Separation of elements of the Large Scale Structure in observed and simulated catalogs.

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Two methods of the LSS investigation

1. The general description of object distribution and the Large Scale Structure (LSS).

2. Separation of isolated structure elements, measurement and statistical analysis of their quantitative characteristics.

The first period: measurement of the power spectrum, correlation analysis, rough separation of typical structure elements – walls, filaments, groups and clusters of galaxies.

Now and in perspective: Detailed investigation of the LSS elements with various threshold parameters, luminosity and morphology. Investigation of the internal structure of richer LSS elements and their redshift evolution (VIRMOS and Ly-α forest) in comparison with theoretical expectations.

Table 1: Observed and simulated catalogs

	Ω_m	h	N_{gal}	$\langle n \rangle$ $h^3\mathrm{Mpc}^{-3}$	$\langle l^{real}_{MST} \rangle$ $h^{-1}\mathrm{Mpc}$	$\langle l^{red}_{MST} \rangle$ $h^{-1}\mathrm{Mpc}$
Cubic Volume Catalogs						
DM	0.3	0.65	$7.08 \cdot 10^6$		0.65	
gal	0.3	0.65	$2.10 \cdot 10^6$	$5 \cdot 10^{-2}$	0.85	
Mock 2dF Catalogs						
L3-600	0.3	0.65	$1.59 \cdot 10^5$	$0.6 \cdot 10^{-2}$	2.02	2.14
L3-400	0.3	0.65	$0.99 \cdot 10^5$	$1.2 \cdot 10^{-2}$	1.56	1.67
Observed Catalogs						
2dF-500			$1.57 \cdot 10^5$	10^{-2}		1.88

DM simulation and mock catalogs for the ΛCDM model with $\Omega_\Lambda = 0.7 \,\&\, \sigma_8 = 1.05$ are taken from Cole et al. 1998 .

Limitations

a. Geometry and selection function

b. Incompleteness of catalogs

c. Measurements in redshift space

d. Bias between the spatial distributions of dark, baryonic and luminous matters.

Correction for the selection effect

For the magnitude limited cataloger we can introduce the artificial distance,

$$r_a^3 = \int_0^r f_s dr = 2R_{sel}^3(1-(1+y)e^{-y}), \quad y = (r/R_{sel})^{1.5} \ .$$

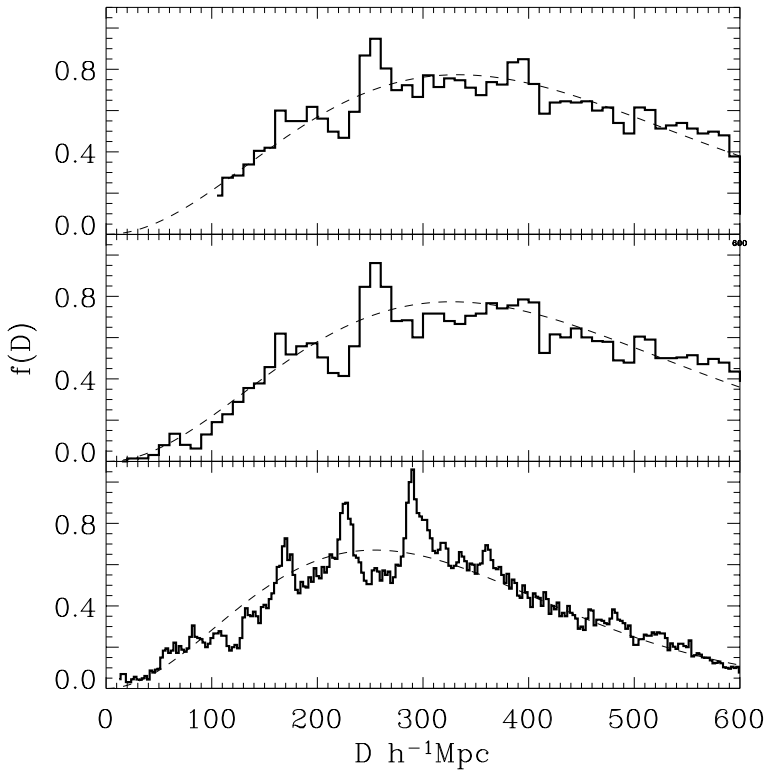


Figure 1: Distribution of galaxy distances in the mock catalogs in real and redshift spaces (top and middle panels) and in the 2dFGRS (bottom panel).

