20250901 Could be NII6583

My feeling is that NII is the smoking gun that causes those 4 outliers in rMZR. Or more specifically, the NII/SII (the second last figure).
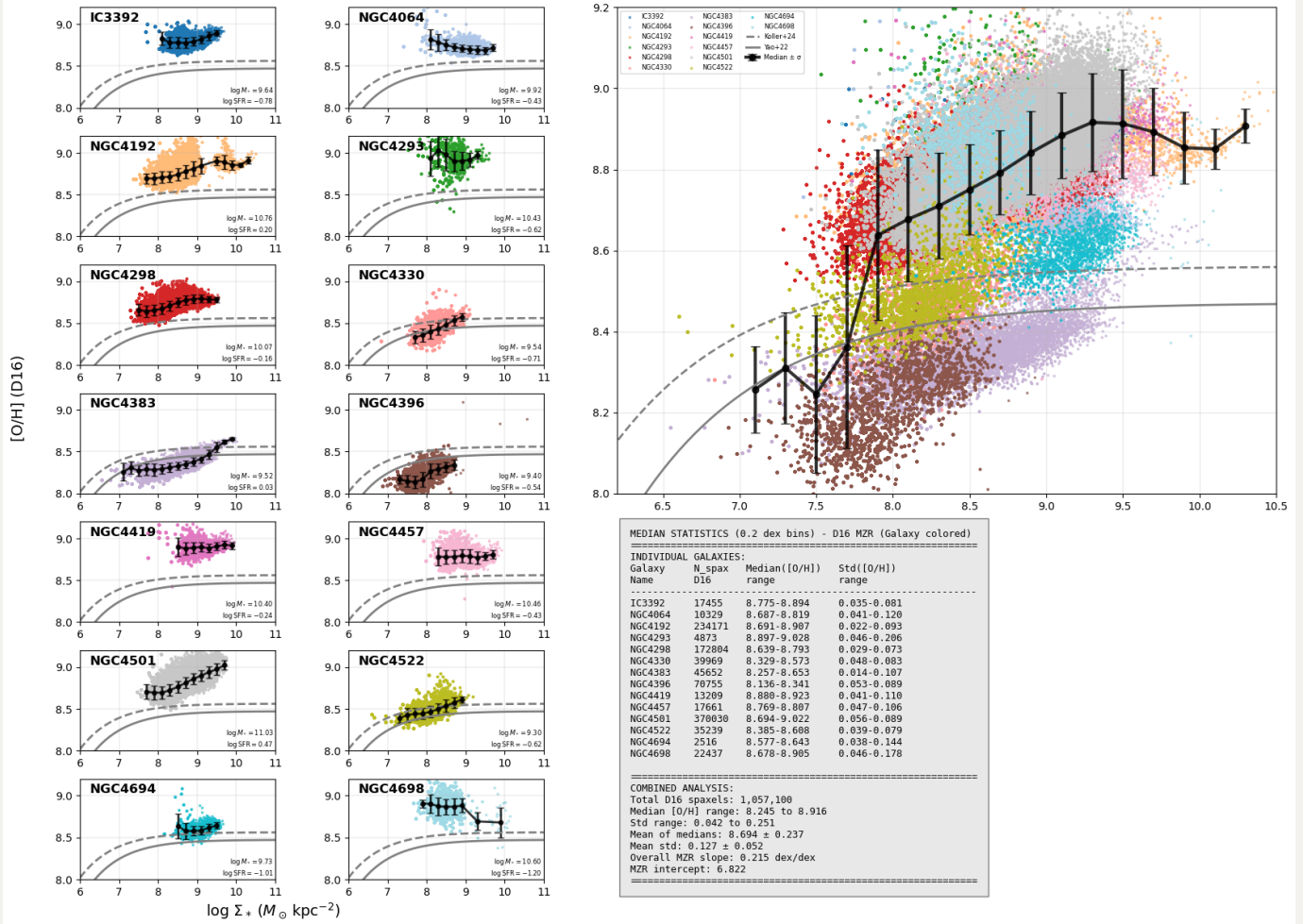
I try some permutations of some simple line ratio to see if a single line ratio can reproduce the morphorlogy of rMZR.

