The Search for Newborn Stars: Observing Bok Globules Using Infrared Archival Data

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Bok Globules are dense clouds of molecular hydrogen gas that are generally associated with emission nebulae and young star clusters. It has been hypothesized that these clouds represent the first stages of stellar formation and that these clouds are collapsing due to gravity and forming stars in their dense cores. Observations from three groups of globules in IC 2944, NGC 2237, and M8 in the I and J bands showed that of the 43 globules surveyed, ~23.25% contained infrared sources that could not yet be attributed to a source other than star formation. In order to verify these results, infrared archival data from the WISE, 2MASS, and Herschel archives were used to observe IC 2944 and NGC 2237 further in the infrared (1.2μm - 160μm). Within the largest globule in IC 2944, six new infrared sources were found. Photometry was used to create spectral energy distributions and temperature estimations for each of these sources. None had a surface temperature of greater than 900K, far less than any main sequence star, making these sources very likely protostar. Of the infrared sources in IC 2944 and NGC 2236 found by the 2016-17 survey, only two could be observed in WISE bands and thus confirmed to be protostellar. Herschel Data in the 160μm range observed a surface temperature of ~18K for the largest globule of IC 2944, data from the 70μm range showed a hotspot of ~41.5K surrounding three of the protostellar sources within the globule, suggesting that the globule is undergoing Internal heating and possible collapse. Two possible protostars were found within NGC 2237 that were not found in the earlier survey. These infrared sources are most likely protostellar as they have characteristic low surface temperatures expected of a protostellar source.

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