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A NEW CATALOGUE OF H I SUPERSHELLS IN THE OUTER PART OF THE MILKY WAY

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A New catalogue of H I supershell candidates (GSc) was developed in the outer part of the Galaxy. The search was carried out using a combination of two techniques: one based on a visual inspection plus an automatic algorithm. A statistical study of the main properties of the detected structure was also carried out.

The neutral hydrogen (H I) supershells are large features that appears in the H I emission distribution as minima surrounded totally, or partially, by "walls" of enhanced H I emission. A new catalogue of GSc was developed in the region delimited by $90° \leq l \leq 165°$ and $195° \leq l \leq 270°$ in longitude and $b \leq |50°|$ in latitude. A structure was considered a supershell if it fulfills the following selection criteria: *i*) it must have, in a given velocity range, a well defined region of low brightness temperature, surrounded, partially or completely, by a ridge of higher H I emissivity, *ii*) The H I minimum must be observable in at least five consecutive velocity channels, *iii*) the structures must have a minimum angular size of 2°, and *iv*) the linear size of the structure must be larger than 200 pc.

Two techniques were used to carry out the catalogue: a visual inspection and an automatic search following a four stage procedure: *a*) a visual search of the GSc, *b*) a learning phase of the automatic detection algorithm, *c*) running the automatic detection algorithm in a blind way, and *d*) a new visual inspection of the structures found in the previous step. In stage *a*), a total of 149 features were detected, while with the automatic technique the number of detected structures has increased to 566.

Our algorithm is able to detect structures that are not completely surrounded by walls of enhanced H I emission, i.e. structures that present one region open. Owing to that, a total of 80 structures have been catalogued as "galactic chimney" candidates.

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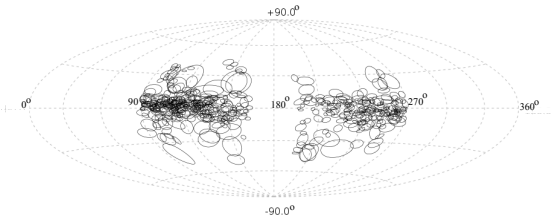

Fig. 1. Hammer-Aitoff projection of the GSc, centered on $(l, b) = (180°, 0°)$

In Fig. 1 is shown the distribution of the GSc in a Hammer-Aitoff projection. The surface (f_{2d}) and the volume (f_{3d}) filling factors are defined as the area or volume occupied by the GSc in a given area or volume, respectively. The estimated values are, $f_{2d} = 0.5 \pm 0.1$ and $f_{3d} = 0.04^{+0.01}_{-0.02}$. These values, within the errors, are in agreement with the ones derived by Ehlerová & Palouš (2005).

We have found an asymmetry in the distribution of the structures between the 2nd and 3rd galactic quadrant in the sense that in the 2nd one we have detected GSc up to distances of ~ 32 kpc from the Sun while for the 3rd one there are no GSc located beyond ~ 17 kpc from the Sun.

We have derived the GSc surface density. It decreases as the galactocentric distances increases. The surface density in the solar neighborhood is ~ 8 kpc^{-2}. It is a factor of 2 higher than the one derived by Ehlerová & Palouš (2013). This fact could be a direct consequence of the ability of our method to identify incomplete features.

An ellipse has been fitted to each GSc, their mean weighted eccentricity is 0.8 ± 0.1 and most of the features are elongated along the galactic plane. It is believed that the galactic density gradient present in the perpendicular direction to the galactic plane plays a minor role in dynamical the evolution of the GSc.

REFERENCES

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