4 outliers:

1. NGC4396: brown;
2. NGC4383: light mauve;
3. NGC4522: yellow green;
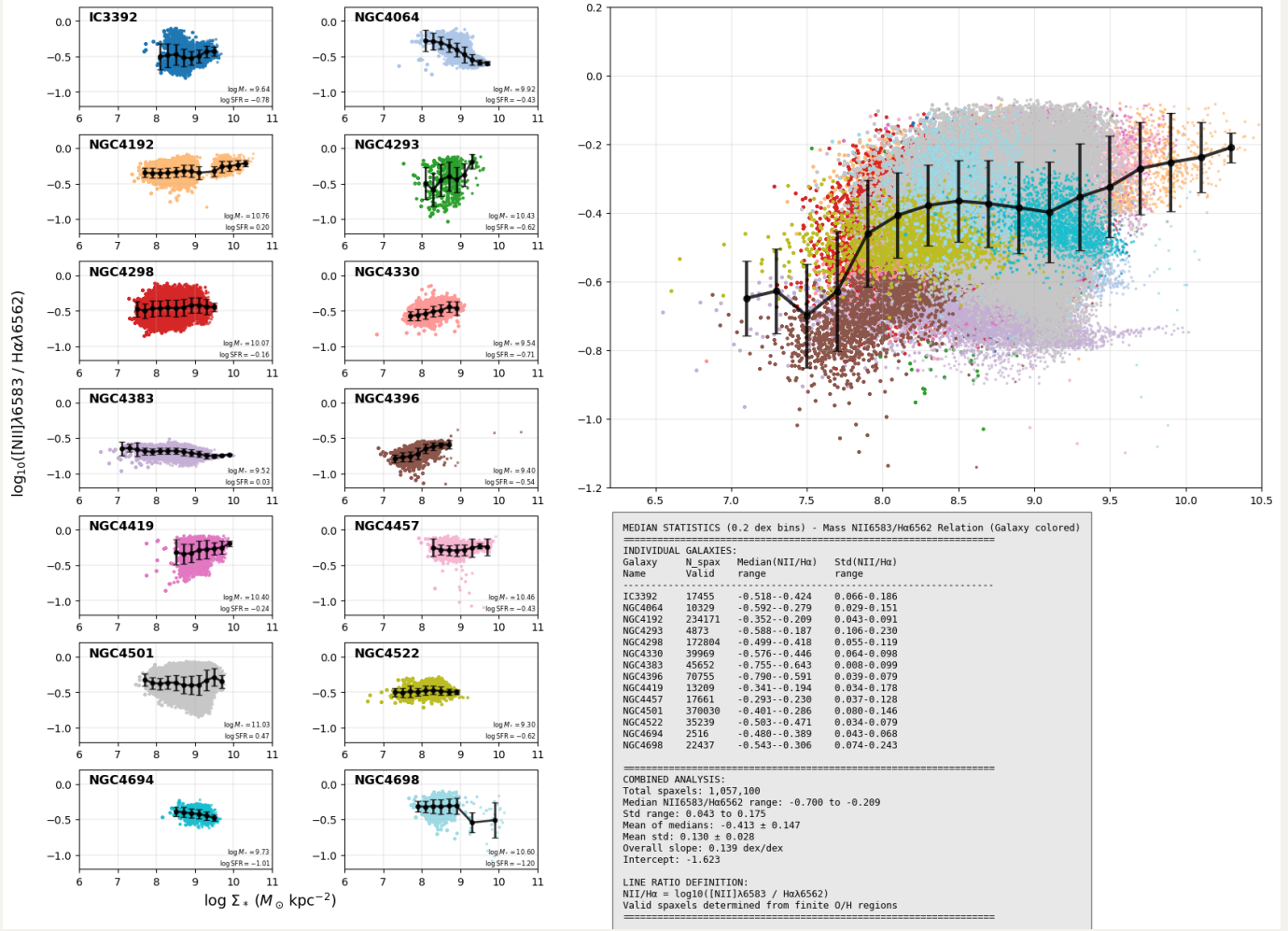4. NGC4694: dark cyan.

rMZR (D16)

