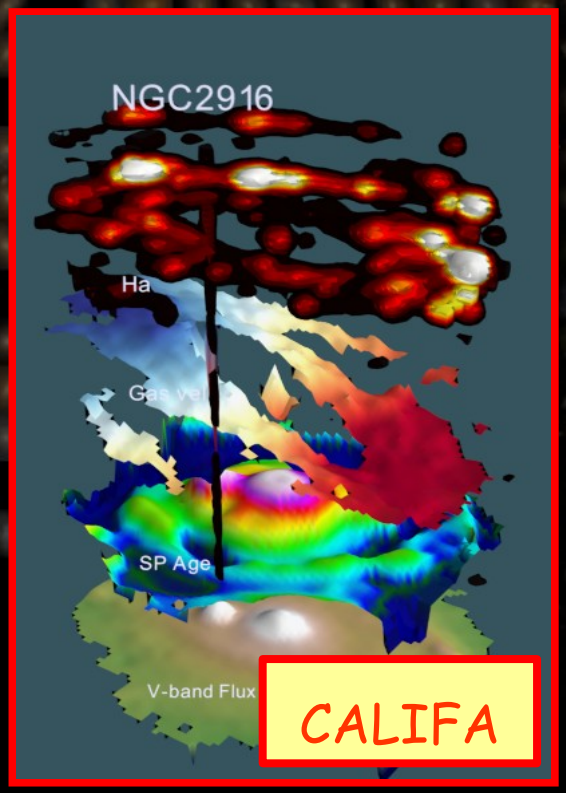
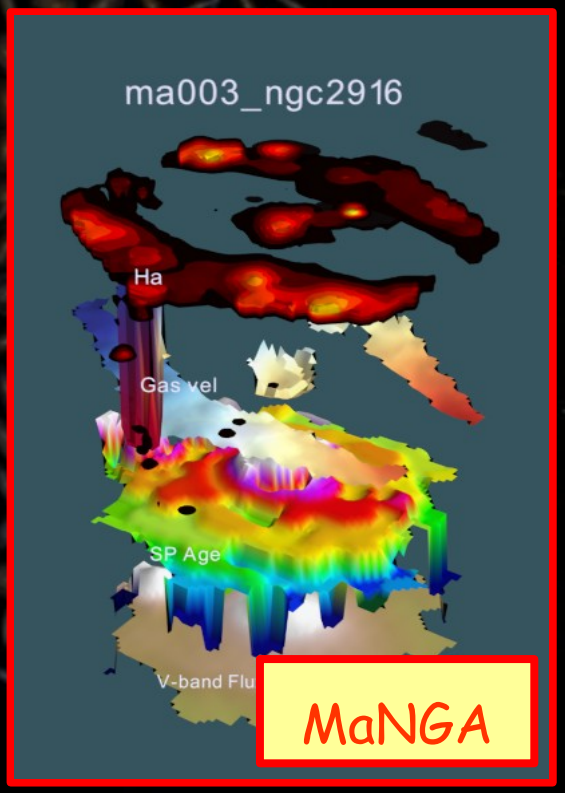
CALIFA & MaNGA Surveys: Spatial resolved ionized gas

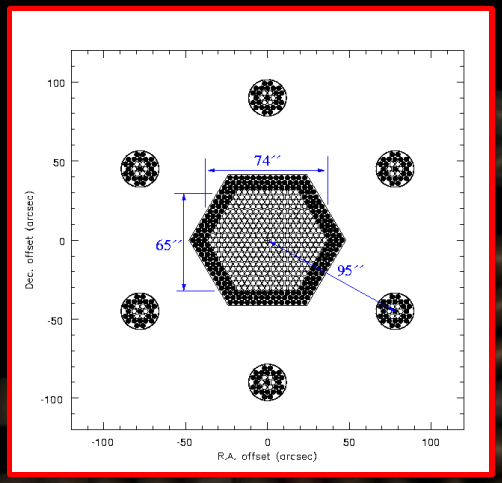
Sebastián F. Sánchez –IA/UNAM

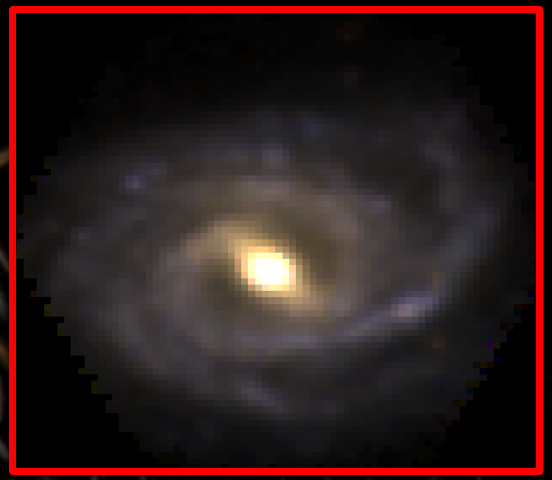


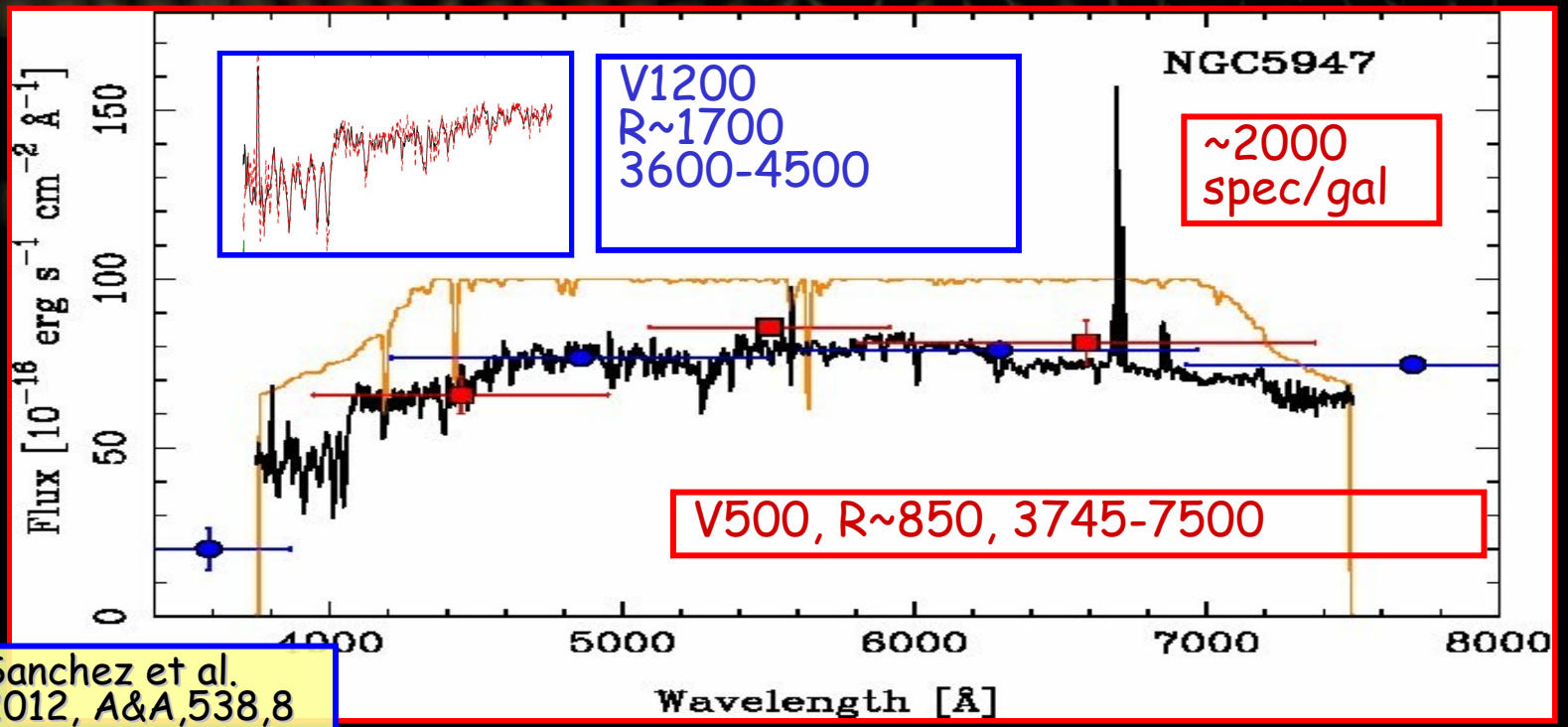


- The interplay between local and global processes in galaxies -
Cozumel, April, 2016

CALIFA: The details...

