Triggered Star Formation in a Turbulent ISM
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A (Sub)Millimeter survey of massive star-forming regions identified by the ISOPHOT Serendipity Survey (ISOSS)

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Abstract. A sample of potential massive starforming regions identified at 170 m by ISO was observed in the submillimeter and millimeter regime. These observations allow us to infer physical properties of the molecular cloud cores. Two sources are presented in detail: ISOSS J23053+5953 and J183640221 show viable candidates for massive protocluster cores. Our analysis shows very low temperatures and low levels of turbulence of the major mass fraction in the molecular cloud cores besides active star formation at an early evolutionary stage. These conditions seem similar to the low mass case and may precede phases of luminous infrared emission observed towards young massive protostars.

Keywords. stars: formation

ISOSS J23053+5953: This object is placed at a distance of ∼3.5 kpc and coincides with IRAS 23032+5937. The SCUBA observations at 450 μm and 850 μm reveal two compact cloud cores separated by ∼17″ and a much more extended emission component. Only about 20% of the submillimeter flux is due to the two cores, and we deduce a large mass fraction of cold gas and dust in an extended envelope. This finding is supported by our molecular line studies in Methanol, Formaldehyde, $C^{18}O$, HCO^+ and the modelling of the thermal dust emission. **Conclusions:** The by far largest mass fraction of ISOSS J23053+5953 has a low temperature of ∼15 K and signatures for large scale infall are detected. It can be considered as a protocluster object probably prior to the formation of massive stars. The analysis of interferometric observations performed with the PdBI (IRAM) will clarify the state of fragmentation.

ISOSS J18364−0221: The distance is ∼2.2 kpc and the SCUBA maps at 450 μm and 850 μm show two components. The eastern seems extended and is probably composed of at least two subcores. It is cold ($T \sim 16.5$ K) and compact ($R \sim 0.2$ pc) with an estimated mass of 75 ± 30 $M_\odot$. The western component shows lower temperatures ($T \sim 12$ K) and is extended ($R \sim 0.5$ pc) with an estimated mass of 280 ± 75 $M_\odot$. We derive a gas kinetic temperature of $T_K = 11.6 \pm 1.5$ K, while the small line widths suggest a low level of turbulence. **Conclusions:** The submillimeter cores in ISOSS J18364-0221 show low temperatures, low levels of turbulence and signs of large scale infall as well as outflows driven by currently formed objects. They can be considered as massive protostellar objects representing the earliest phases of star formation.

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