14 MAUVE galaxies: Resolved Mass-Metallicity Relation (D16) - Colored by Galaxy

NII6583/Hα6562

Kind of raise the outliers back, but NGC4383 and NGC4395 are still in the bottom.
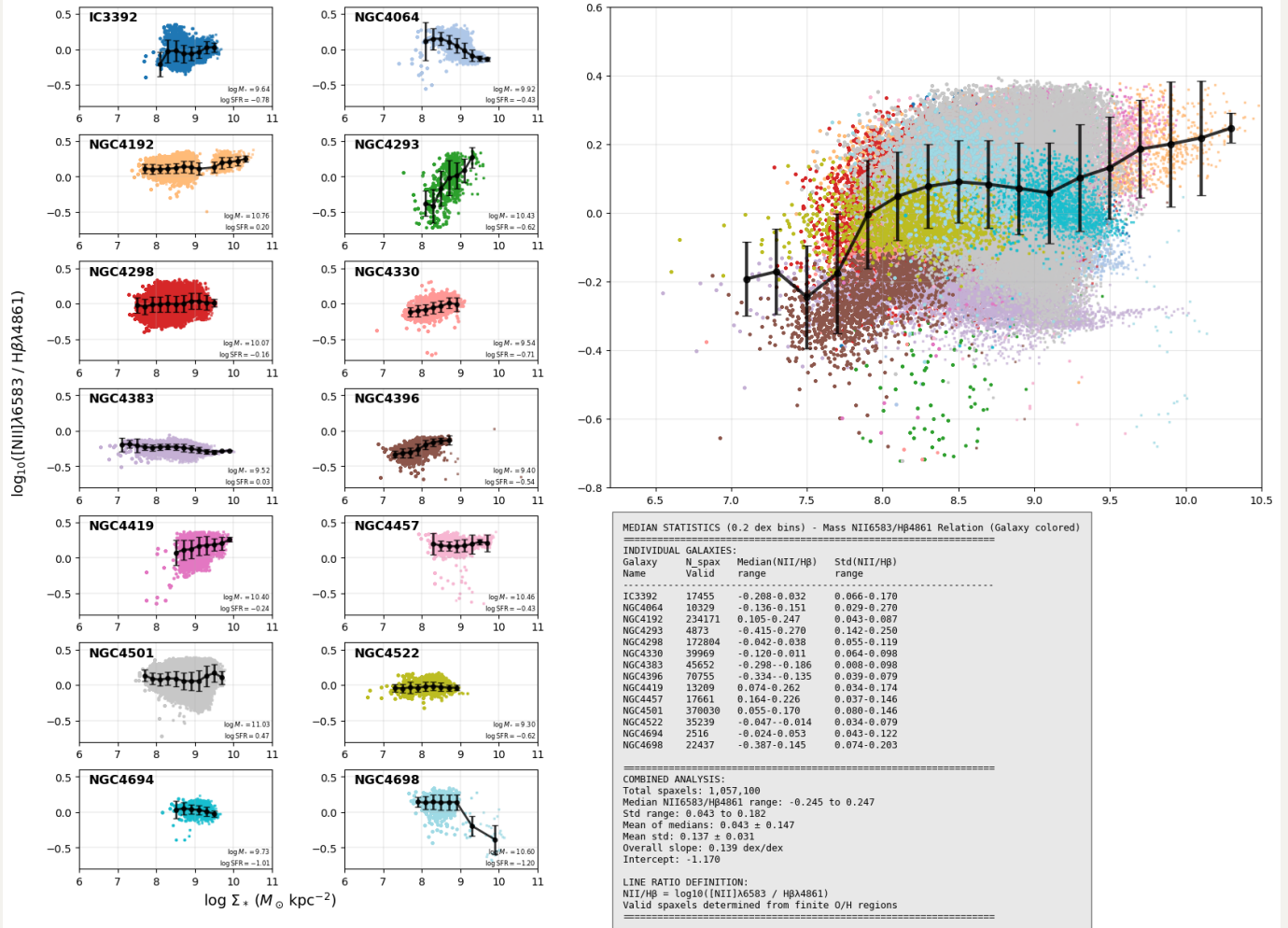
14 MAUVE galaxies: Resolved Mass NII6583/Hα6562 Relation - Colored by Galaxy
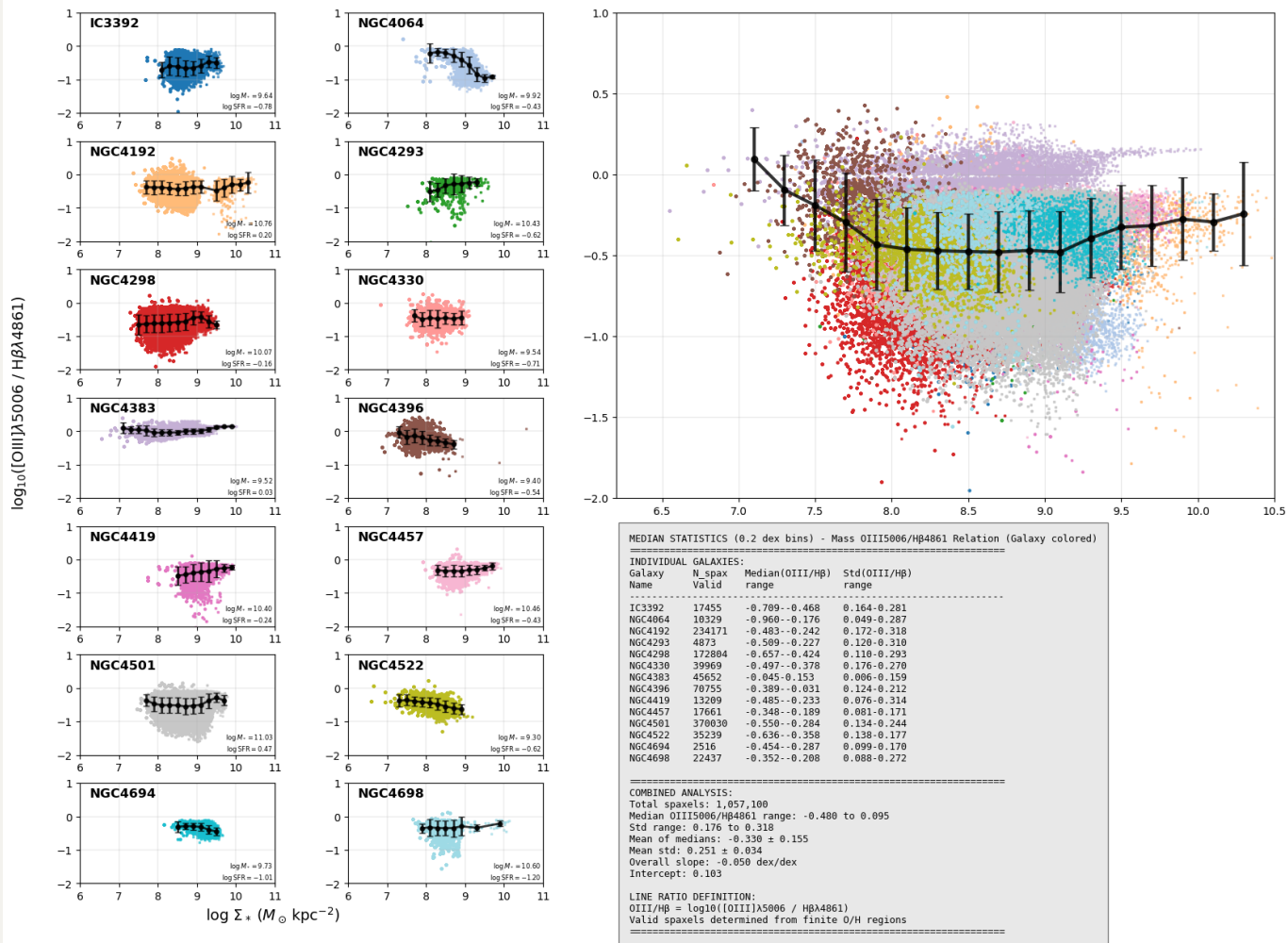
NII6583/Hβ4861