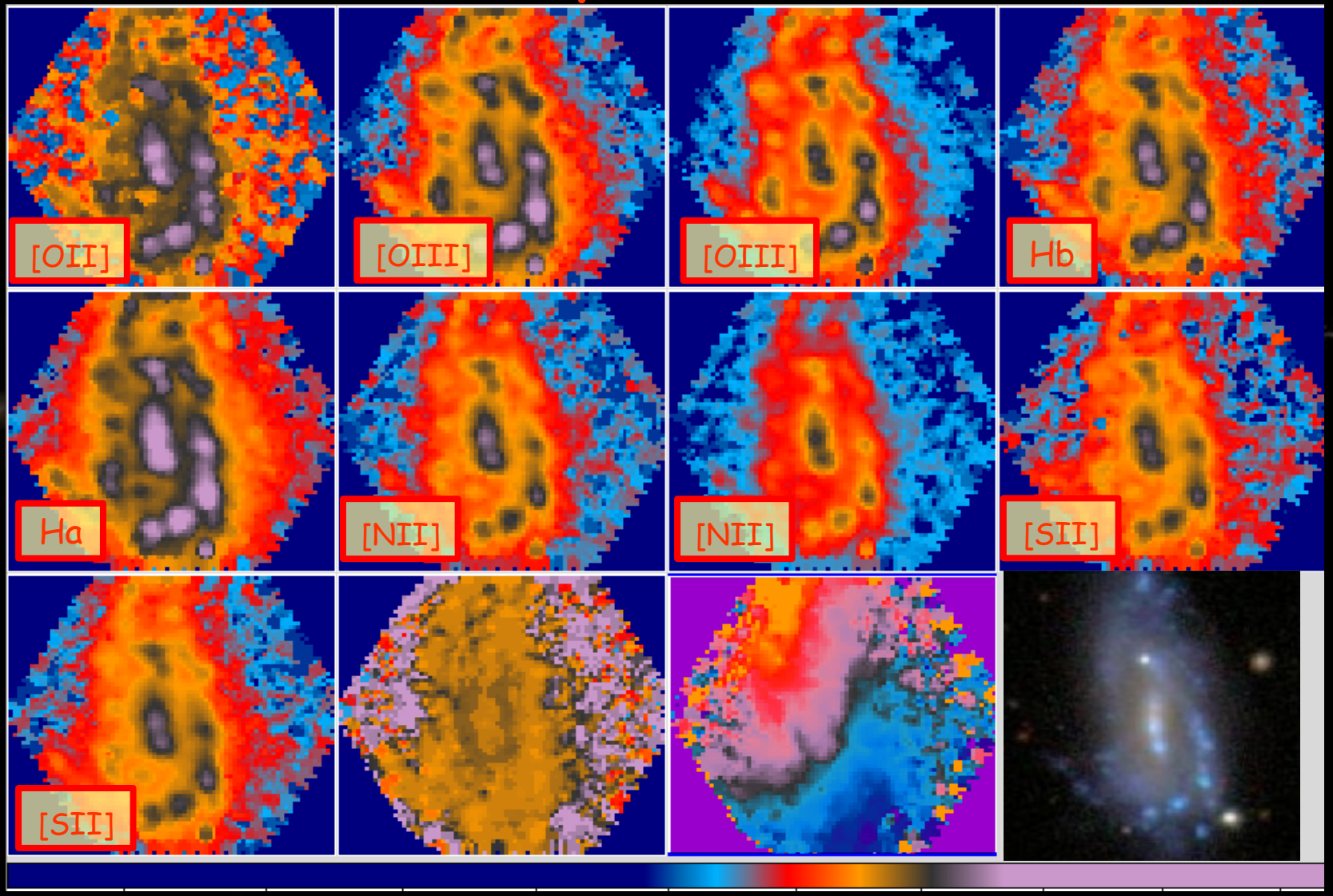




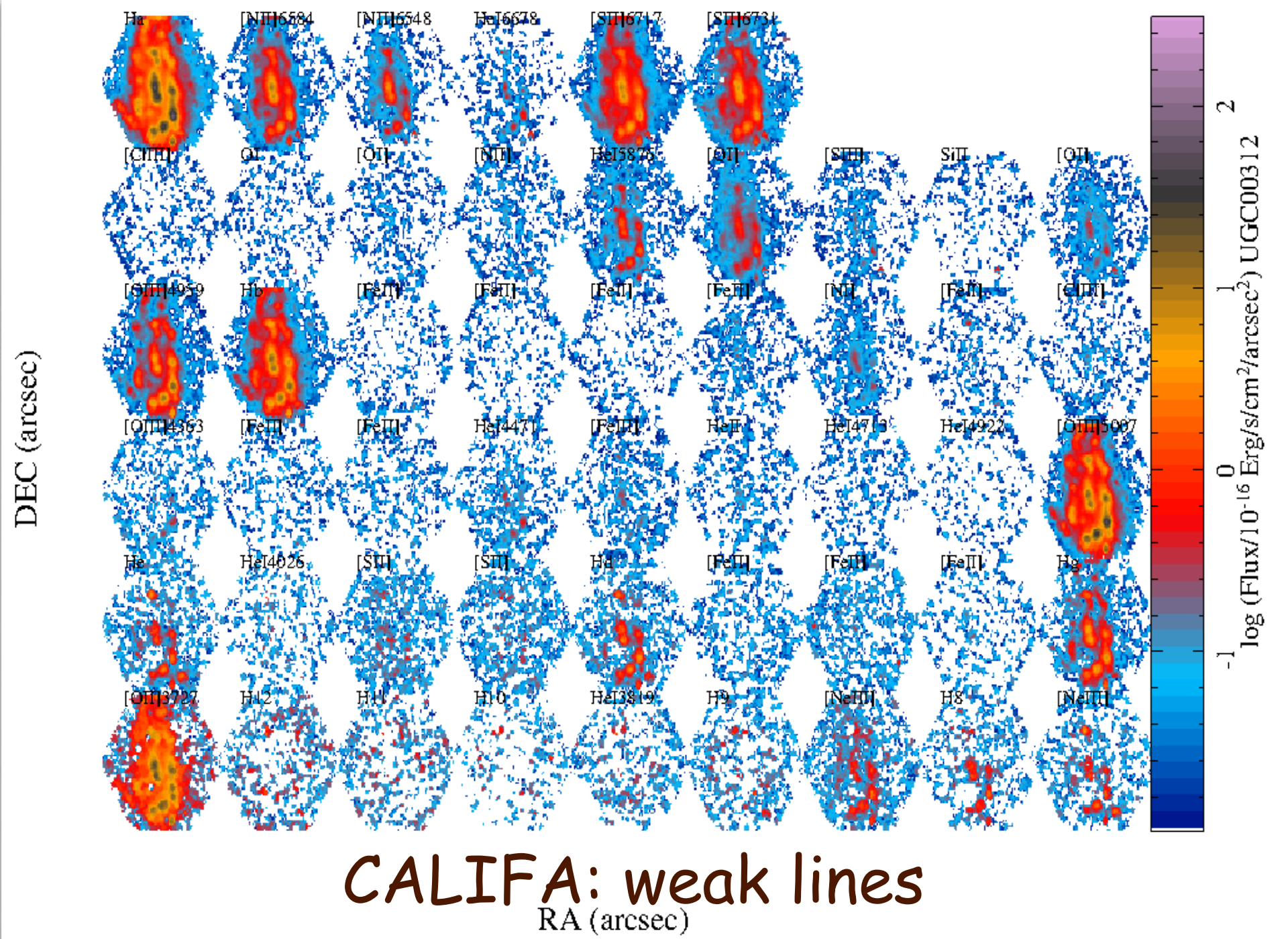


Sanchez et al.
2012, A&A,538,8

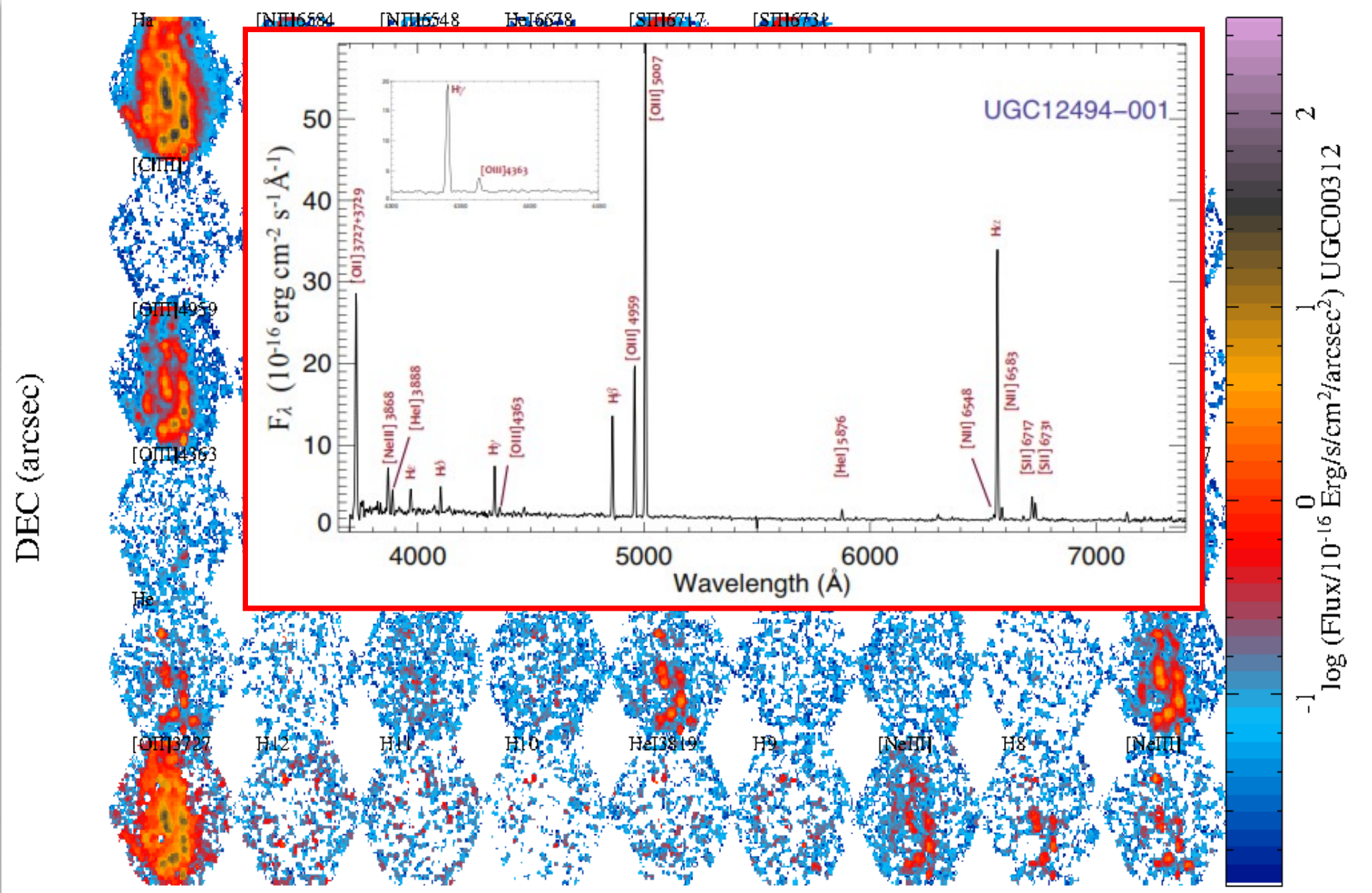
