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The trace of the hierarchical assembly of massive E–S0s galaxies at $0.8 < z < 1.5$ in galaxy number counts

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Abstract

K-band galaxy number counts (GNCs) exhibit a slope change at $K \sim 17.5$ mag, not present in optical bands that may be related with the hierarchical assembly of massive E-S0s galaxies at $0.8 < z < 1.5$. To unveil the nature of this feature, we have derived the contribution of different galaxy types to the total K-band GNCs at $0.3 < z < 1.5$ and by redshift bins, and compared the results with the expectations of different galaxy evolutionary models. We find that the slope change is due to a sudden swap of the galaxy population at $z < 1.5$ that numerically dominates the total GNCs at $z < 1.5$ (from quiescent E–S0's at $K < 17.5$ mag to blue star-forming discs at fainter magnitudes). Models in which the bulk of massive E–S0's were formed at high redshifts ($z > 2$) and evolved passively since then cannot predict the slope change; whereas models that impose a late definitive assembly for them (at $z < 1.5$) can reproduce it. This assembly needs to have been progressive and at $0.8 < z < 1.5$ to reproduce the total K-band GNCs by redshift bins. We conclude that the slope change in total K-band GNCs is thus nothing other than a vestige of the hierarchical, definitive assembly of a substantial fraction ($\sim 50\%$) of present-day massive E–S0's at $0.8 < z < 1.5$. IR MOS spectroscopy for a significant sample of red galaxies at $z < 1.5$ is necessary to confirm the late arrival of the bulk of massive galaxies to the Red Sequence.