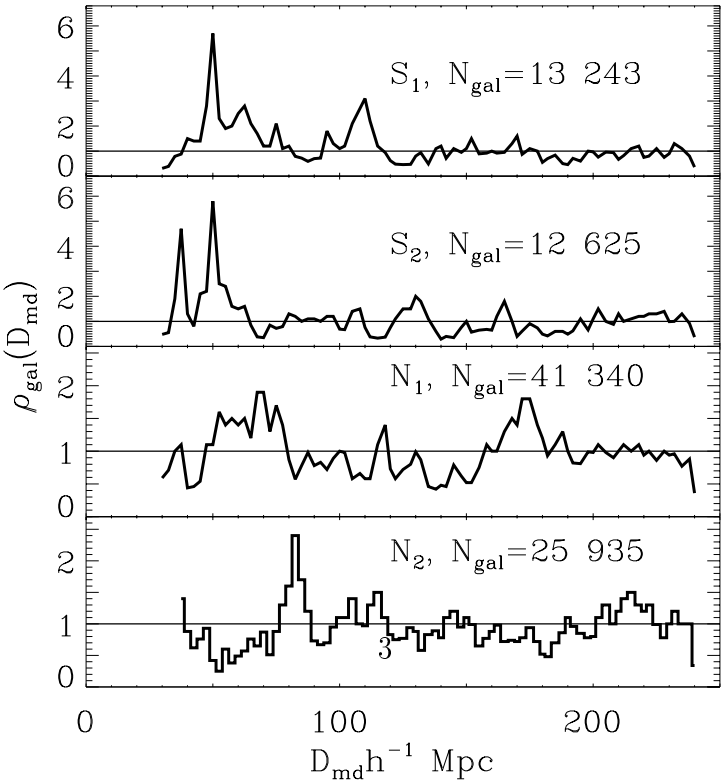
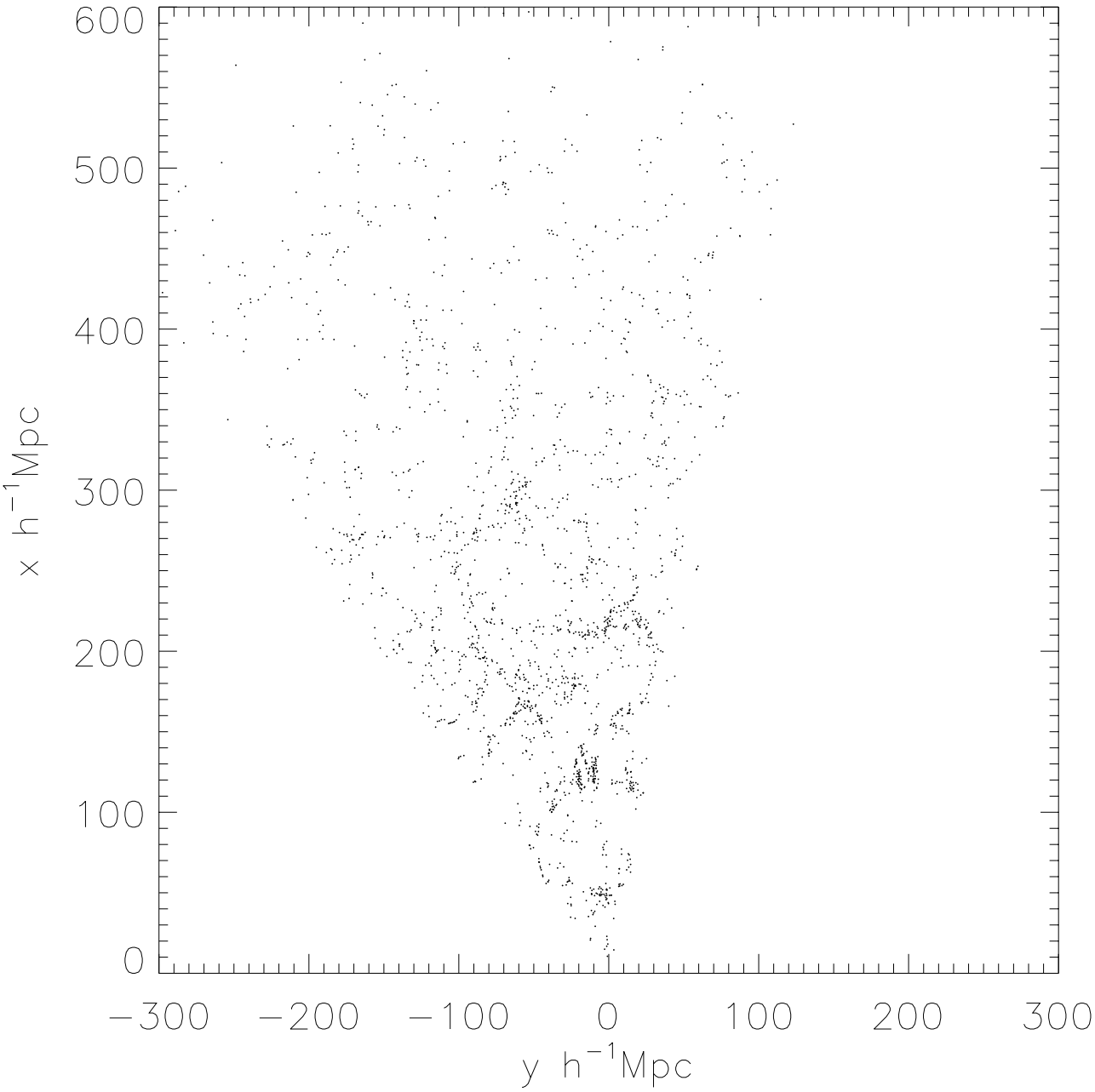


Figure 2: Galaxy number density in four slices of the SDSS DR1 after correction for the selection effect.


600
500
400
300
200
100
0
x h^{-1}Mpc
−300
−200
−100
0
100
200
300
y h^{-1}Mpc