CALIFA: A panoramic view



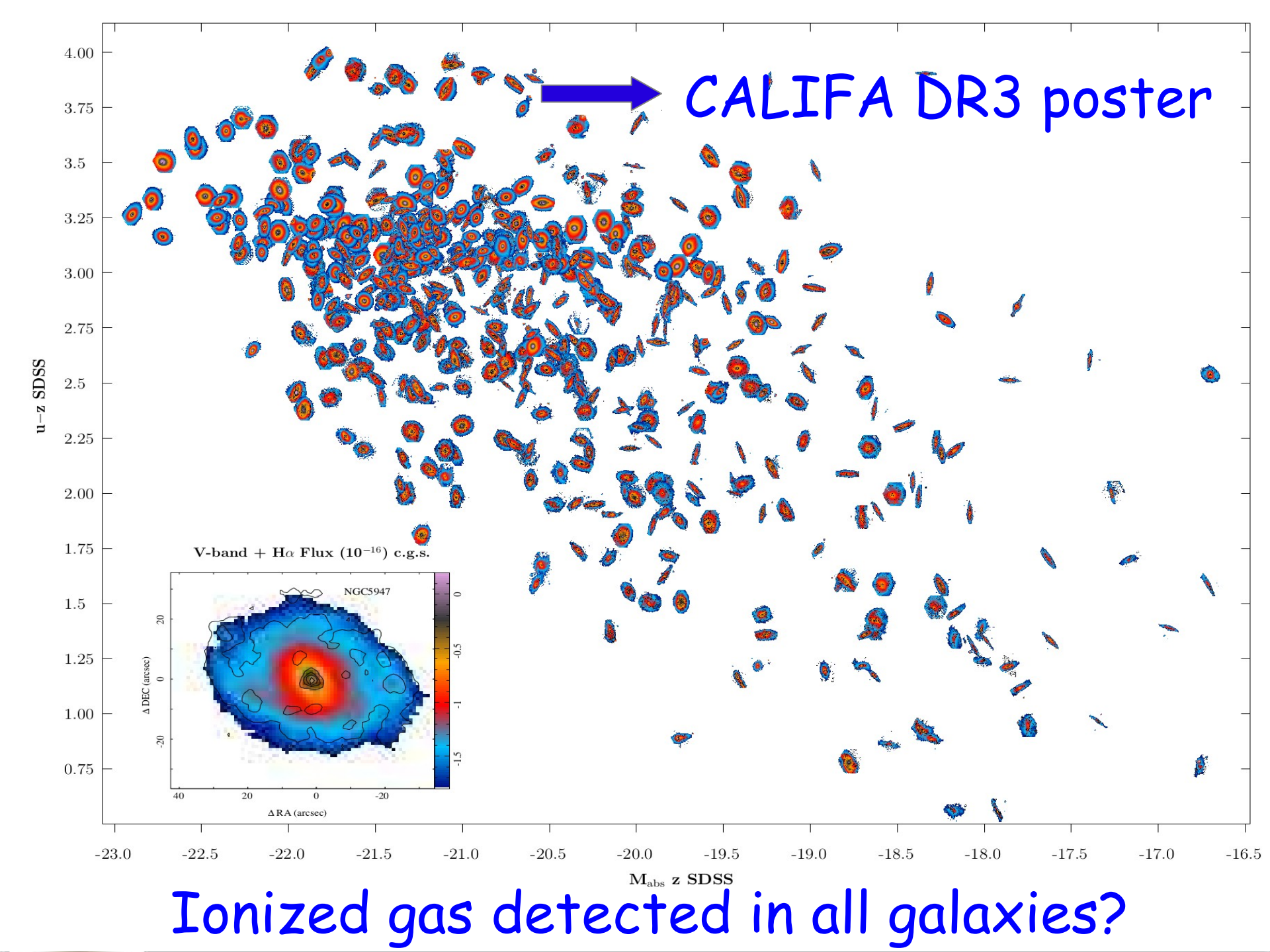
Ionized Gas: Multiple emission lines intensity maps, velocity and velocity dispersion.

