NEIGHBORING SUPERCLUSTERS AND THEIR ENVIRONS

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Recently finished redshift surveys make it possible to study the large-scale environment of superclusters and their mutual relationship.

Figure 1 shows the distribution of nearby clusters in the sky in supergalactic coordinates at two redshift intervals. Nearby clusters in the distance interval 75 to 150 Mpc form a belt around us which is close to the supergalactic equator; its inclination is only 20°. The following superclusters belong to this belt: Ursa Major-Lynx (Giovanelli and Haynes 1982), Coma, Hydra-Centaurus, Pavo-Corona Australes, and Perseus-Pisces. Coordinates and redshifts for a number of previously unknown southern clusters have been derived by Dr. H. Corwin and Dr. M. Tarenghi (Einasto et al. 1982).

Clusters in the distance interval 150 to 250 Mpc are found at much higher supergalactic latitudes. Clusters in this distance interval form a number of superclusters: Hercules, Ursa Major-Leo, Pegasus and several southern superclusters.

All these superclusters belong to cells which can be called the Northern Local Cell and the Southern Local Cell (Einasto et al. 1982). Nearby superclusters form together with our Local Supercluster a disk about 250 Mpc in diameter and 50 Mpc thick, which is located between both local cells. The Hercules supercluster is located between the Northern Local Cell and The Bootes cell, studied by Kirsher et al. (1981). The Perseus-Pisces and Pegasus superclusters are located between the Northern Local Cell and the Perseus cell.

In the sky, the Northern Local Cell covers the whole northern supergalactic hemisphere and the Southern Local Cell covers the whole southern hemisphere. These are probably the largest objects in the Universe which can be considered "local" ones.

Figure 2 shows the distribution of the same clusters in rectangular supergalactic coordinates, X, Y, and Z, where X = V cos SGB cos SGL, Y = V cos SGB sin SGL, and Z = V sin SGB.

The Sandage-Tammann survey covers the whole sky and is complete to $13^{m}.2$, which corresponds for galaxies brighter than -21.0 to a distance 70 Mpc (H = 50/km/s/Mpc). The CfA survey is complete to $14^{m}.5$ in the northern sky; the corresponding distance limit is 130 Mpc. Within the

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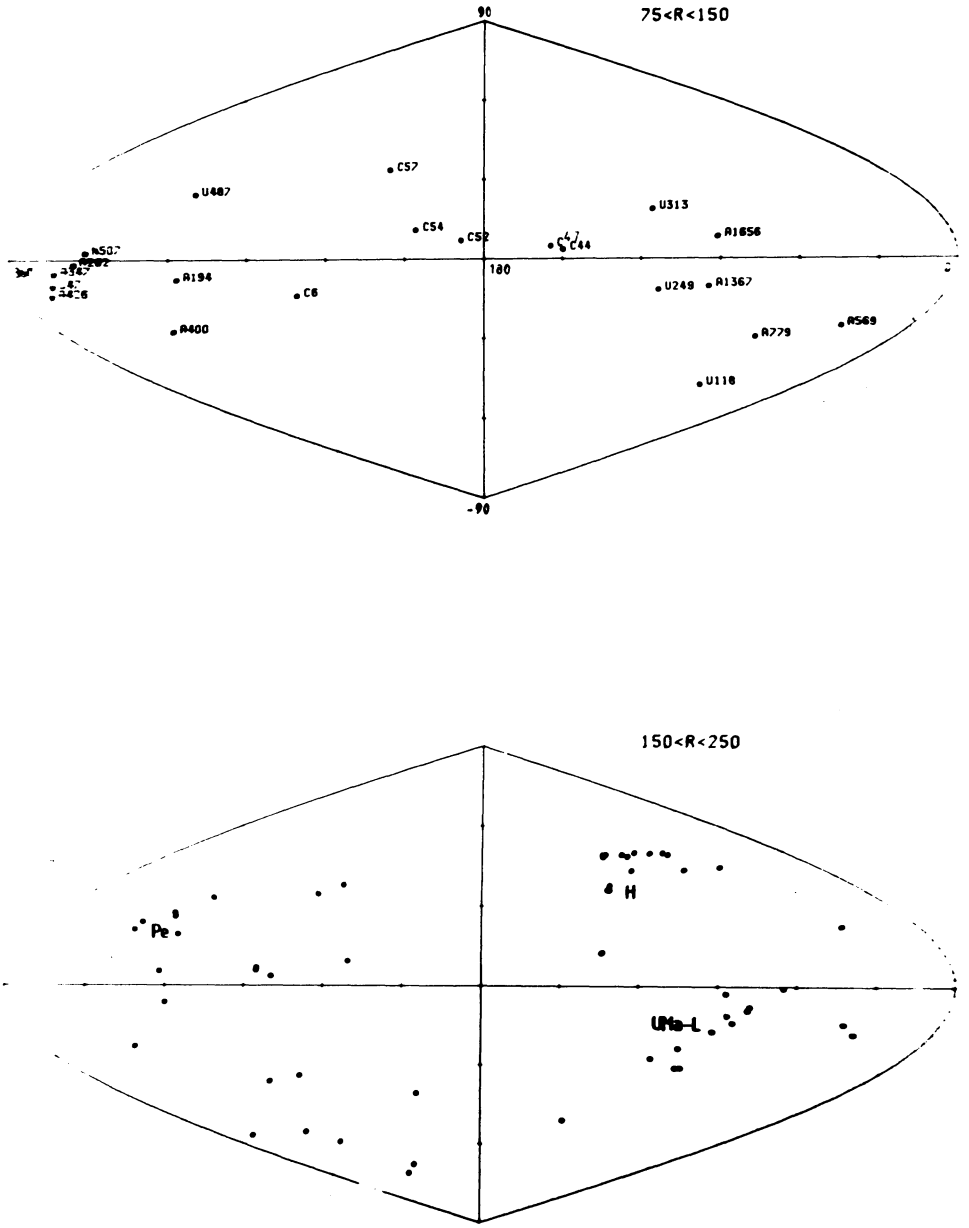