Similar to Hα

14 MAUVE galaxies: Resolved Mass NII6583/Hβ4861 Relation - Colored by Galaxy

OIII5006/Hβ4861

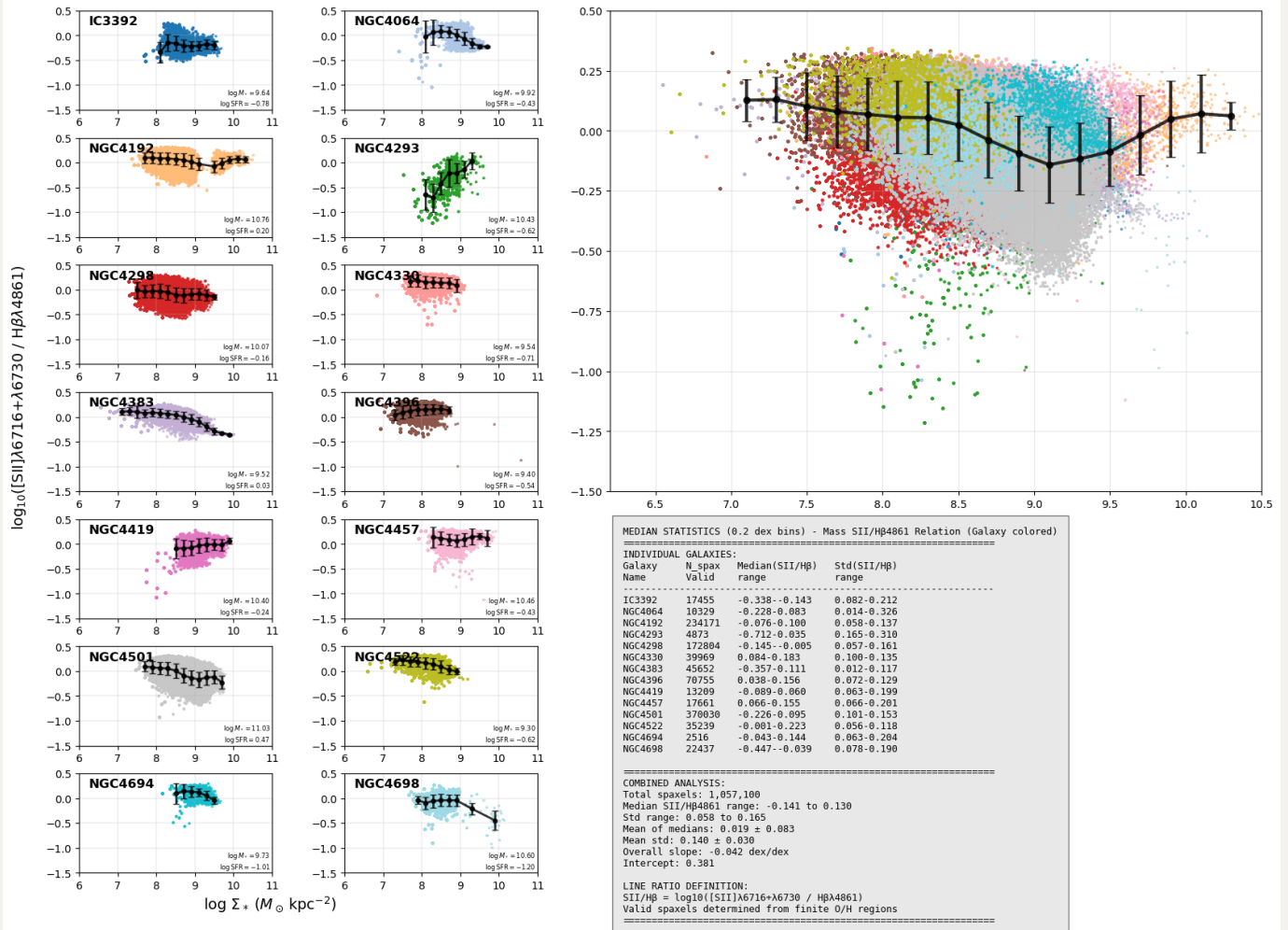Kind of inverse the y-axis of previous two plots.