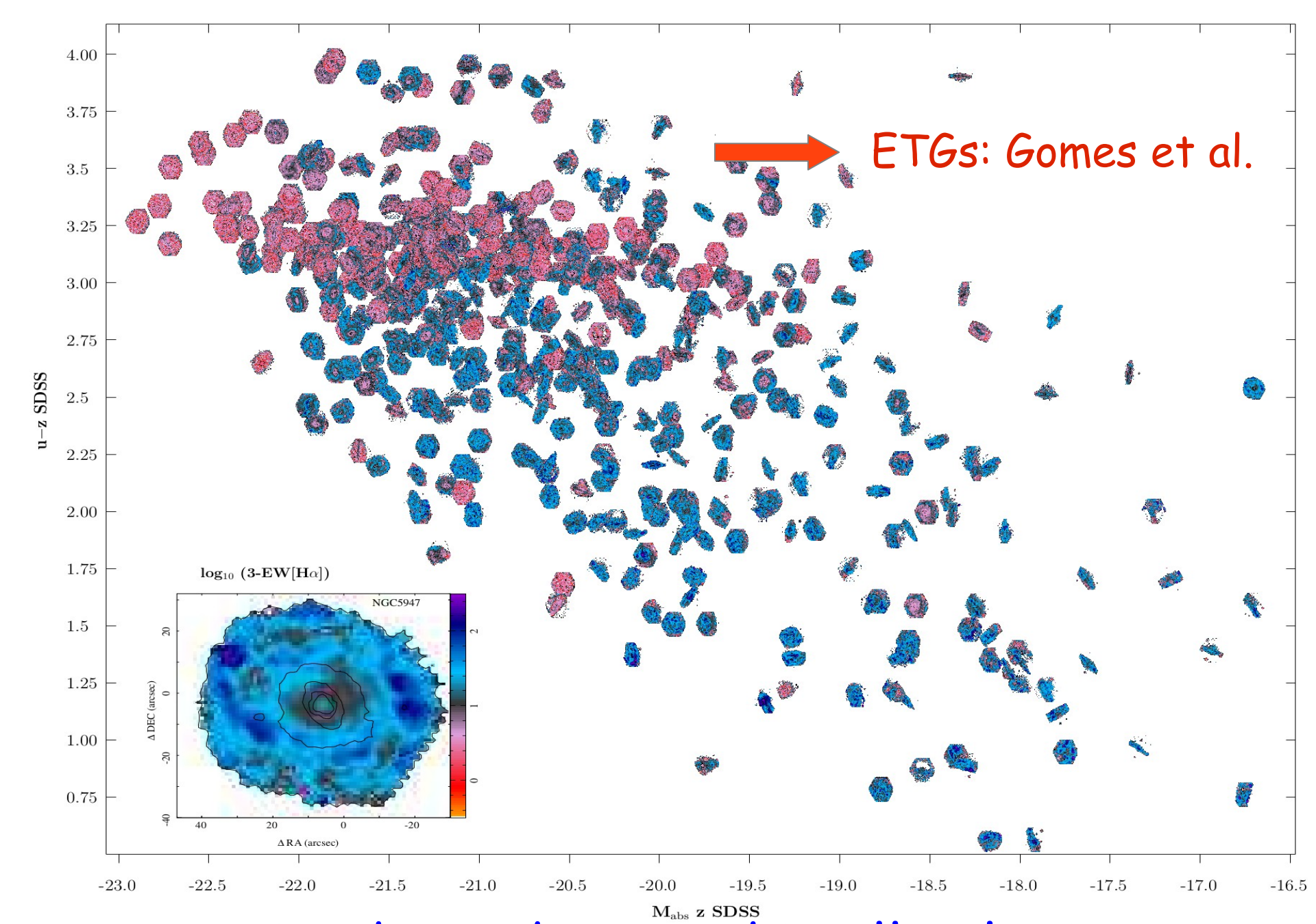


CALIFA: weak lines

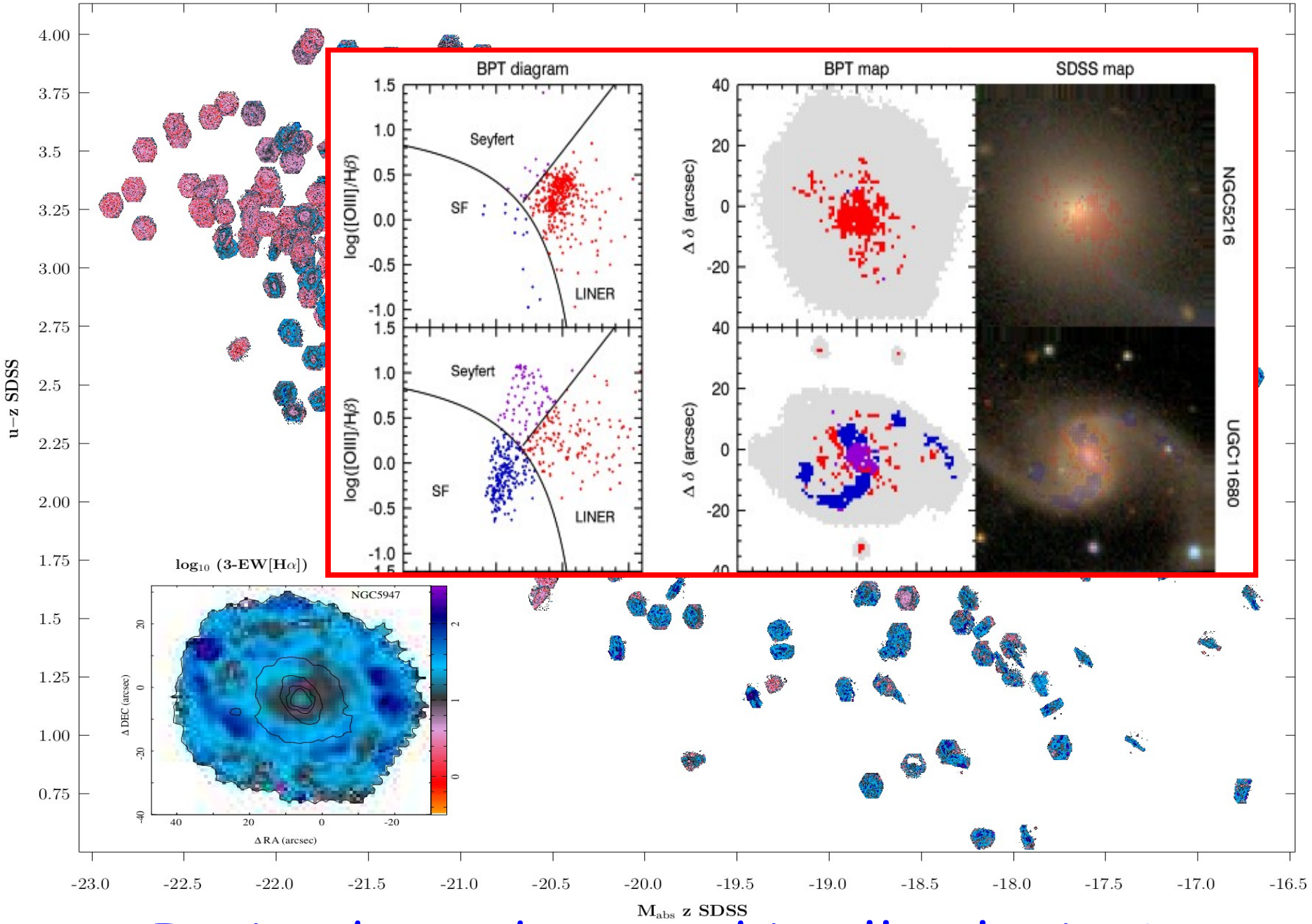


CALIFA: weak lines

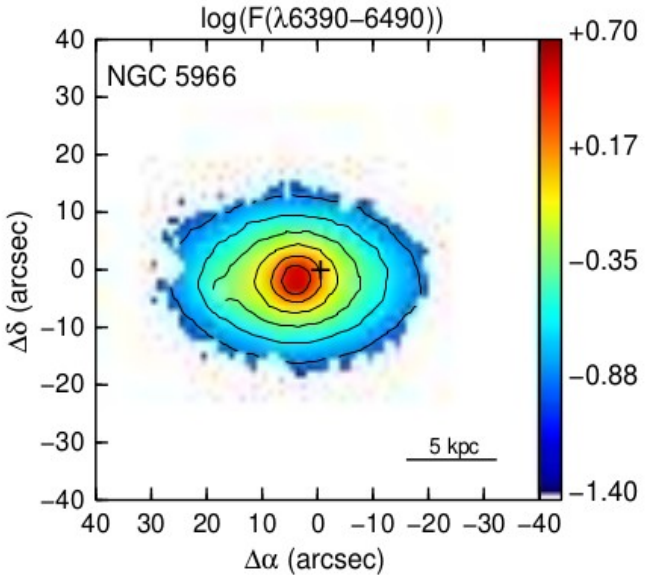

CALIFA DR3 poster
u−z SDSS
M_abs z SDSS
V-band + Hα Flux (10^−16) c.g.s.
NGC5947
Δ DEC (arcsec)
Δ RA (arcsec)
Ionized gas detected in all galaxies?

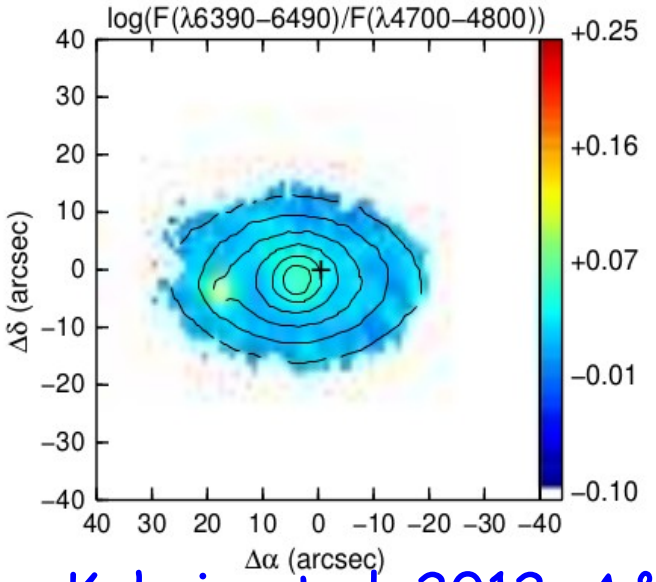


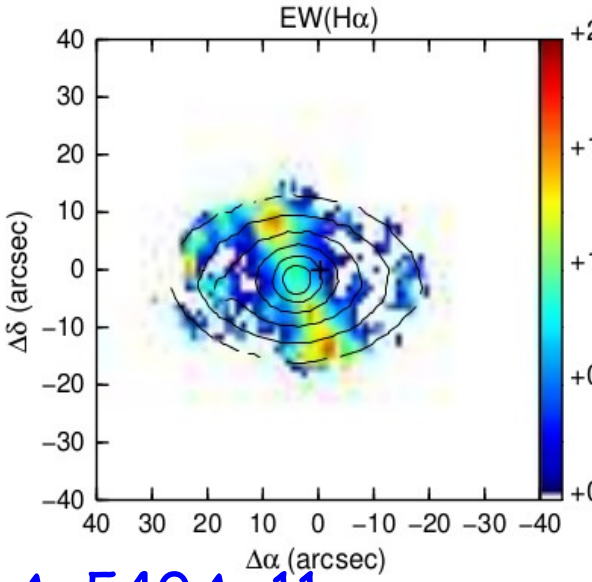
Ionized gas detected in all galaxies?



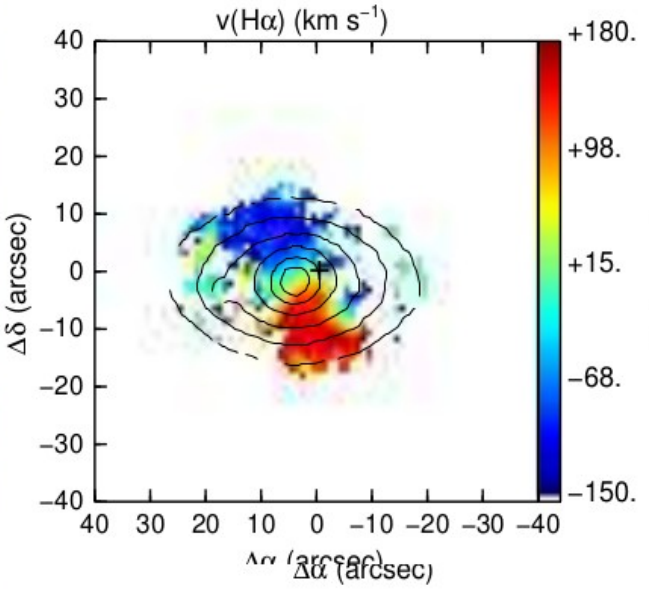
Ionized gas detected in all galaxies?

