

Olbers' paradox: if the Universe (or forest) were infinitely large, we'd see a star/galaxy (or tree) in every direction

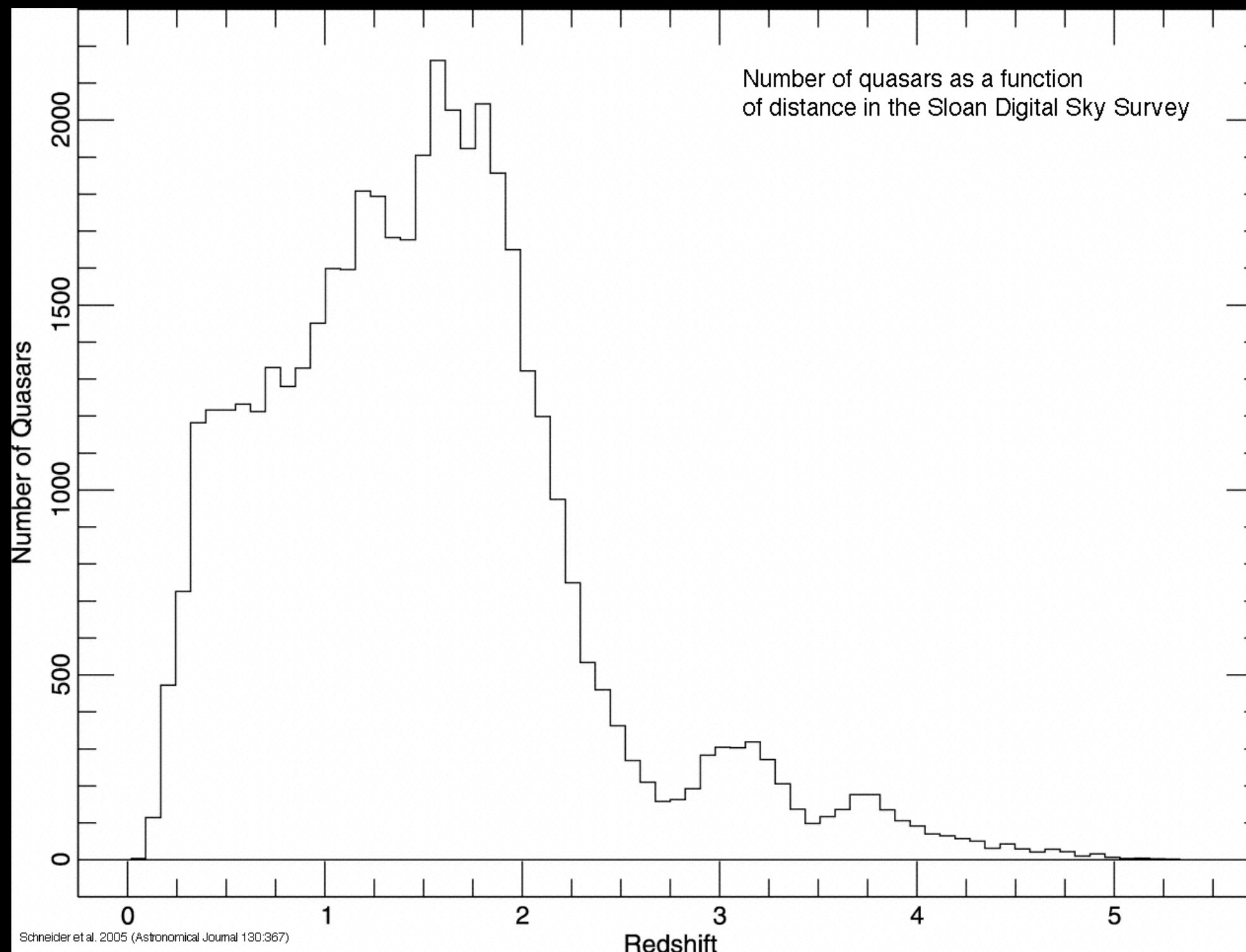


The Cosmological Principle

weak: the Universe is the same everywhere (homogeneous and isotropic on large scales)