14 MAUVE galaxies: Resolved Mass OIII5006/Hβ4861 Relation - Colored by Galaxy

SII(6716+6730)/Hβ4861
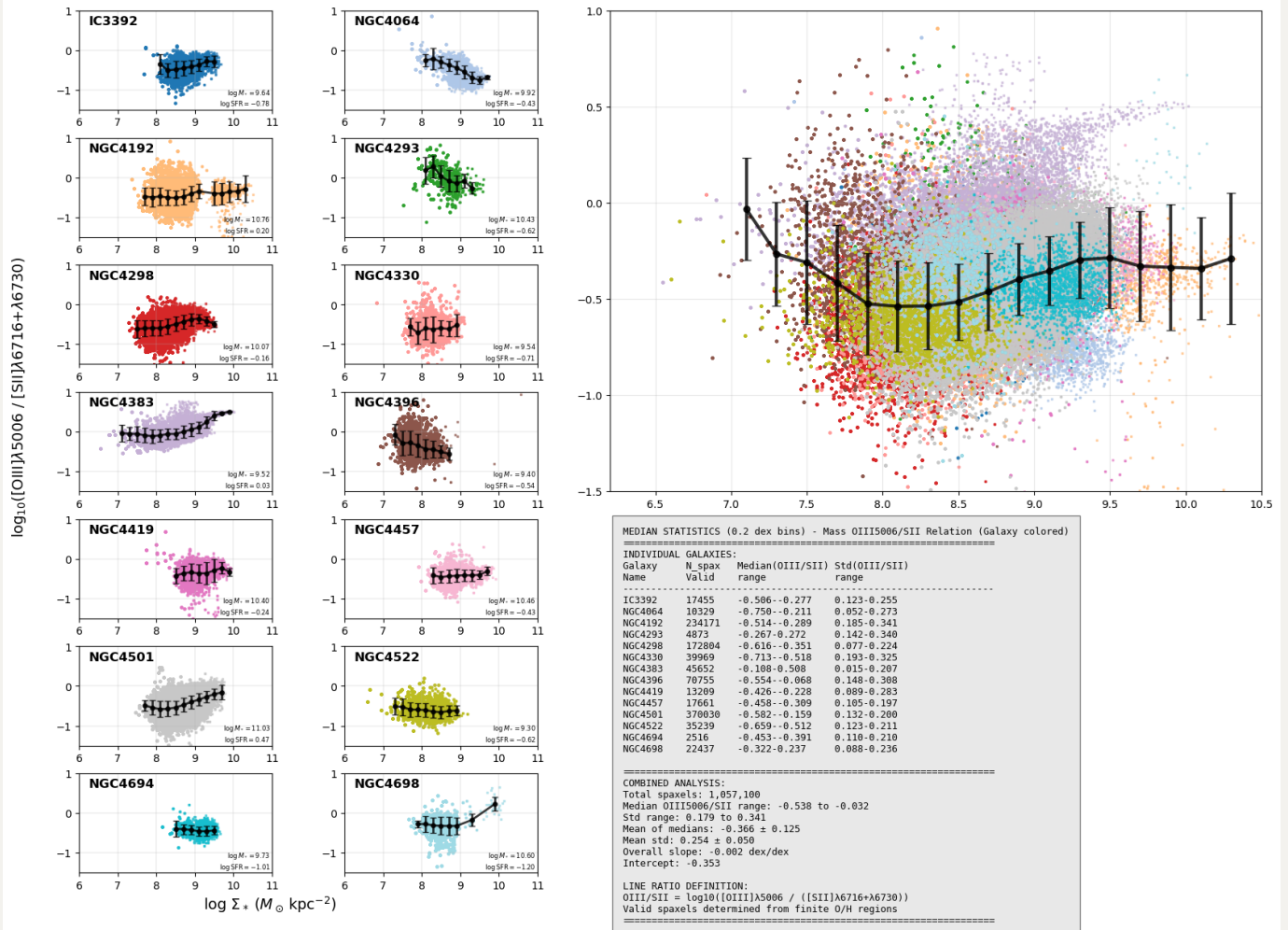
The most consistent parameter space.