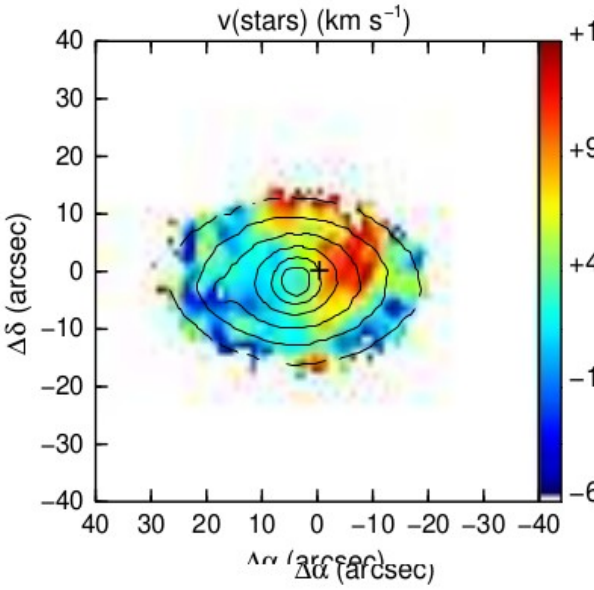






Kehrig et al. 2012, A&A. 540A, 11





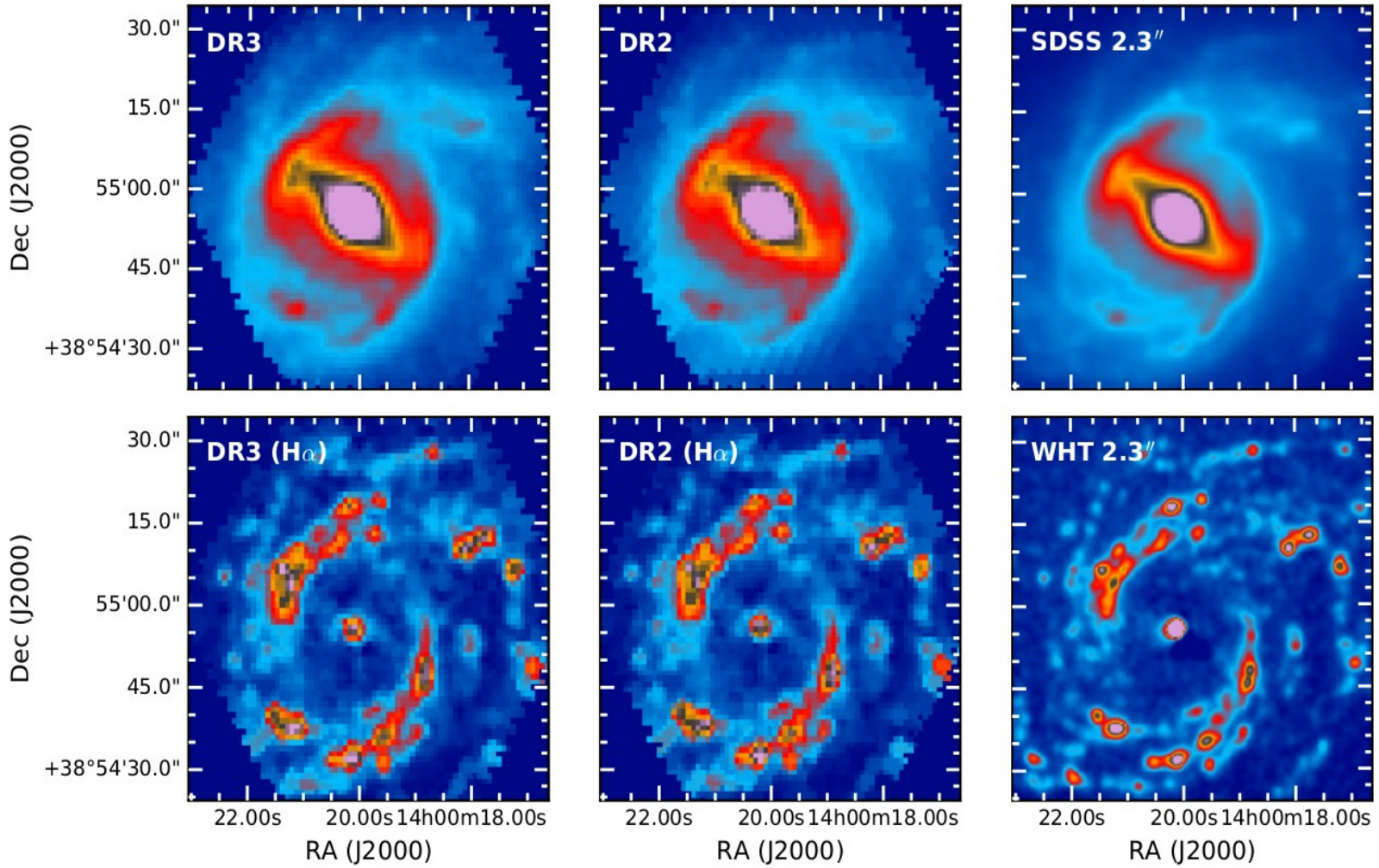
M_{abs} z SDSS

Geysers?

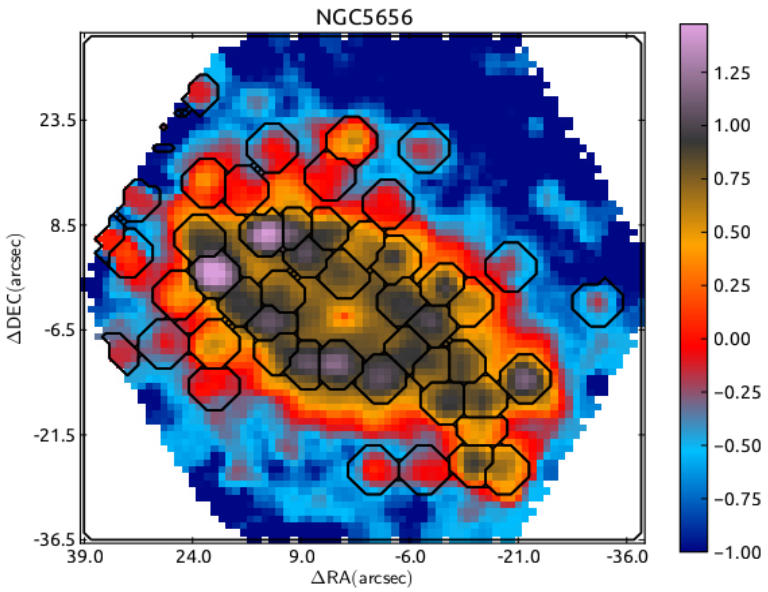
CALIFA: Spatial Resolution & coverage

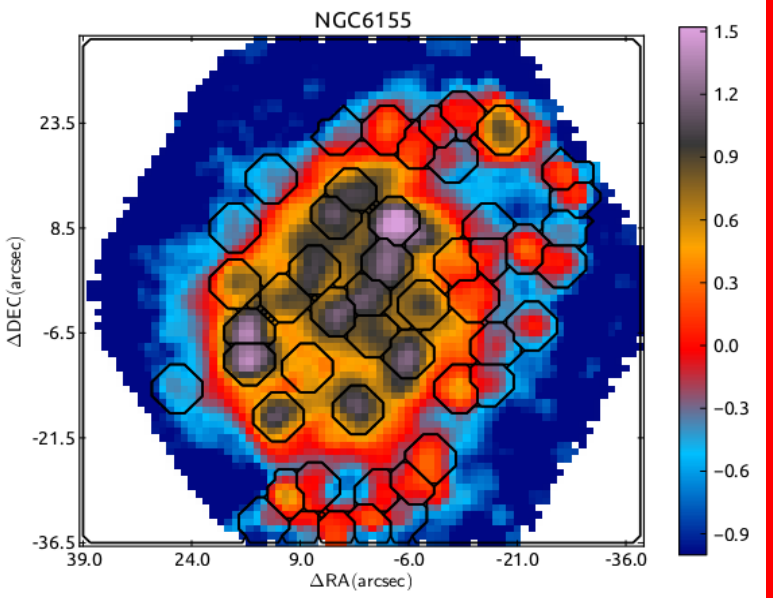
- Final PSF FWHM~2.5"

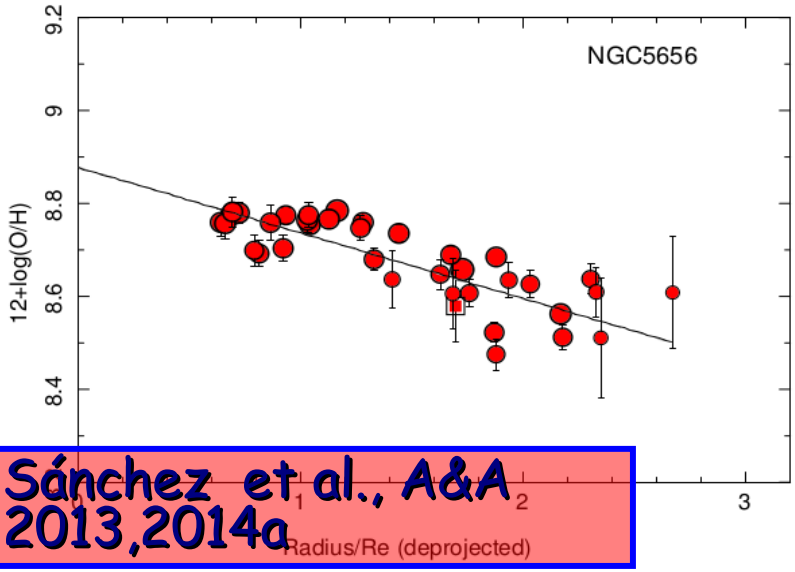
Garcia-Benito et al. 2015, A&A, 576, 135
Sánchez et al., 2016, submitted

