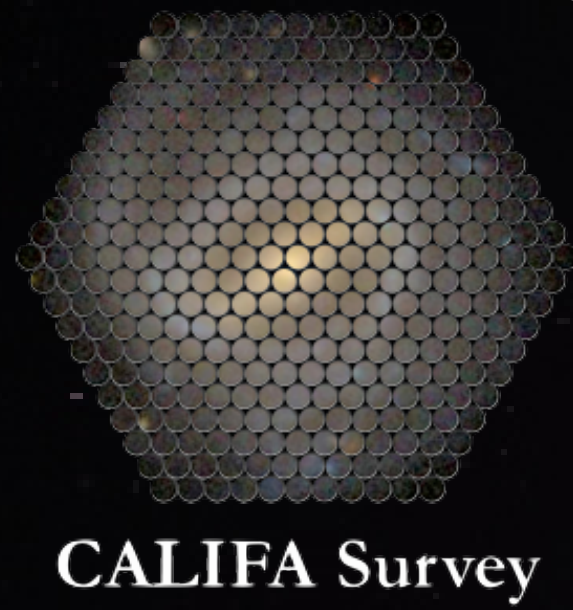


The Red Spiral Galaxy UGC11680: Clues for the Inside-Out Quenching.



CALIFA Survey

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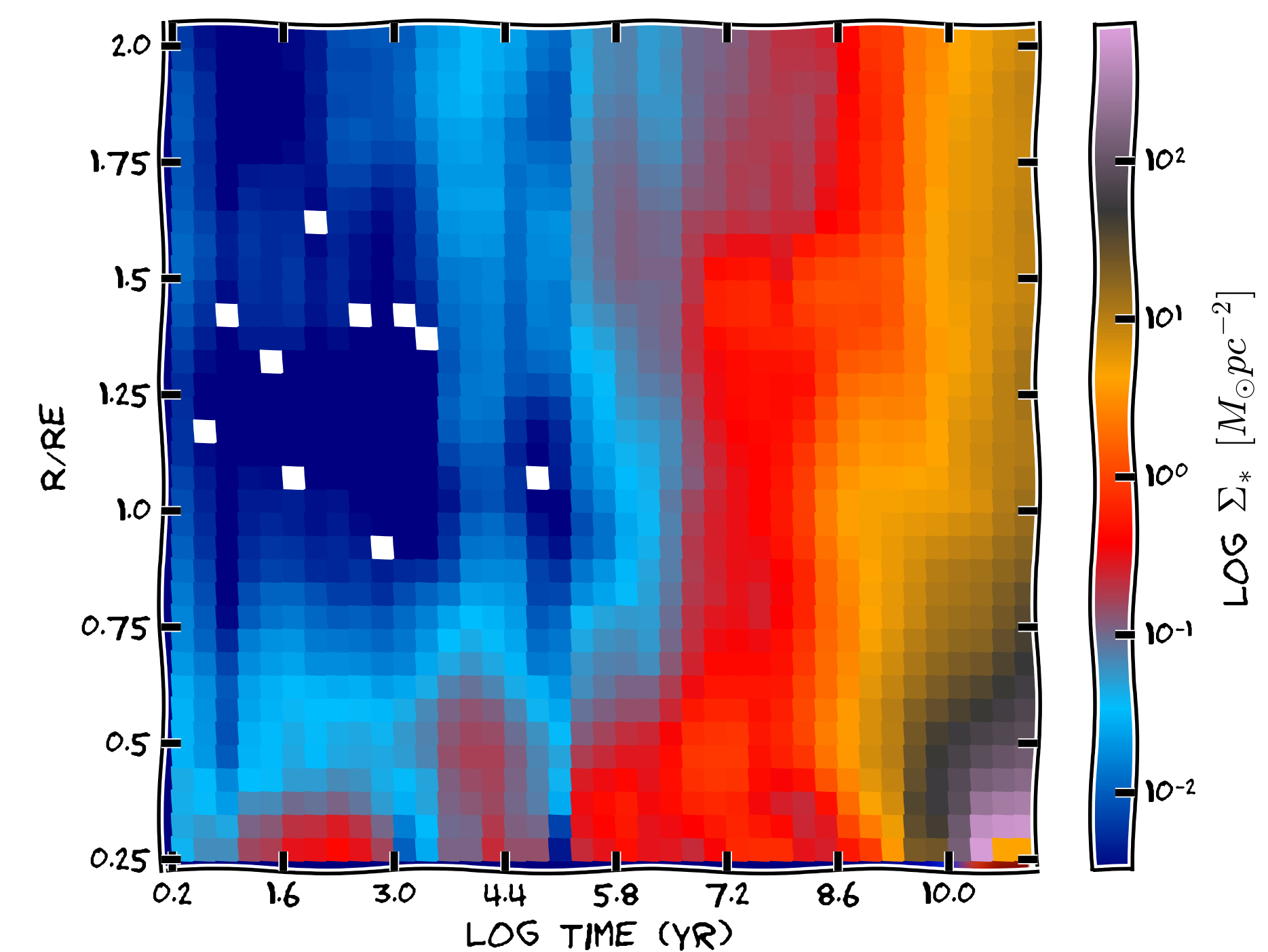
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The red spiral Galaxy UGC11680