14 MAUVE galaxies: Resolved Mass SII/Hβ4861 Relation - Colored by Galaxy

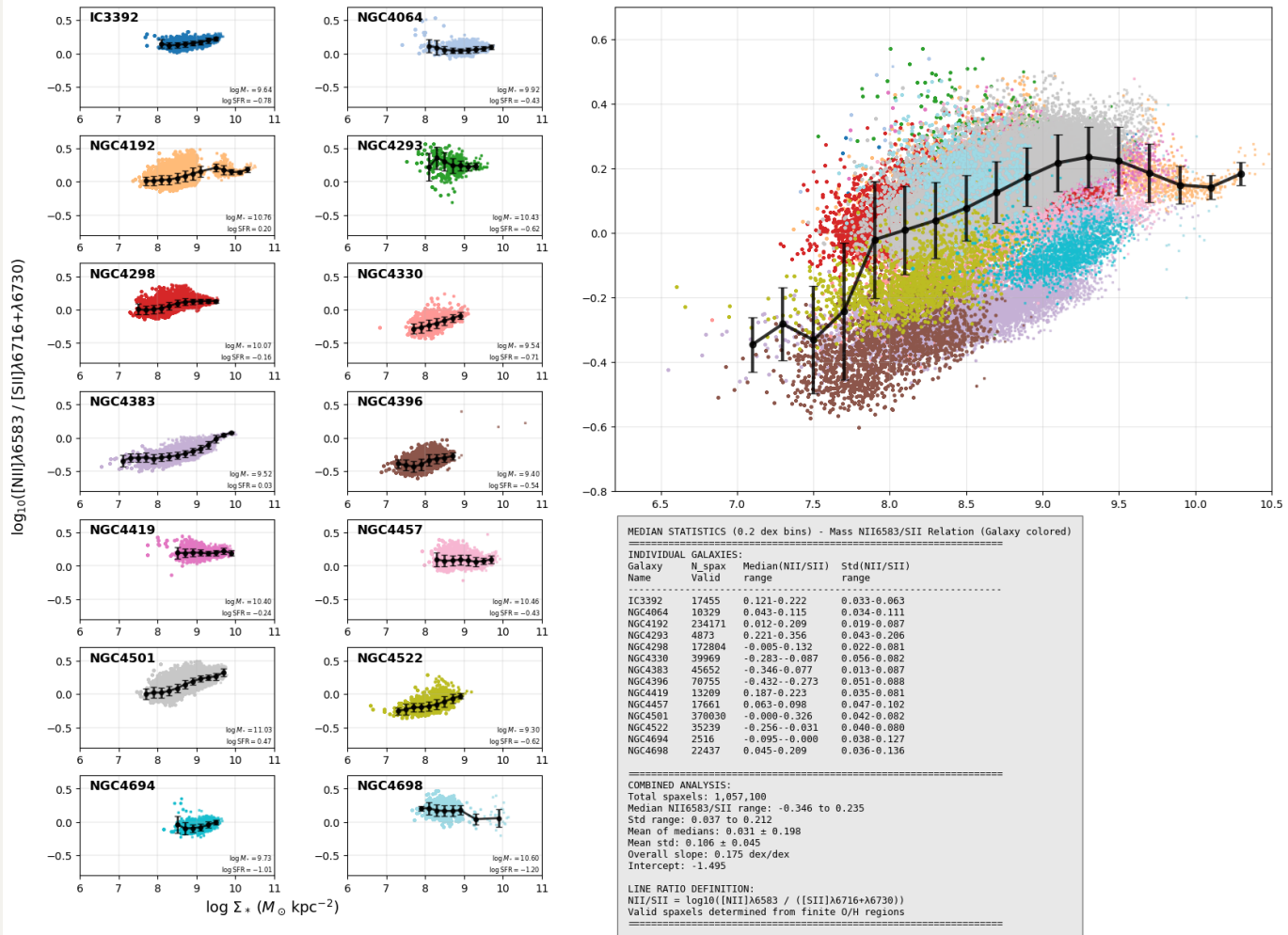# OIII5006/SII(6716+6730)

Also looks consistent.

