which the gas is excited. Several compact reddened objects are observed, which are likely to be massive protostars. These images demonstrate the viability of the Antarctic plateau for wide-field imaging surveys in the thermal infrared.

¹See URL <http://newt.phys.unsw.edu.au/~mgb/Proposals/n6334pahlbra.jpg>

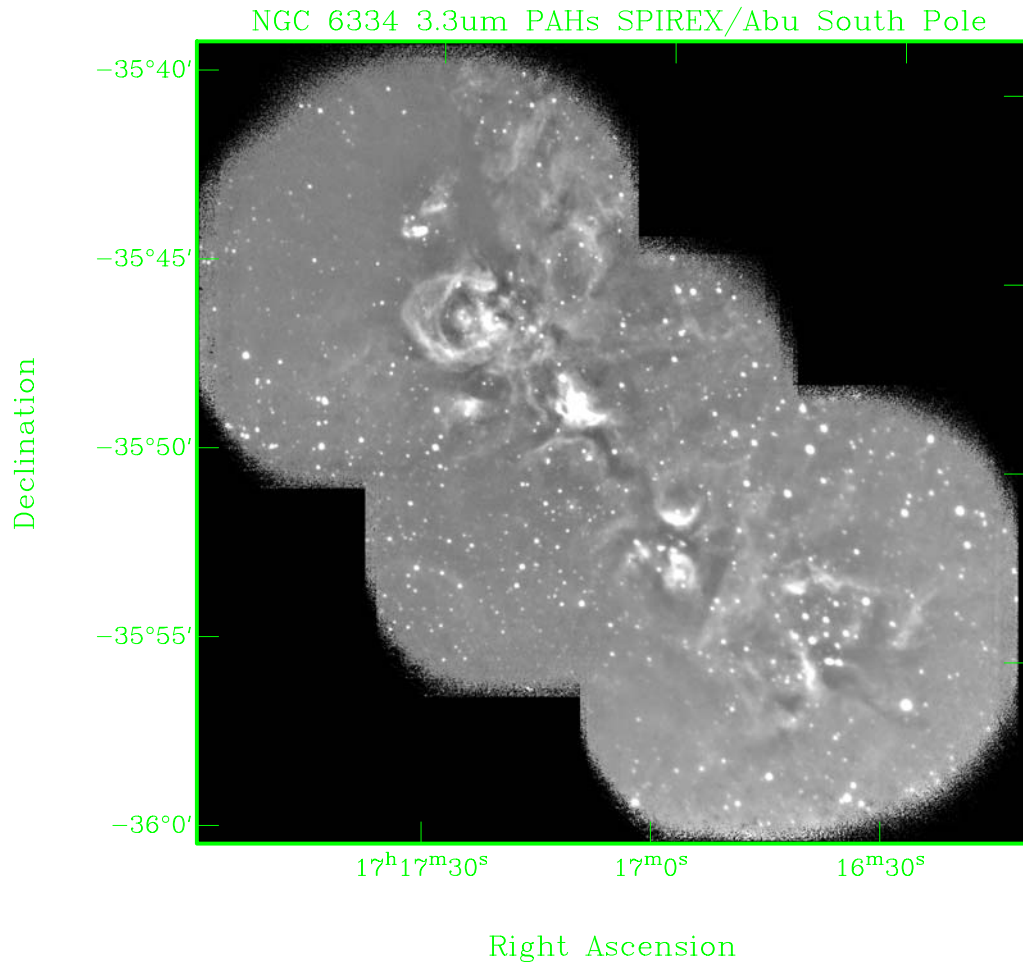


Figure 1: 3.3 μ m PAHs emission from the molecular ridge of NGC 6334. The image covers 22' on a side, with 0.6'' pixel scale. Bubbles and loops of PAHs emission surround sites of massive star formation.