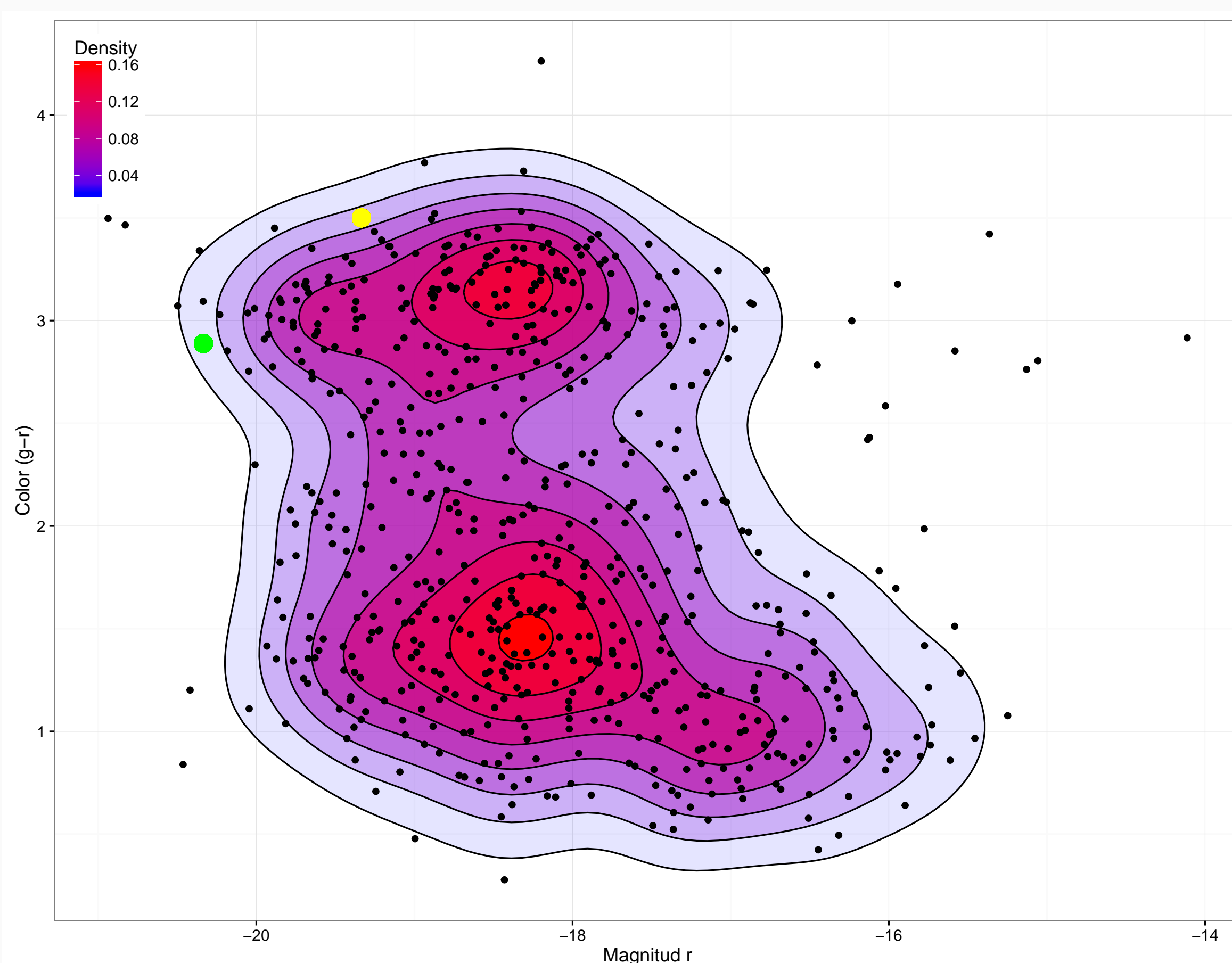
Broadly, galaxies can be divided in two groups, thanks to the Color-Magnitude Diagram: the lively star formation ones, "The blue Cloud" and galaxies which halted their star formation, "The Red Sequence". It is a currently knowledge that the galaxies start their lifespan as a blue objects, turning red when they stop to assembly more mass and thus more stars. Nevertheless, This change need to be quick (~ 1 Gyr), due to the dearth of galaxies between this two populations (the so called "green valley"). Previous works have found two distinct stellar mass assembly modes, they are termed as "the inside-out" and "the outside-in" growth scenarios in the literature. In the "inside-out" scenario, mass assembly is finished in the galactic central region. In some cases, the inflow gas can fuel the central supermassive blackhole. The subsequent AGN feedback will then shut-off the central star formation. One possible case of this scenario is the galaxy UGC11680, an unusual face-on red spiral galaxy with an AGN type 2, at the red sequence in the CALIFA survey. We used the so called fossil method to study its star formation history and try to understand what happened to its stellar populations.