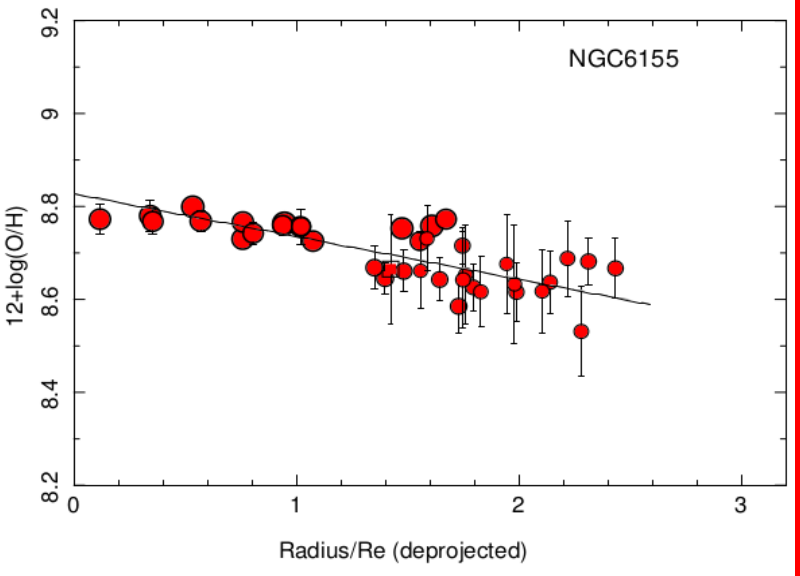


~9000 Hii regions, with CALIFA



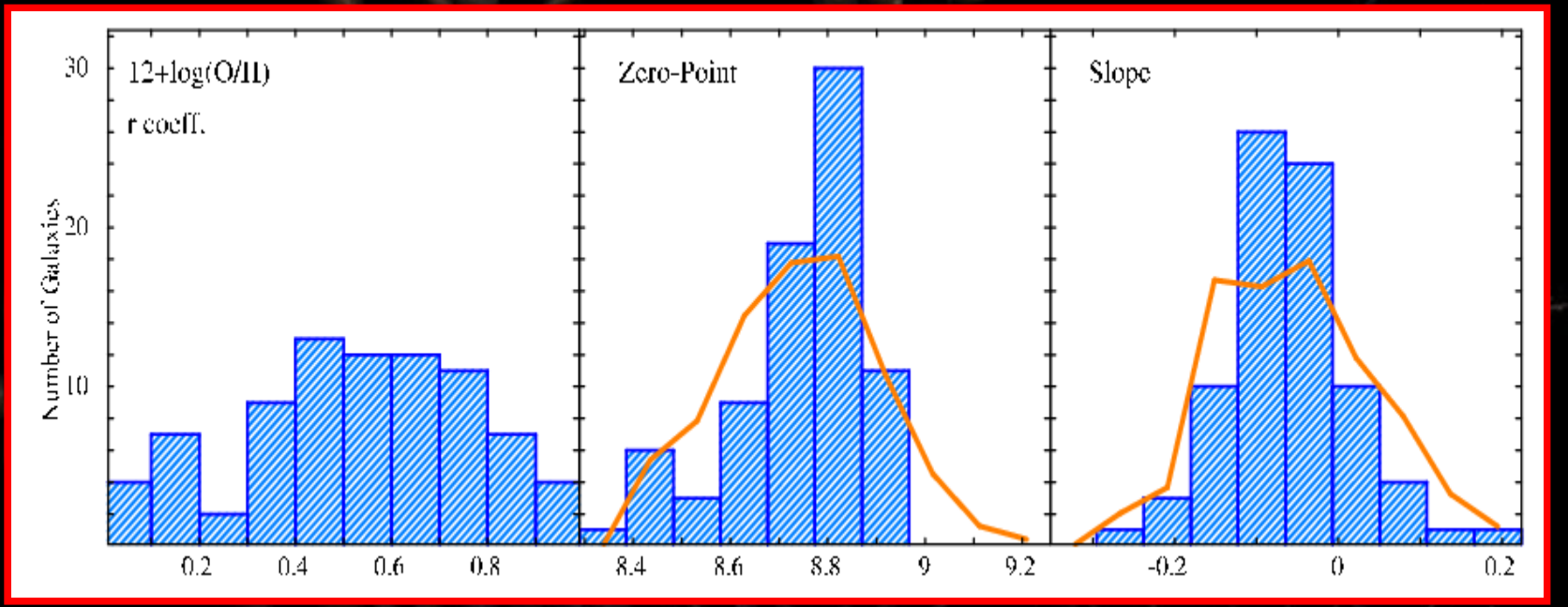






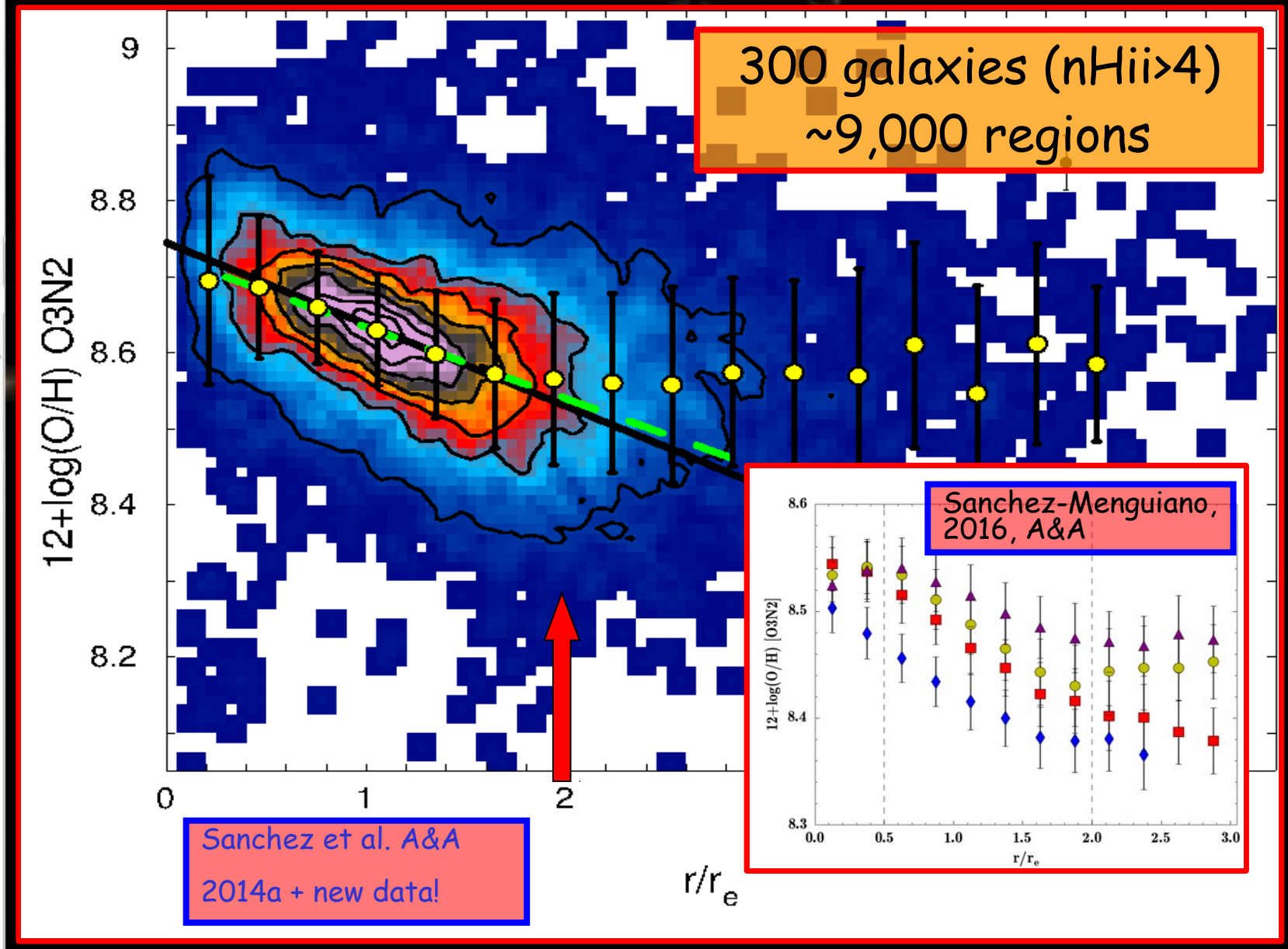
Sánchez et al., A&A 2013,2014a

O/H Abundance gradients With CALIFA galaxies

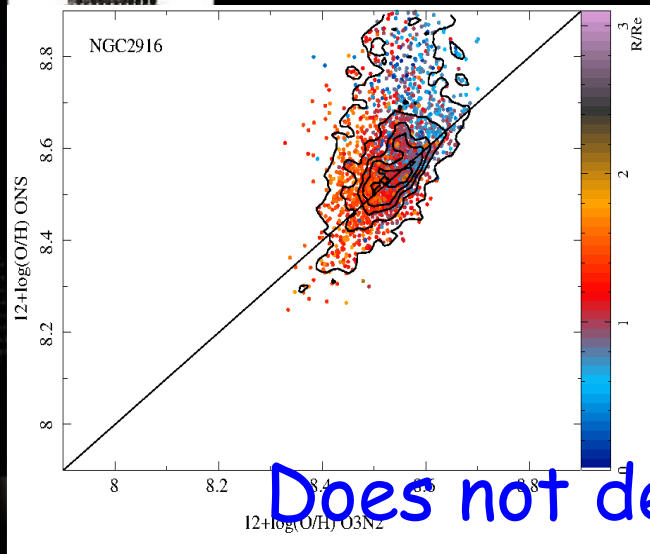


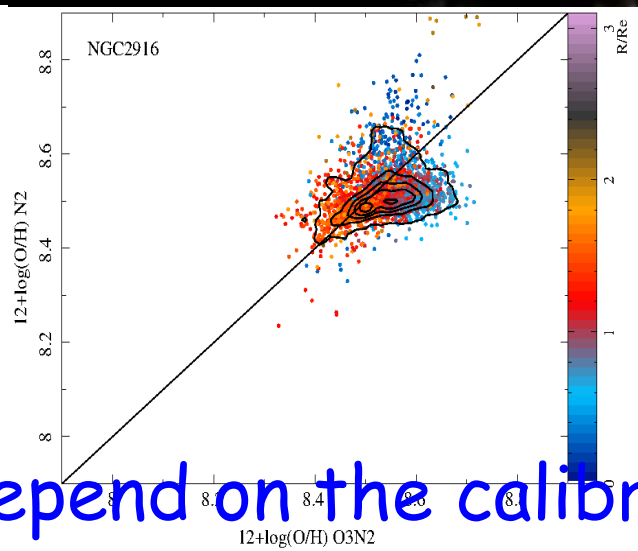
- Gradients determined at 0.3<R/Re<2.1.
- 207 galaxias, ~6500 regions → 9000 reg!!!