Figure 1. Distribution of clusters at two distance intervals in equal area supergalactic coordinates.

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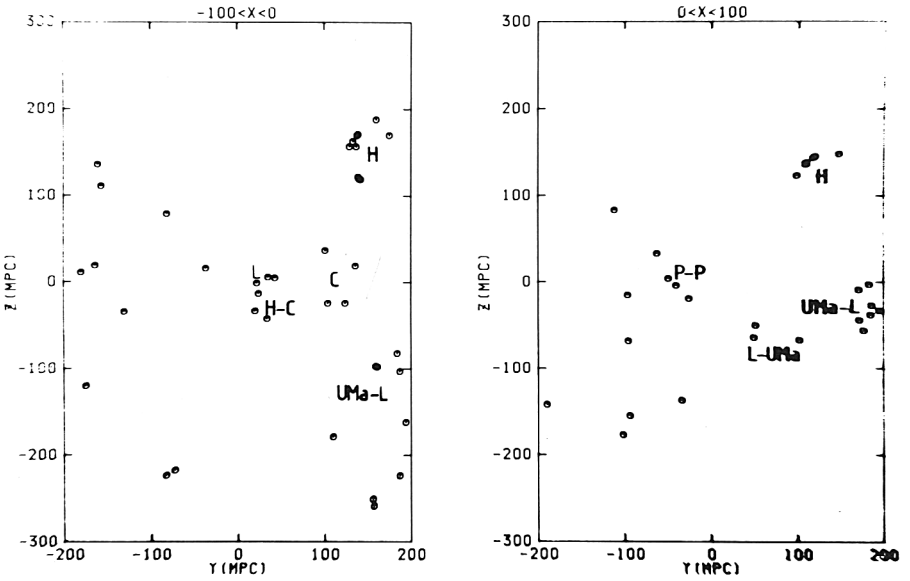

Figure 2. Distribution of clusters in rectangular supergalactic coordinates.