UGC11680 and CALIFA's AGNs averaged Star Formation History Map

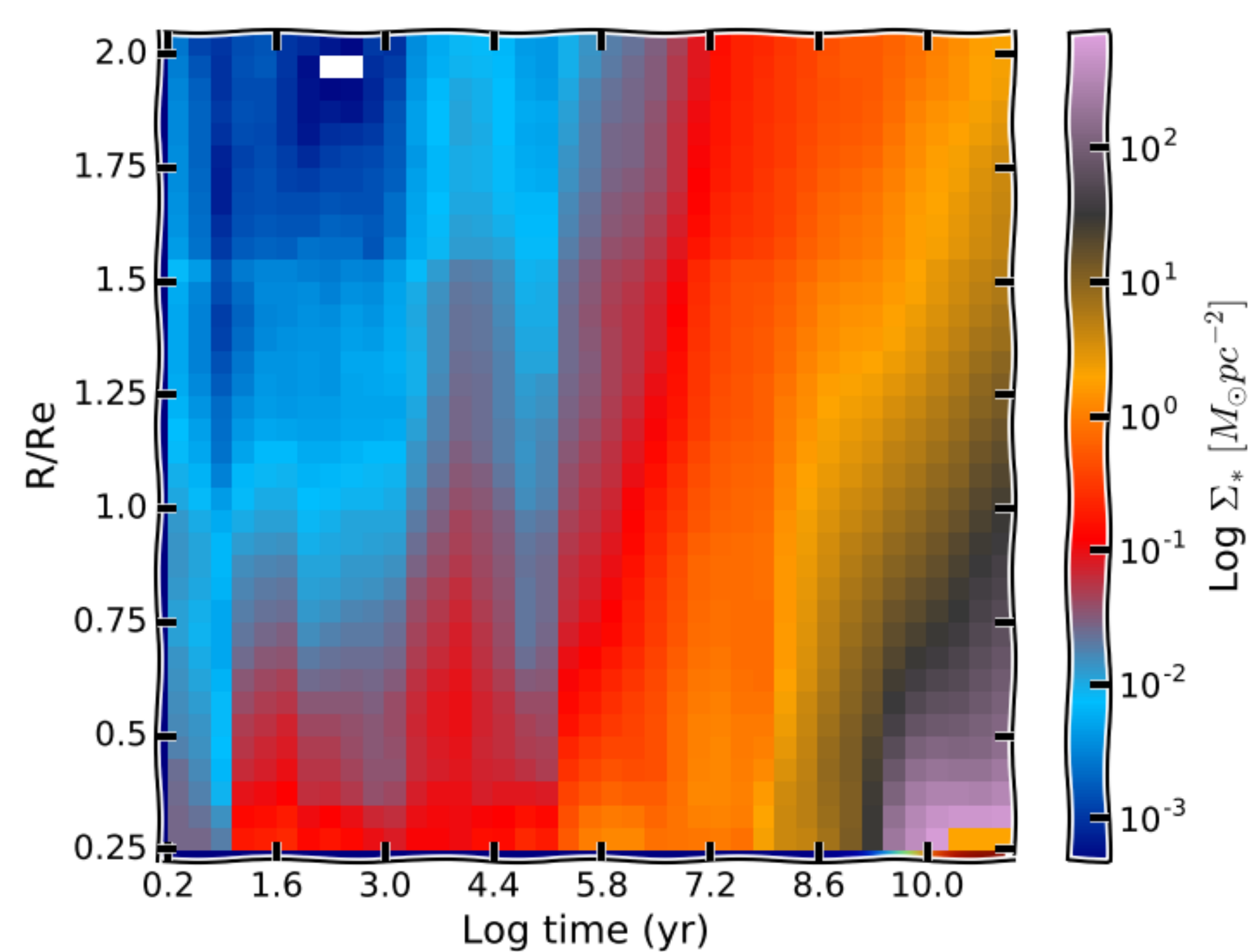


The first map shows the space-time diagram of surface mass density of UGC11680 known as the map of star formation history. In all maps the time reads from right to left. The second is the same map but for type 2 AGNs within the CALIFA sample. Note the clear difference in surface mass density for both maps: while for both is clear a mass assembly "inside-out", the galaxy UGC11680 has a shut-off on its star formation, resembling a "cut-off" that begins in its central parts followed by moderate explosions in subsequent times.