strong: also, the same at all *times*

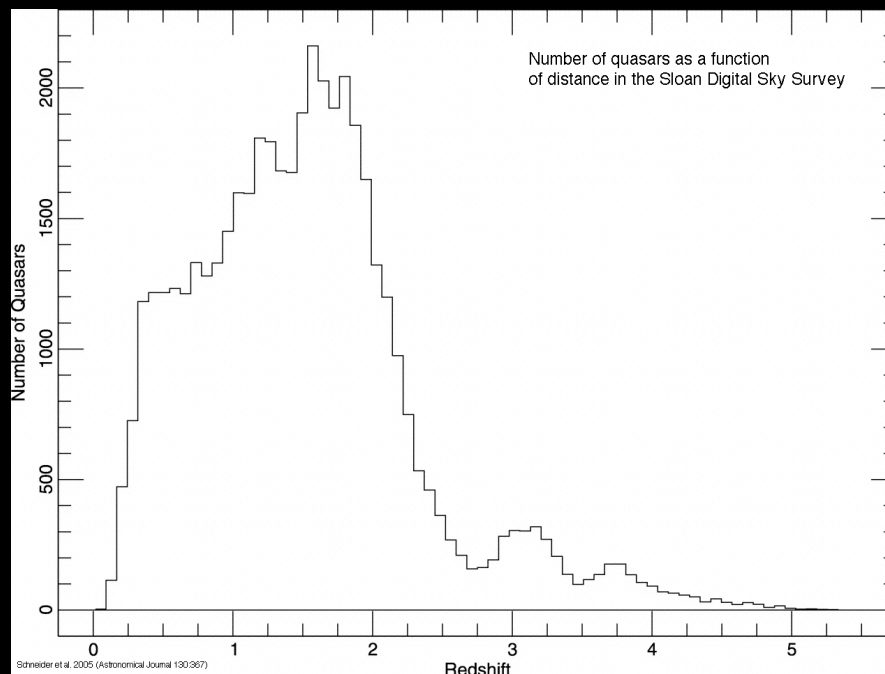
Contents of the Universe changes with time: Quasars as a function of redshift (and thus distance and lookback-time)



The Cosmological Principle

weak: the Universe is the same everywhere (homogeneous and isotropic on large scales)

strong: also, the same at all times



strong: ruled out by observations; including the darkness of the night sky

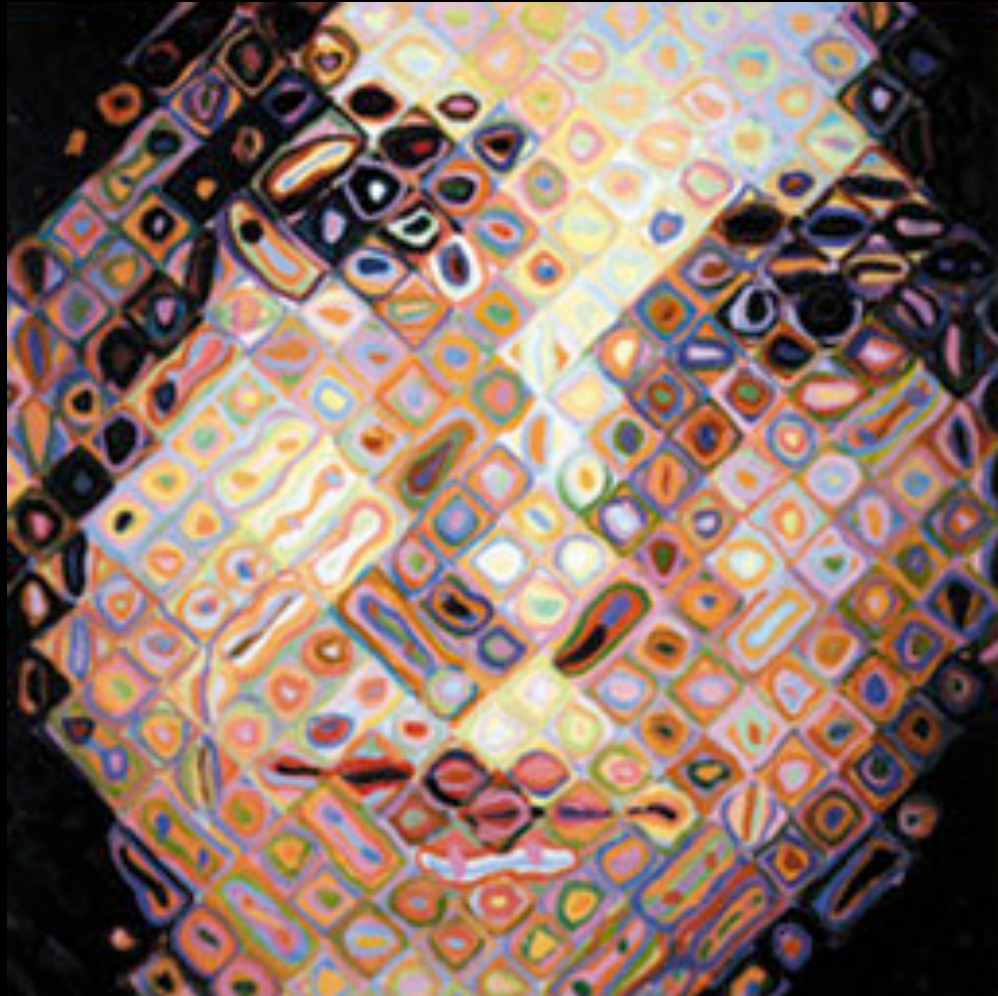
Cosmological Principle: Universe is the same everywhere