- Gradients distribution compatibles with of single Gaussians.
- Slope ~ -0.11+-0.08 dex/Reff.

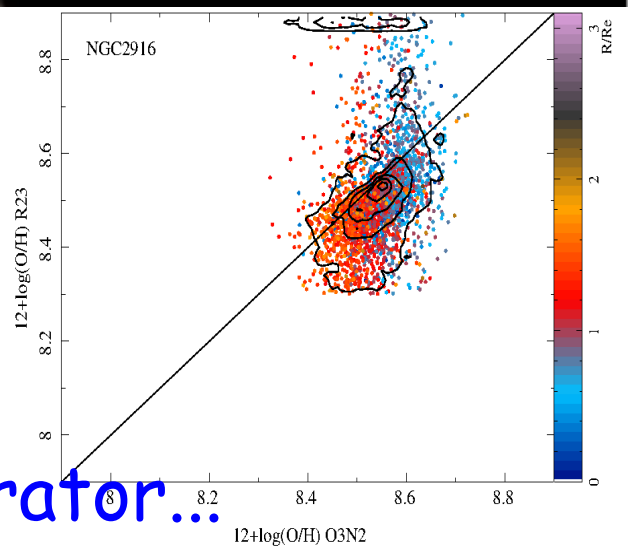
O/H Abundance gradients



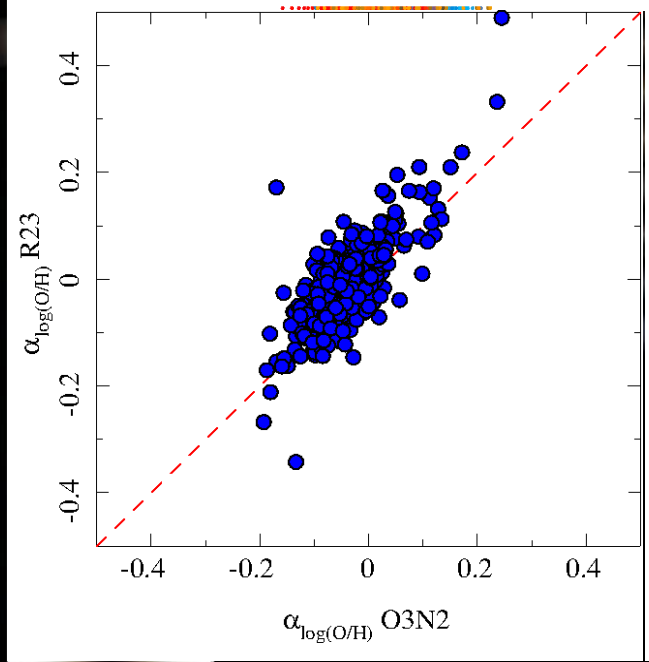
O/H Abundance gradients

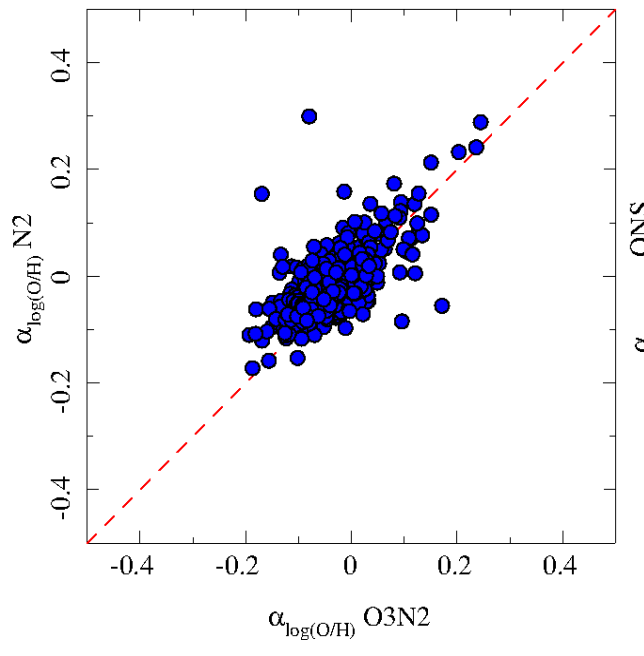


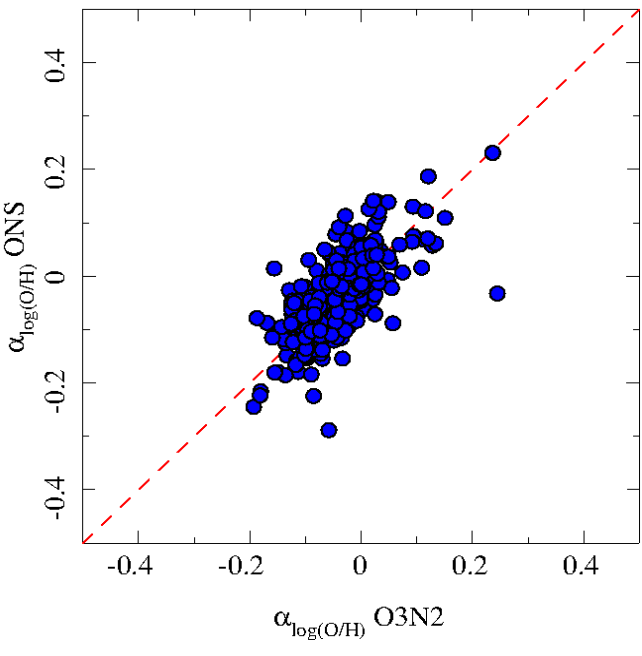




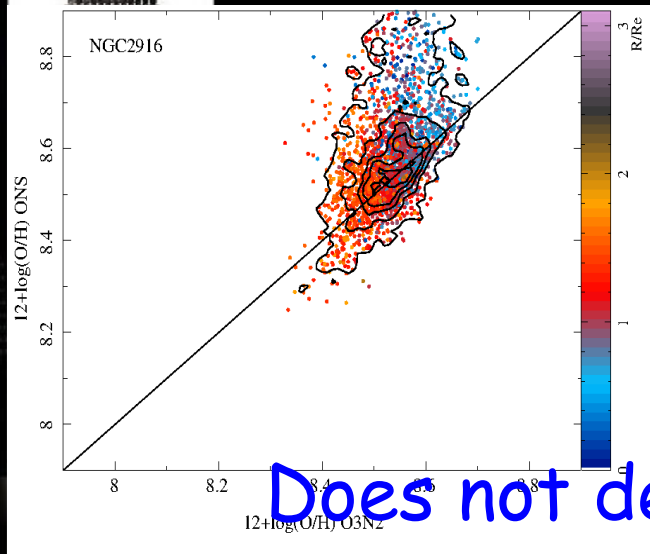
Does not depend on the calibrator...

