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# Two fossil groups of galaxies at z~0.4 in the COSMOS: accelerated stellar-mass build-up, different progenitors

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We report on 2 fossil groups of galaxies at z=0.425 and 0.372 discovered in the Cosmic Evolution Survey (COSMOS) area. Selected as X-ray extended sources, they have total masses (M_200) of 1.9(+/-0.41)E13 and 9.5(+/-0.42) E13 M_sun, respectively, as obtained from a recent X-ray luminosity-mass scaling relation. The lower mass system appears isolated, whereas the other sits in a well-known large-scale structure (LSS) populated by 27 other X-ray emitting groups. The identification as fossil is based on the i-band photometry of all the galaxies with a photo-z consistent with that of the group at the 2-sigma confidence level and within a projected group-centric distance equal to 0.5R_200, and i_AB<=22.5-mag limited spectroscopy. Both fossil groups exhibit high stellar-to-total mass ratios compared to all the X-ray selected groups of similar mass at 0.3<=z<=0.5 in the COSMOS. At variance with the composite galaxy stellar mass functions (GSMFs) of similarly massive systems, both fossil group GSMFs are dominated by passively evolving galaxies down to M^stars~1E10 M_sun (according to the galaxy broad-band spectral energy distributions). The relative lack of star-forming galaxies with 1E10<=M^stars<=1E11 M_sun is confirmed by the galaxy distribution in the b-r vs i color-magnitude diagram. Hence, the 2 fossil groups appear as more mature than the coeval, similarly massive groups. Their overall star formation activity ended rapidly after an accelerated build up of the total stellar mass; no significant infall of galaxies with M^stars>=1E10 M_sun took place in the last 3 to 6 Gyr. This similarity holds although the 2 fossil groups are embedded in two very different density environments of the LSS, which suggests that their galaxy populations were shaped by processes that do not depend on the LSS. However, their progenitors may do so. ...

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