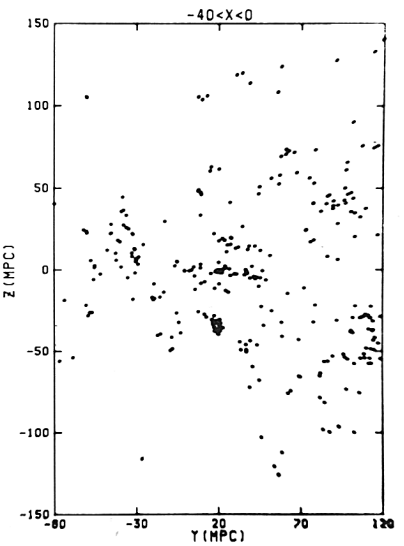

Figure 3. Distribution of bright galaxies ($M \leq -21.0$) in rectangular supergalactic coordinates (H = 50 km/s/Mpc).

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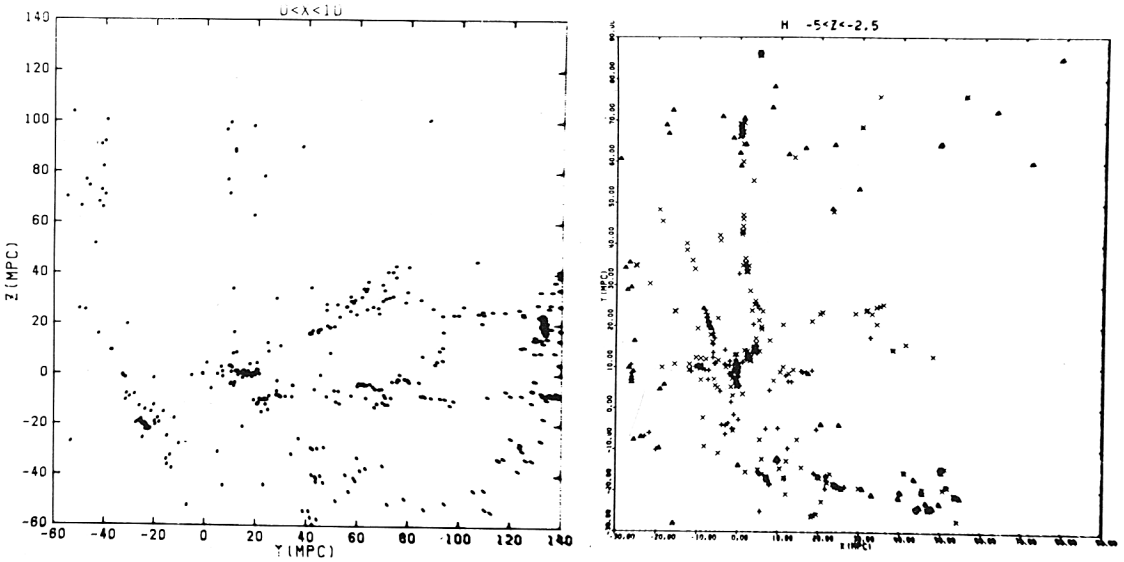

Figure 4. Thin slices through the Local Supercluster, in SG coordinates, corresponding to Hubble constant 100.

Local Supercluster it is possible to use the Fisher-Tully and other surveys of dwarf galaxies. Here much fainter galaxies can be studied.

These surveys provide a unique opportunity to study in detail the galaxy distribution in cells and cell walls.

A rectangular plot of galaxies brighter than -21.0 absolute magnitude is given in Figure 3. The density has a peak at the plane Z = 0 and decreases on each side. Figure 3 shows that the galaxy density does not drop to zero near the center of the cell interior. In other words, voids defined by rich clusters of galaxies are not completely empty. The mean density of galaxies in the void center is about ten times lower than in cell walls and three times lower than the mean density of the Universe.

Figure 3 also shows the presence of some smaller voids in the galaxy distribution. In thin slices through the Local Supercluster, plotted in Figure 4, these small voids are seen much better. We see also that the whole disk consists of a lattice of intertwined galaxy strings, located both in horizontal (X,Y) and vertical (Z) directions.

The galaxy chains seen in Figure 4 do not differ in principle from cluster chains. The difference lies only in the scale and population. Within superclusters, chains are rich; in cell interiors, they are poor. The geometry is the same.

To visualize the three-dimensional distribution of galaxies, a series of motion pictures has been prepared. To see the third dimension, rotation is artificially introduced. The string-like distribution of galaxies, the concentration of galaxies into a disk of superclusters, and the very low galaxy density in cell interior, are apparent in the films showing the distribution centered near the center of the Northern Local void.

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