

## A SENSITIVE HIGH-VELOCITY HI SURVEY

Riccardo Giovanelli

National Astronomy and Ionosphere Center\*, Arecibo, Puerto Rico

The observational studies of the neutral hydrogen high velocity clouds (HVC's) in the last decade have for the most part concentrated on the detailed study of the prominent complexes discovered by the surveys of the late 1960's. More recently, several HVC's were discovered, often by accident, with very high velocities, which are typically outside of the velocity range and below the sensitivity limit of the old surveys. The tendency to associate these clouds with the closest galaxy at hand became a rather common practice. The idea that the Local Group, or the Local Supercluster, is populated with such "intergalactic clouds" was fed by these discoveries, and generalized to the whole field of the HVC's. I have repeatedly argued against the latter generalization (Giovanelli 1977, 1978). In this paper I shall report on the progress of a new survey that intends to constitute a test of the intergalactic approach itself.

For the past year and a half I have been conducting a large scale, high sensitivity survey in the 21-cm line, using the 300-foot (92.6 m) telescope of the N.R.A.O.† Earlier observations of more limited scope (concentrating on the region between the northern tip of the Magellanic Stream and the northern HVC complexes A and C) were conducted with the 140-foot (42.3 m) telescope. The surveyed region is bounded by declination +50° and -10°, with the grid spacing about 1° in R.A. and varying between 2.5 and 5° in declination. Each of about 3500 sampled positions consists of two independent total-power spectra of orthogonal polarization with total integration time varying between 4 and 7 minutes. The bandwidth used was 10 MHz, yielding a 2100 km/s coverage, centered on zero km/s with respect to the LSR, and a channel separation of 11 km/s. The observational mode and the stability of the receiving equipment allowed the combination, for each profile, of an "off" spectrum of effectively indefinite integration time, yielding typical rms noise

\* Operated by Cornell University under contract with the National Science Foundation.

† Operated by Associated Universities, Inc., under contract with the National Science Foundation



(c) A new stream is found in the anticenter region. The distribution of new detections in the area is illustrated in the lower panel of Figure 2; the stream is outlined by a roughly drawn contour, and seems to merge with the ACII high velocity complex. Calling this feature a stream is encouraged by an inspection of the velocity field, shown in the upper panel of Figure 2. It is surprisingly smooth and almost constant with respect to the LSR.

