The Perseus star-forming region: highlights from PACS and SPIRE observations

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As part of the Herschel Gould Belt survey, the Perseus star-forming cloud was observed with the *Herschel* PACS and SPIRE instruments. Data analysis is ongoing and the final results will be presented in an upcoming paper. In this poster we give a brief overview of the Herschel observations, we show the column density map and we present a preliminary analysis of the filamentary structures of the region. We also report on the discovery of two first hydorstatic cores candidates.

1.

The star forming region in Perseus is located at an average distance of ~250 pc. It hosts a number of well-known sites of active star formation like **NGC 1333, L1448, L1455, B1, IC348**.

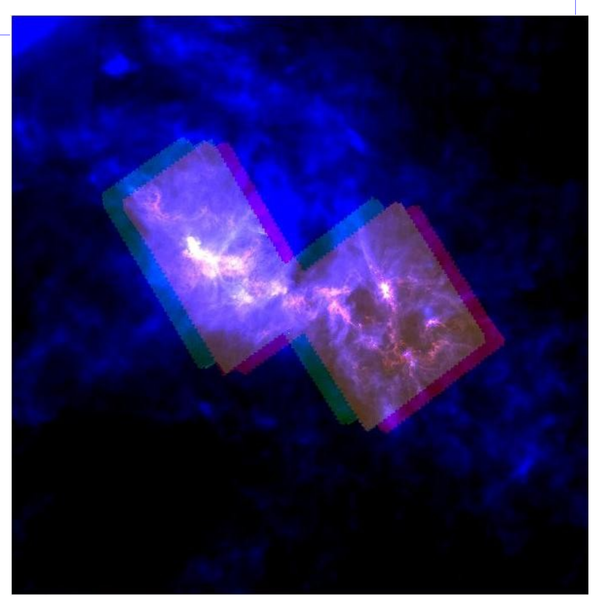
Perseus was observed as part of the **Herschel Gould Belt survey** (GBS, André et al. 2010) which aims to obtain a complete census of pre-stellar cores and Class 0 sources in the closest star-forming regions. The survey was executed with the *Herschel* (Pilbratt et al. 2010) instruments *PACS* (Poglitsch et al. 2010) and *SPIRE* (Griffin et al. 2010, Swinyard et al. 2010).

2.

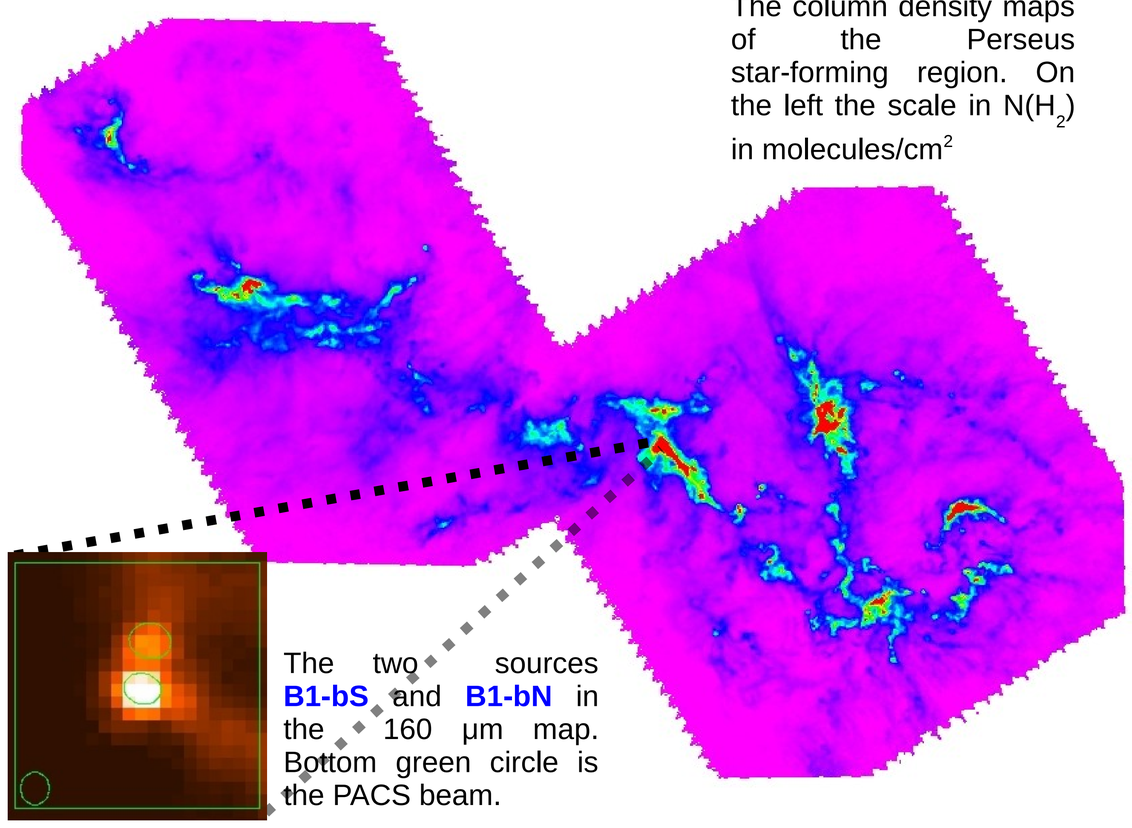
The Perseus complex covers many square degrees in the sky. The sites of active star formation, however, extend on a smaller area that was splitted in two overlapping zones, a Western and an Eastern part. The two zones were observed in parallel mode, with the telescope scanning at 60"/s; chosen PACS bands were 70 μm and 160 μm. The inner, and denser, parts of each zone were also observed with PACS only at 20"/s, at 100 μm and 160 μm.