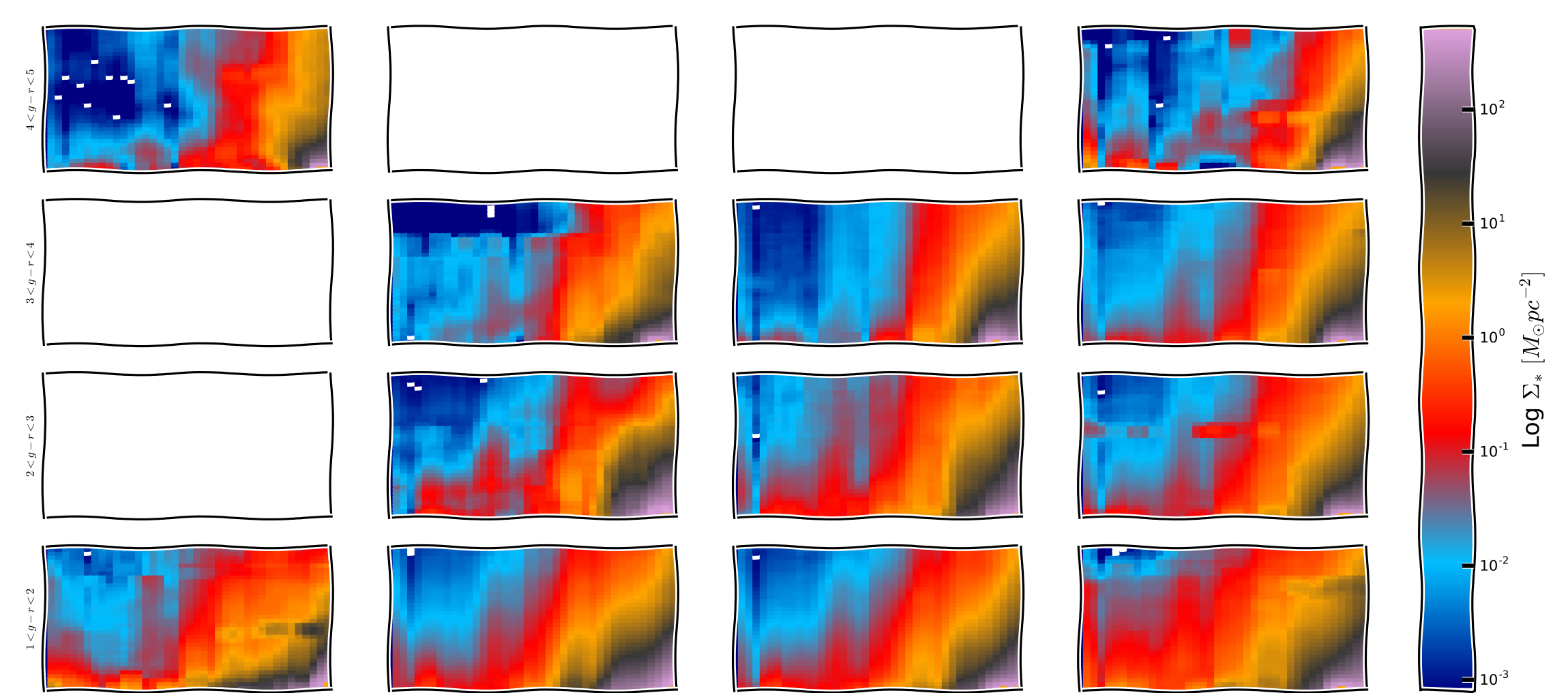
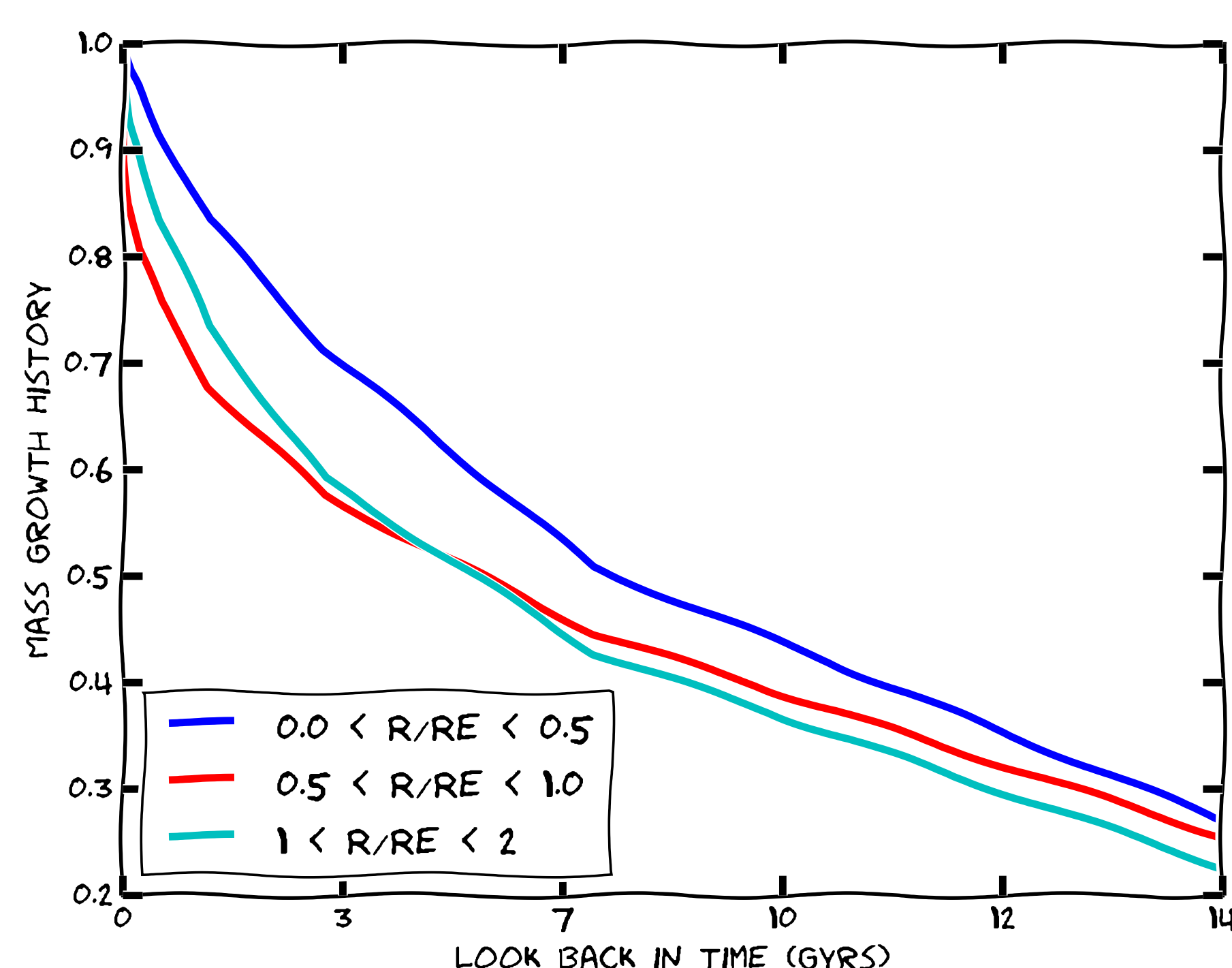
Color Mass Diagram



The Color-Magnitude diagram for galaxies in the CALIFA sample, showing the red sequence, the blue cloud and the space between them, the green valley. the yellow dot represents the position of the galaxy UGC11680 reddened by dust. The green dot is the same galaxy, but now extinction-corrected version.



Mass Growth History for UGC11680



Once we have analyzed the individual SFH map for UGC11680, then the procedure was to compare this galaxy with the averaged SFH maps for the galaxies within the CALIFA sample. here is a Color- Mass Diagram arrange showing averaged SFHs, separated for color and mass bins. The UGC11680 SFH is at the upper left corner for reference. Notice the inside-out mass ensemble for massive and red galaxies (averaged) and the slow pace growth for the less-massive and blue galaxies.