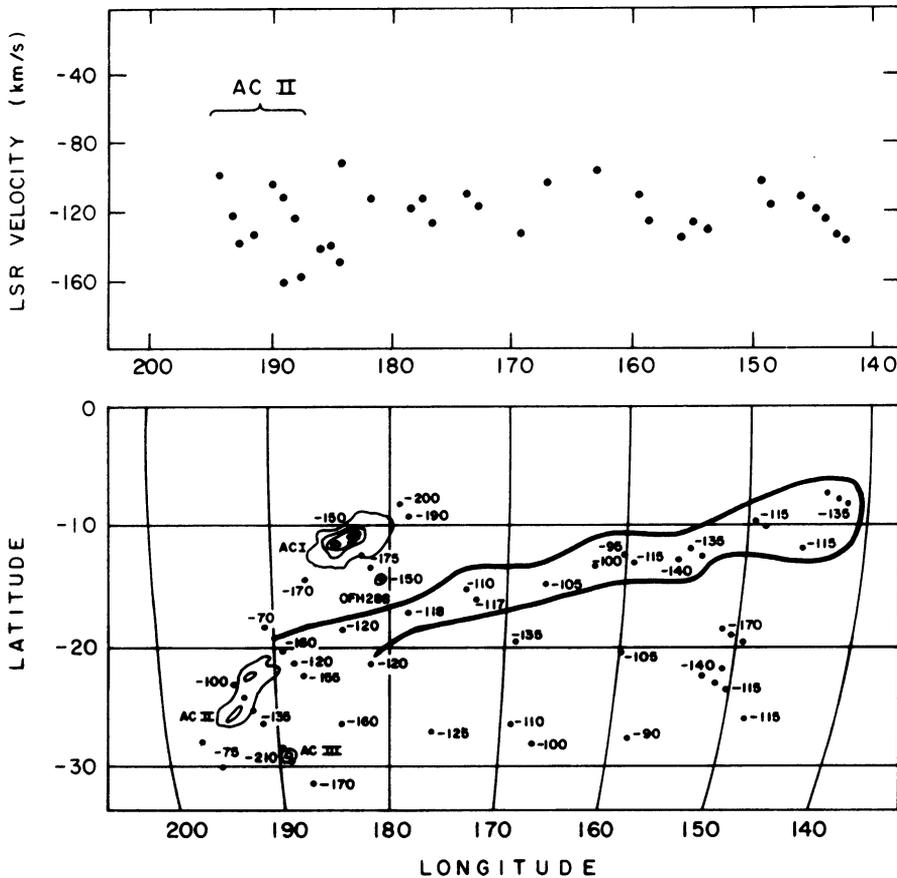


Fig. 2. Stream in the galactic anticenter region. Diagram above represents the velocity field.

(d) In contrast to the statement made by Hulsbosch in this symposium, numerous high positive velocity clouds exist, in addition to the low latitude complexes near  $\ell = 260^\circ$ . They are all found at  $\ell > 180^\circ$ , with velocities up to  $+195$  km/s. A number of them overlap the region where the Local Group galaxies Sex A, B, C and Leo I lie, but their velocities are consistently 100–200 km/s more positive than

the velocities of those galaxies. The similarity of these clouds with ones found far from this region further discourages an association with the galaxies.

(e) To the little surprise of most, the previously known complexes which are within the region sampled by this survey, such as the anticenter complexes, are revealed to be much more extended than previously thought.

A bonus of this survey was that I stumbled onto a very nearby galaxy, unaccounted for, as far as I know, in any of the galaxy catalogs. A profile with the characteristic signature of rotating HI disks was detected in a region dominated by foreground galactic dust, in Orion. Line profiles taken with the Arecibo telescope, along the North-South axis of the feature, assumed to be centered at R.A. (1950) =  $5^{\text{h}} 42^{\text{m}} 24^{\text{s}}$ , Dec. (1950) =  $5^{\circ} 03'$ , are shown in Figure 3. A red photographic plate kindly taken by Quintana and Melnick at the 4-m telescope at Cerro Tololo, centered on the peak of HI emission reveals a low surface brightness elongated extragalactic object.

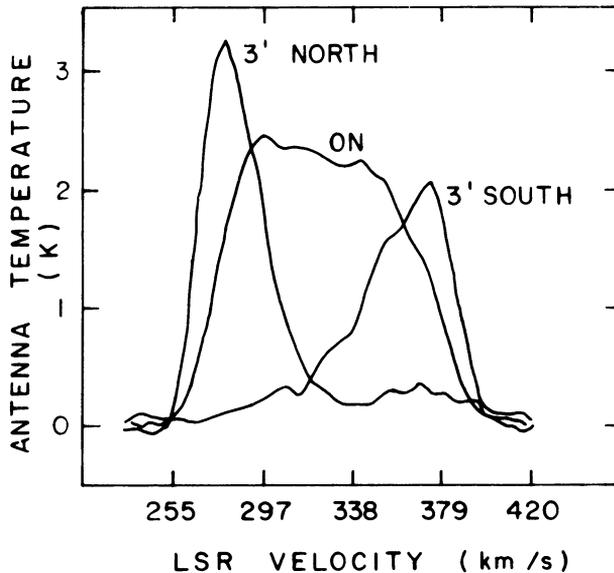


Fig. 3. 21-cm Arecibo profiles of features in Orion.

#### REFERENCES

- Giovanelli, R.: 1977, *Astron. and Astrophys.* **55**, pp. 395-400.  
 Giovanelli, R.: 1977, in "Structure and Properties of Nearby Galaxies", eds. E. M. Berkhuisen and R. Wielebinski.