These data have been already exploited in a few papers: Sadavoy et al. (2012) made a multiwavelength study of a few young sources in **B1-E**; Pezzuto et al. (2012) reported on the analysis of the SED of **B1-bS** and **B1-bN**, two first hydrostatic cores candidates; Sadavoy et al. (to be submitted) presents the analysis of the clumps.

In this poster we give a general overview of the region.



The RGB figure above shows in blue a 10°x10° IRAS 100 μm image. Green and Red channels show the PACS 160 μm and SPIRE 250 μm fields.



The column density maps of the Perseus star-forming region. On the left the scale in $N(H_2)$ in molecules/cm^2

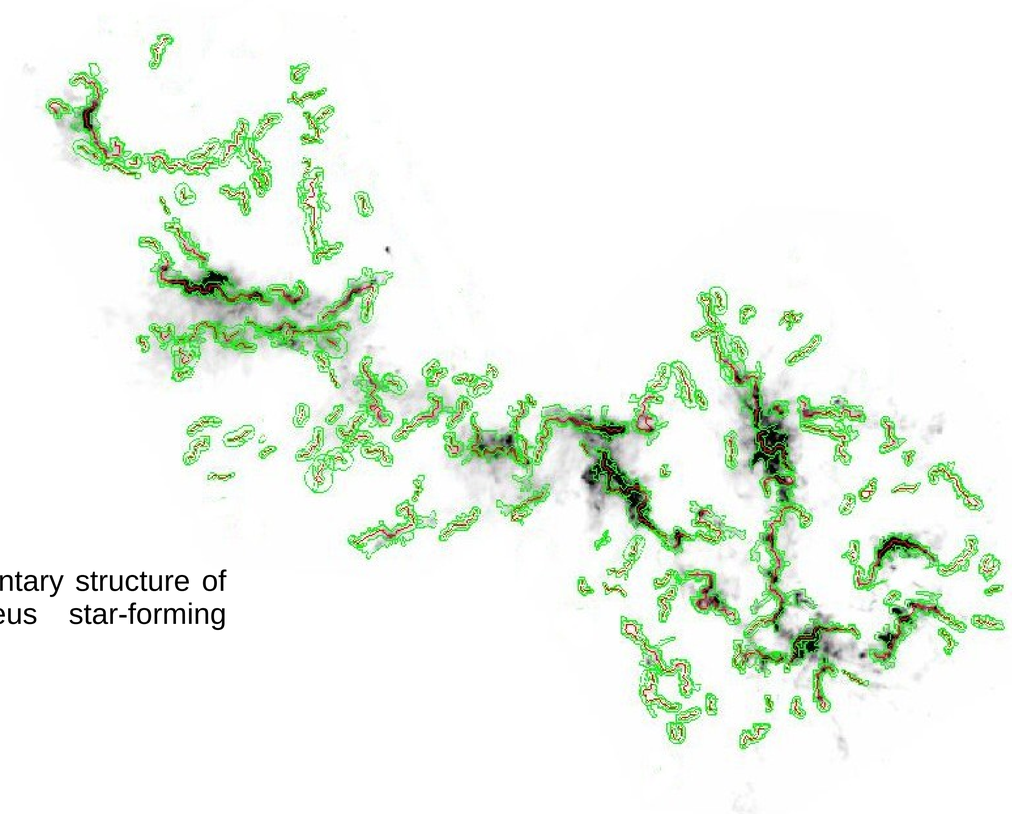
The two sources **B1-bS** and **B1-bN** in the 160 μm map. Bottom green circle is the PACS beam.

3.

PACS data were processed up to Level 1 with HIPE using the latest calibration tree. The maps were generated with Unimap (Piazzo et al. 2012) and the zero point was calibrated against Planck (Bernard et al. 2010); SPIRE maps were obtained directly from the pipeline.

The figure on the left shows the column density map of the combined Perseus East and West regions.

An important result from *Herschel* data is the deep link between the filaments and the star formation (e.g., Polychroni et al. 2013 for **L1641** in **Orion A**; see also André et al. 2010, Molinari et al. 2010). In the figure below we show a preliminary detection of filaments extracted with Schisano's et al. (submitted, see also poster P73 for a description) algorithm. The complex network of filaments which connects (in a 2D map) the different regions is clearly visible.



The filamentary structure of the Perseus star-forming region

4.

The generation of the sources catalog is under work. Two interesting sources, however, have been already subject of a recent publication.

Pezzuto et al. (2012) found that the two sources **B1-bN** and **B1-bS** (see the small map above) discovered by Hirano et al. (1999), are younger than previously thought. Thanks to *Herschel* data it has been proposed that these sources are good first hydrostatic cores candidates.

The hypothesis has been then enforced in a paper by Huang & Hirano (2013), based on interferometric *SMA* observations.

Because in the 70 μm parallel map B1-bS was marginally detected and B1-bN was not, the two sources were observed again at 70 μm with a higher sensitivity. In the resulting map B1-bS is now very well detected while B1-bN is just above the noise. We plan to publish a new paper modelling the continuum with a better model than that used in our first work.

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