

# The TOP-SCOPE survey of Planck Galactic Cold Clumps: The 200 brightest compact sources of Planck

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**Abstract.** The Planck all-sky submillimetre observations have made it possible to study Galactic cold clumps in diverse environments, to probe dust properties and to examine the earliest stages of star formation. The TOP-SCOPE joint survey program aims to statistically study the evolution of molecular clouds and the initial conditions of star formation in a wide variety of environments. In this work we carry out an investigation of the 200 brightest compact sources detected by Planck.

**Keywords.** surveys, ISM: clouds, ISM: abundances, stars: formation

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## 1. Introduction

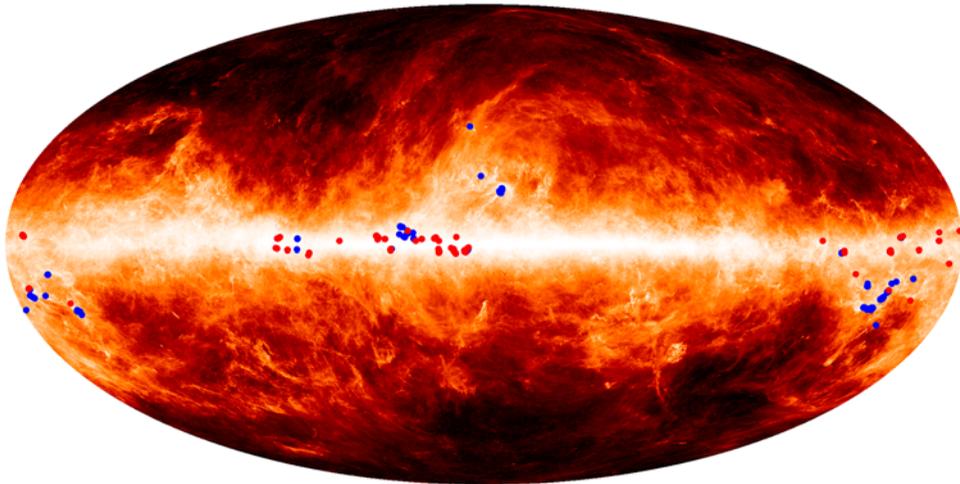
Regarding star formation both the analysis of individual star-forming regions and survey-driven research have become of huge importance. From the results of Planck an all-sky catalogue of Galactic cold clump candidates (PGCC) have been made ([Planck Collaboration 2016](#)). TOP-SCOPE is a joint follow-up survey program targeting around 2000 PGCCs in CO isotopologues and around 1000 PGCCs in 850 micrometer continuum emission using ground-based radio telescopes.

The TRAO Observations of Planck cold clumps (TOP - PI: Liu, T.) is a Key Science Program of the Taeduk Radio Astronomy Observatory surveying the J=1-0 transitions of 12CO and 13CO toward 2000 PGCCs. The goals are to find dense CO clumps, study the universality of filaments in the cold interstellar medium and cloud evolution, investigate the role of magnetic fields, turbulence and gravity and to examine the dynamical effects of stellar feedback and cloud collisions on star formation ([Liu et al. 2018](#)).

The Scuba-2 Continuum Observations of Pre-protostellar Evolution (SCOPE - PI: Liu, T.) is one of the large programs at the JCMT of the East Asia Observatory, a survey of 1000 PGCCs at 850  $\mu\text{m}$ . The main goal of the survey is to investigate dense clumps in different environments, study the roles of filaments in dense core formation, examine dust properties and detect rare populations of dense clumps ([Liu et al. 2018](#)).

## 2. Data

The TOP200 sample consists of the 200 brightest sources of the Planck Compact Source Catalog that can be observed by telescopes from the northern hemisphere. These are not



**Figure 1.** Distribution of the TOP200 sources on the Planck 857 GHz all-sky map in histogram-equalized colour mapping. Blue dots: TOP sources, red dots: sources in the SCOPE fields.

necessarily PGCCs, most of them are in star forming regions: the sample contains more evolved sources, starless core candidates and protostellar cores as well as UCHII regions. 80 of the sources have been observed by the SCOPE survey.

The primary aim of the project is to make a catalog and a statistical study of the sources as in the work of [Eden \*et al.\* \(2017\)](#). Using Herschel and JCMT observations we are investigating the dust properties of the cores, making column density and dust temperature maps. We are also investigating the young stellar objects in the vicinity of the sources to examine their influence on such star-forming sites. We aim to compare the properties of this sample to PGCCs to see how star formation efficiency, clustering behavior and core masses evolve with time.

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