SCUBA & HIRES Results for Protostellar Cores in the Mon OB1 Dark Cloud

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HIgh-RESolution (HIRES) processing of *IRAS* data and point-source modeling techniques (Hurt & Barsony 1996; O'Linger 1997; Barsony et al. 1998) are a powerful method of identifying new Class 0 objects (O'Linger et al. 1999), and of separating the spectral energy distributions (SEDs) of young stellar objects (YSOs) in confused regions. Depending on the data set in question, significant improvements in image resolution may be attained past the typical twenty-iteration default used when HIRES data is requestly remotely from IPAC (Aumann, Fowler, & Melnyk 1990; Hurt & Barsony 1996; O'Linger 1997; Barsony et al. 1998; O'Linger et al. 1999; Wolf-Chase et al. 1999). Figure 1 illustrates this, showing HiRes results achieved at 1, 20, & 200 iterations in the 60 & 100 μm wave bands for IRAS 06382+0939, which is located in one of two extended dense cores in the Mon OB1 dark cloud (Margulis, Lada, & Young 1989; Wolf-Chase, Walker, & Lada 1995). Furthermore, point-source models of the *IRAS* emission may be constructed using the diagnostic "beam-sampled" maps, by inputting a series of user-defined "spikes", and HIRES-processing these along with the actual data. If higher-resolution observations are available at different wavelengths, these can be used to estimate placement of input spikes. The first map shown in Figure 2 is an 850 μm image of IRAS 06382+0939, that was obtained using the Submillimetre Common User Bolometer Array (SCUBA) on the James Clerk Maxwell Telescope (JCMT) located near the summit of Mauna Kea, Hawaii. Features that were identified in this image were used to help guide the placement of HIRES model input spikes (labelled S#), which were used to create models of the 200-iteration 60 & 100 μm emission shown in the subsequent two maps.

This technique has enabled the separation of the SED of a Class 0 protostar (labelled '12S' in the figures) from a more evolved source (12N: located at the *IRAS* PSC position) to the northwest. Source 12N is undetected in the 850 μm map, and its 100 μm emission can be modeled *without* specifying a point source at the PSC position. Subsequent CO J=2$\rightarrow$1 line mapping of the outflow in this region at the National Radio Astronomy Observatory (NRAO) 12-meter telescope located on Kitt Peak, near Tucson, Arizona, has identified the new Class 0 object as the source of the outflow (Wolf-Chase et al. 1999), *not* the more evolved source, which was previously associated with the outflow based on lower-resolution CO J=1$\rightarrow$0 observations (Margulis, Lada, & Snell 1988). We suggest this technique can help establish a data base of protostellar objects for further study by SOFIA.

Fig. 1.— 60 μm (upper row) & 100 μm (lower row) HiRes results for IRAS 06382+0939 (IRAS 12: Margulis, Lada, & Young 1989; Wolf-Chase, Walker, & Lada 1995) at 1, 20, & 200 iterations (left to right). Pixel size is 15″; achieved resolution at 200-iterations is $\leq$1′.

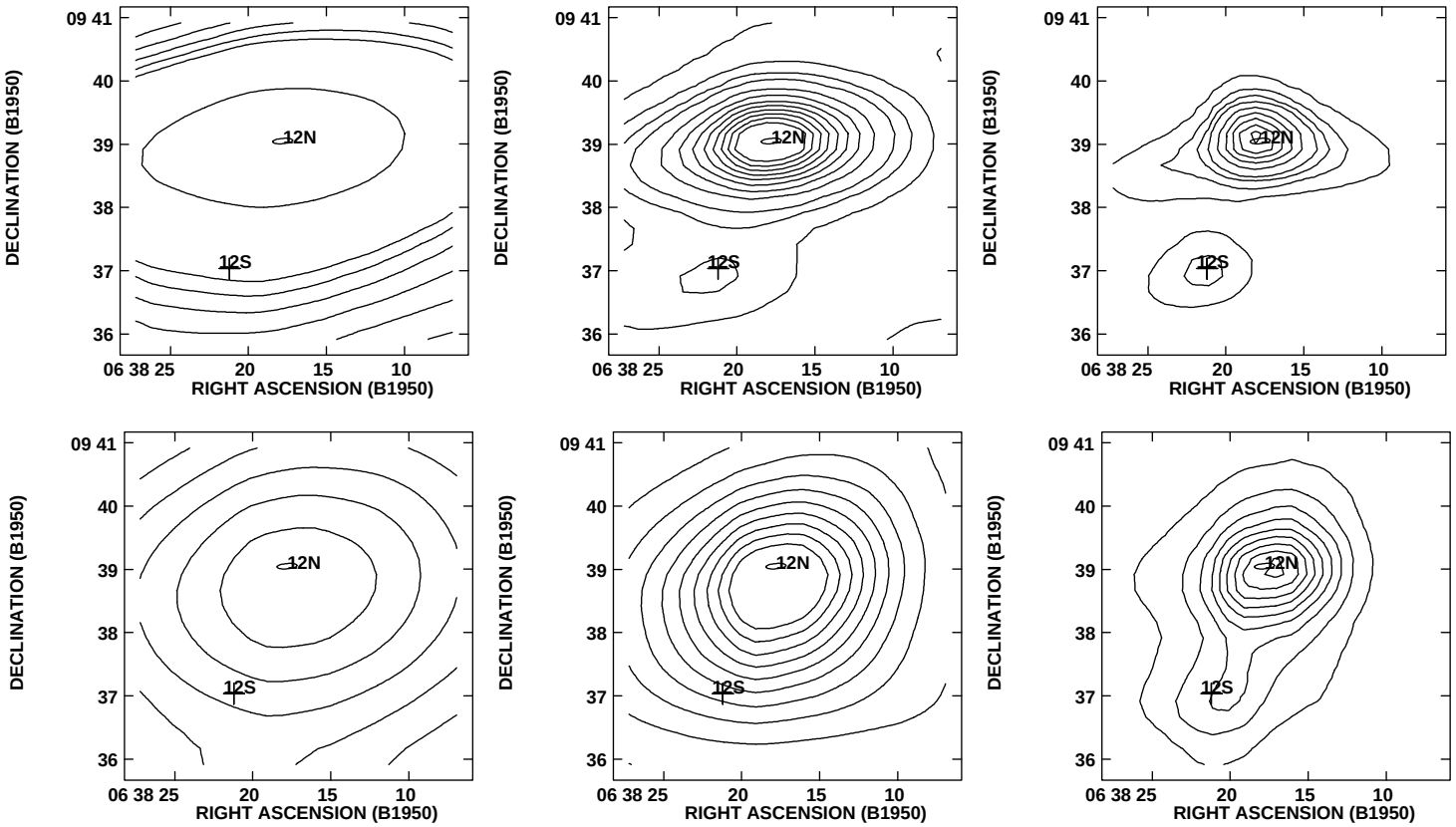

Fig. 2.— From left to right: 850 μm SCUBA map (14″ resolution), 60 μm & 100 μm 200-iteration HiRes point-source models for IRAS 06382+0939. These maps show the placement of input "spikes" (S#) described in the text. Note how closely the models simulate the actual HIRES-processed emission shown in Figure 1. The position of a H_2O maser near '12S' is also indicated (Mendoza et al. 1990).