14 MAUVE galaxies: Resolved Mass OIII5006/SII Relation - Colored by Galaxy

NII6583/SII(6716+6730)
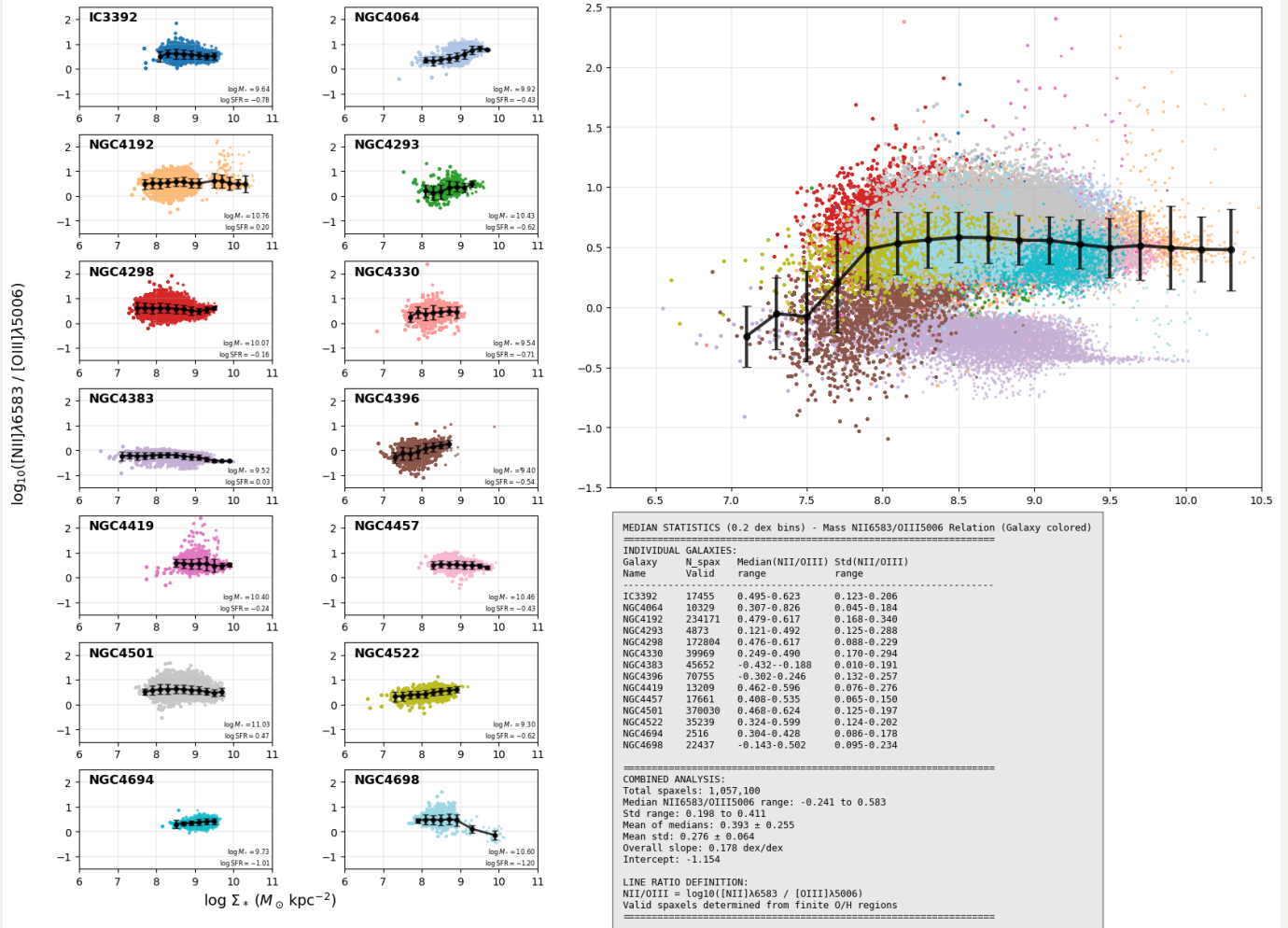
Almost the imitation of rMZR!

14 MAUVE galaxies: Resolved Mass NII6583/SII Relation - Colored by Galaxy

NII6583/OIII5006

NGC4383 is prominent in this case.

14 MAUVE galaxies: Resolved Mass NII6583/OIII5006 Relation - Colored by Galaxy

Next step

I will also check complex line ratios like O3N2 and check the exact forms of those prescriptions mentioned in Groves+2023 and try to find if there exists a calibration that will not produce outliers, probably the ones that more dependent on SII/Hβ and less dependent on NII/SII.