X35a Test for a Quenching Mechanism of Cosmic Web Detachment

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Understanding mechanism(s) of quenching of star formation is one of the most important issues in galaxy evolution. Several possible mechanisms of the quenching have been proposed. However, the most essential mechanism is still not clear. Recently, a new scenario aiming at unifying the various possible mechanisms is proposed (Aragon-Calvo et al. 2019). Generally, gas is supplied into a galaxy halo by accretion along a cosmic web structure (e.g., Dekel et al. 2009). In the new scenario, initially a galaxy is connected to a web of filaments along which the gas is accreting into the halo. Subsequently, major interaction (merging) between the halo and a nearby halo detaches the halo from the gas feeding filament. Then, the gas supply stops and star formation stops, resulting in color evolution from blue cloud to green valley, and to red quiescent galaxies. If the time scale for the quenching (color evolution) is smaller than or comparable to a dynamical time scale, the fraction of major merging is expected to be high in the green valley.

In order to examine this scenario, we derived the fractions of the major merger in the blue cloud, green valley, and red quiescent, using a galaxy catalog in COSMOS field based on combined CLAUDS-HSC-SSP surveys (Desprez et al. in prep). We picked out ~ 4000 galaxies at $z = 0.2 - 0.7$, and selected interacting galaxies by eye inspection considering the presence of tidal tails, shells, and/or double core feature. The resulting fraction is about 5% and does not change with NUV-r color. No significant excess of the fraction is seen in the green valley. The result does not support the scenario mentioned above.