homogeneous?

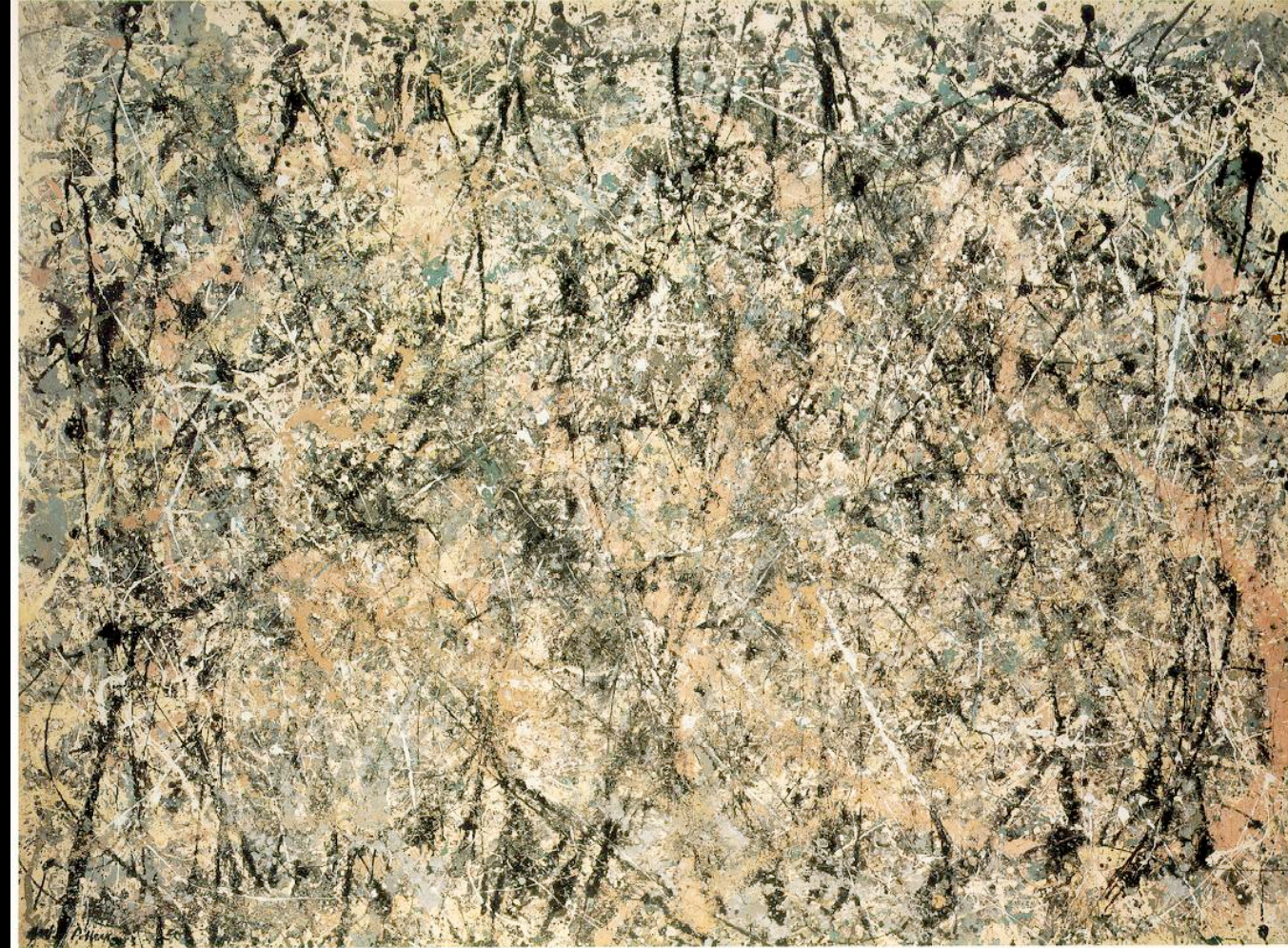


scale is the key

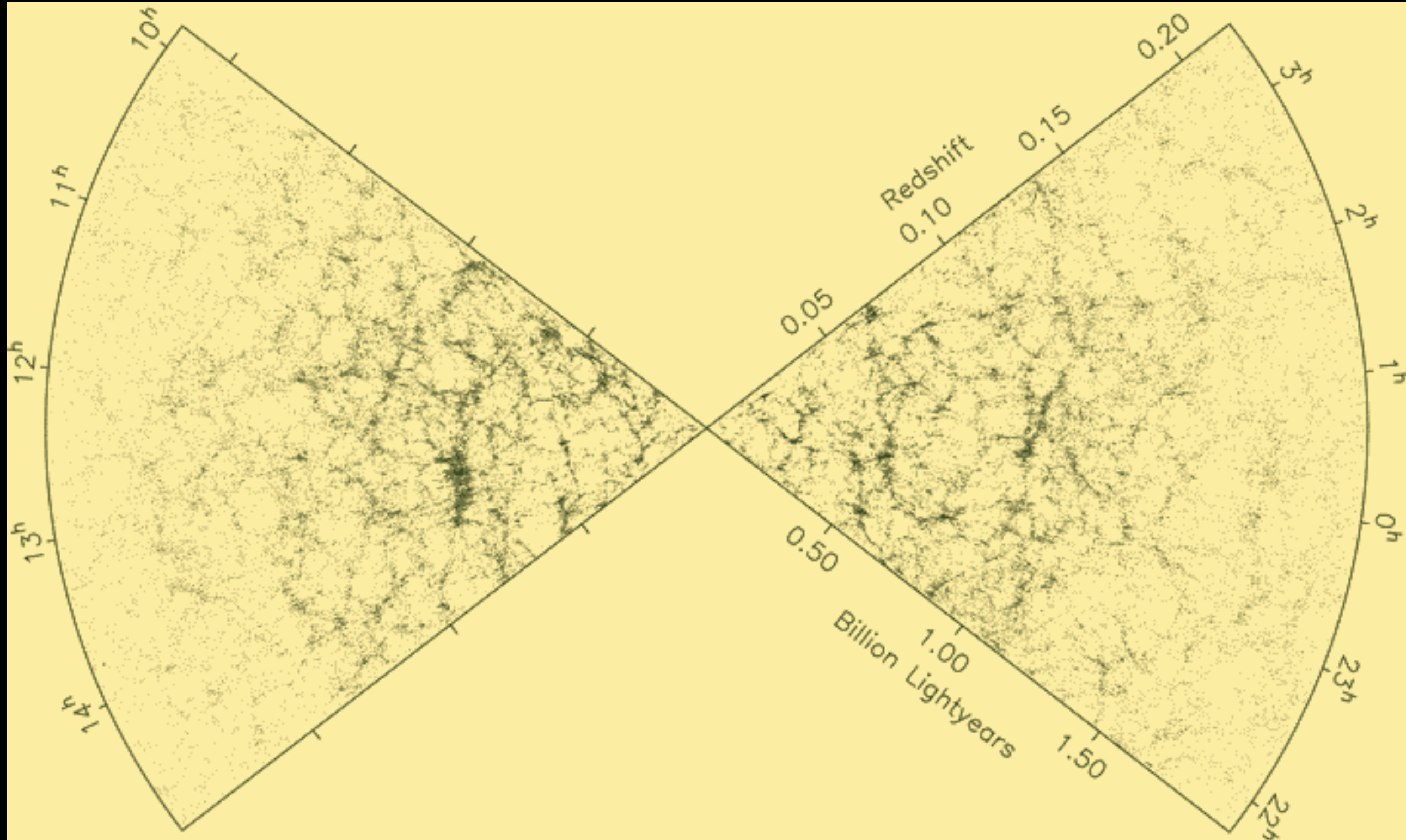
Chuck Close, Maggie, 1996



Jackson Pollock, Number 1, 1950 (Lavender Mist)



there is a limit to the size scale of structure (~ 100 million light years)



a wheat field is homogeneous...but that characterization depends on the scale



and it might be *homogeneous* without being *isotropic*
view from the left vs. the right?



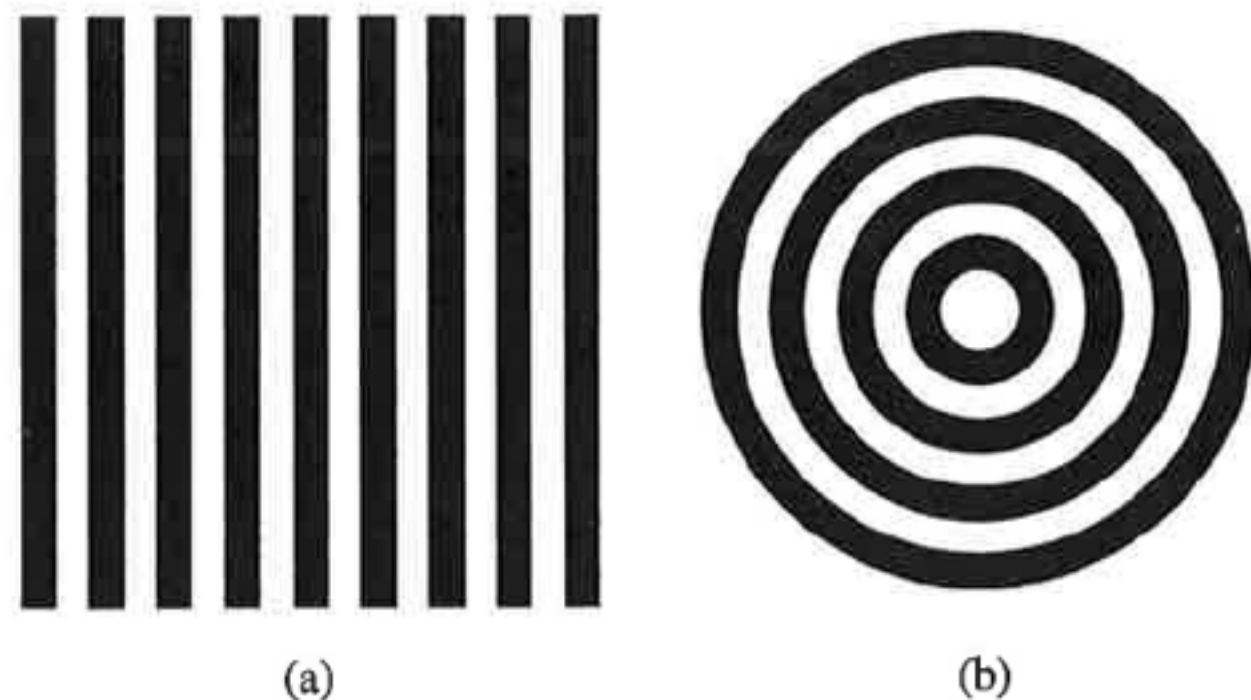


FIGURE 2.3 (a) A pattern that is anisotropic, but is homogeneous on scales larger than the stripe width. (b) A pattern that is isotropic about the origin, but is inhomogeneous.

we observe isotropy on large scales; if we are not in a special place, then this implies global homogeneity