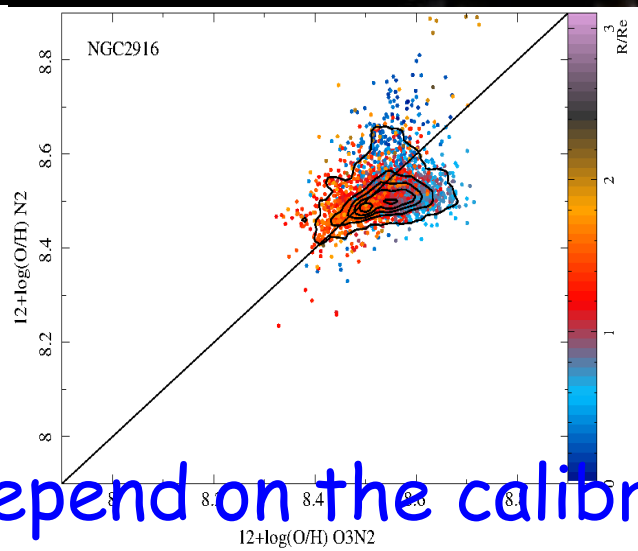


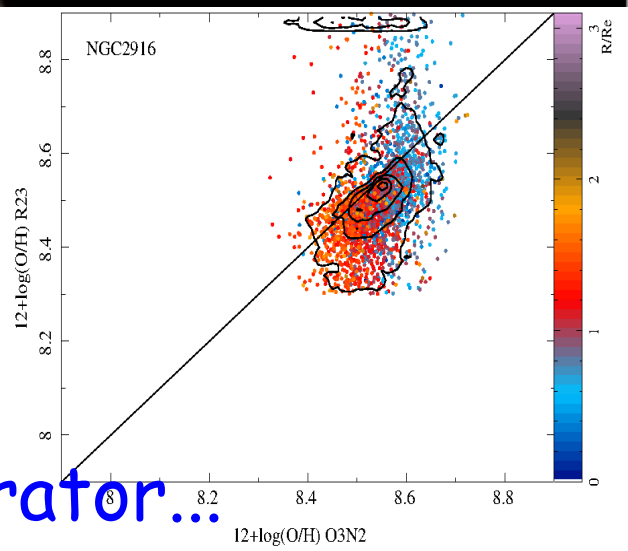




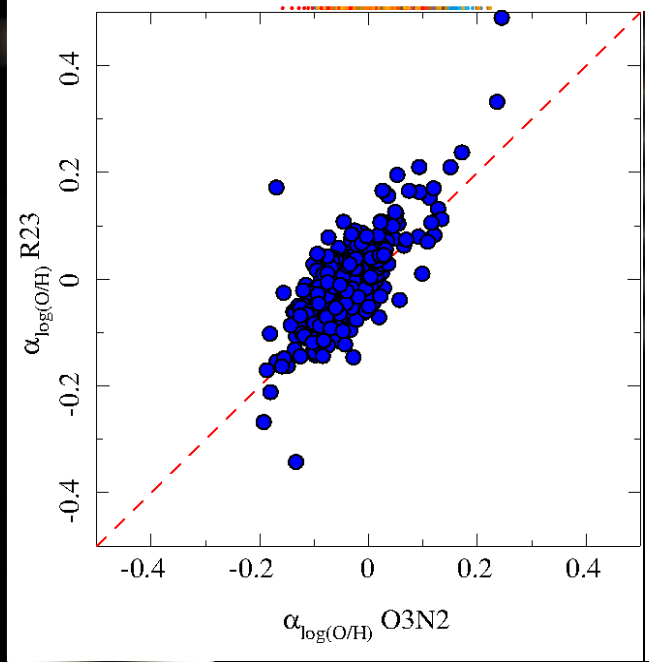
O/H Abundance gradients

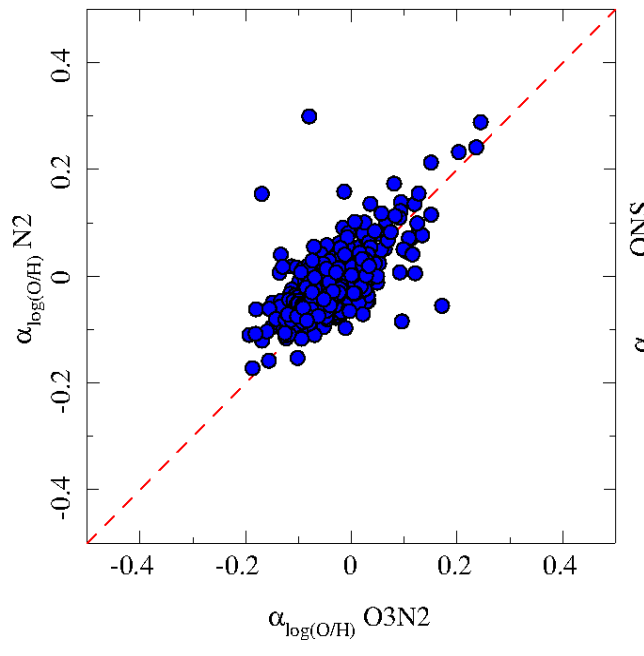


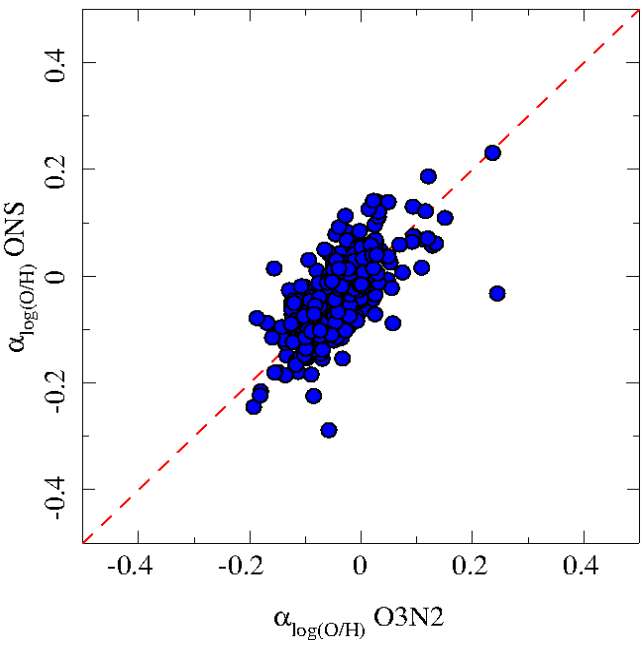


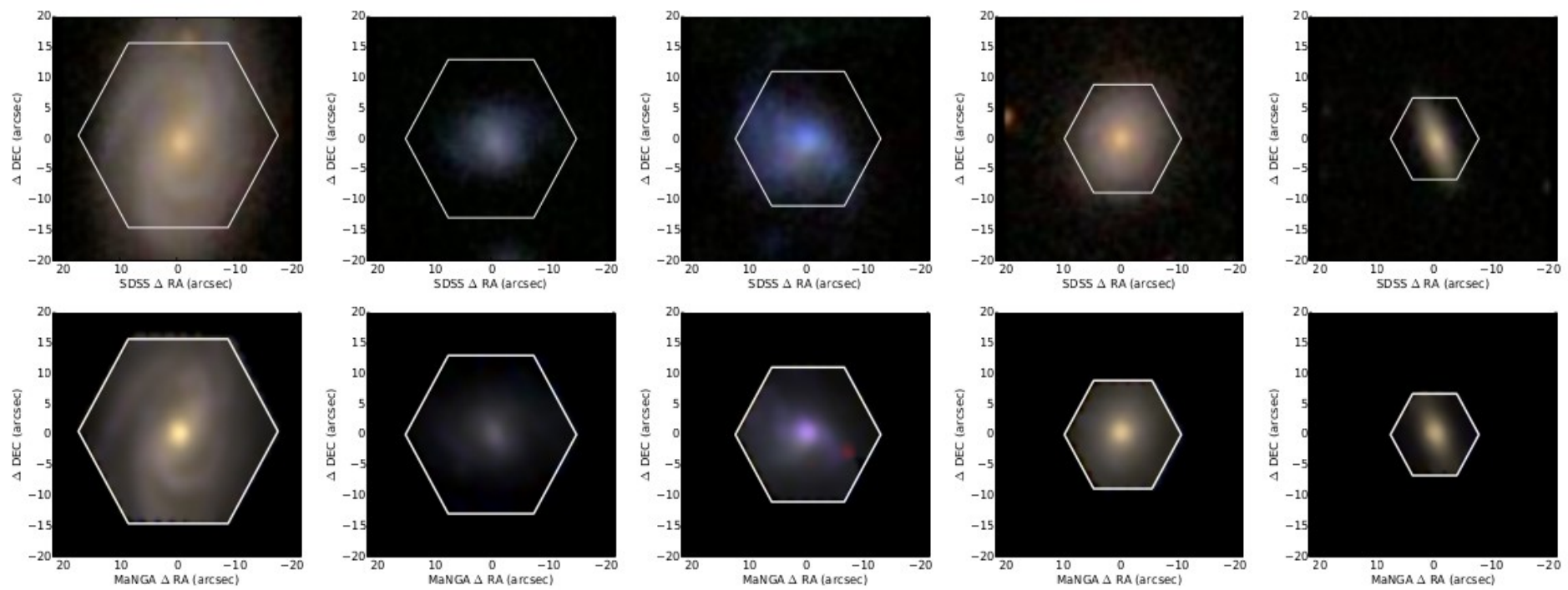


Does not depend on the calibrator...

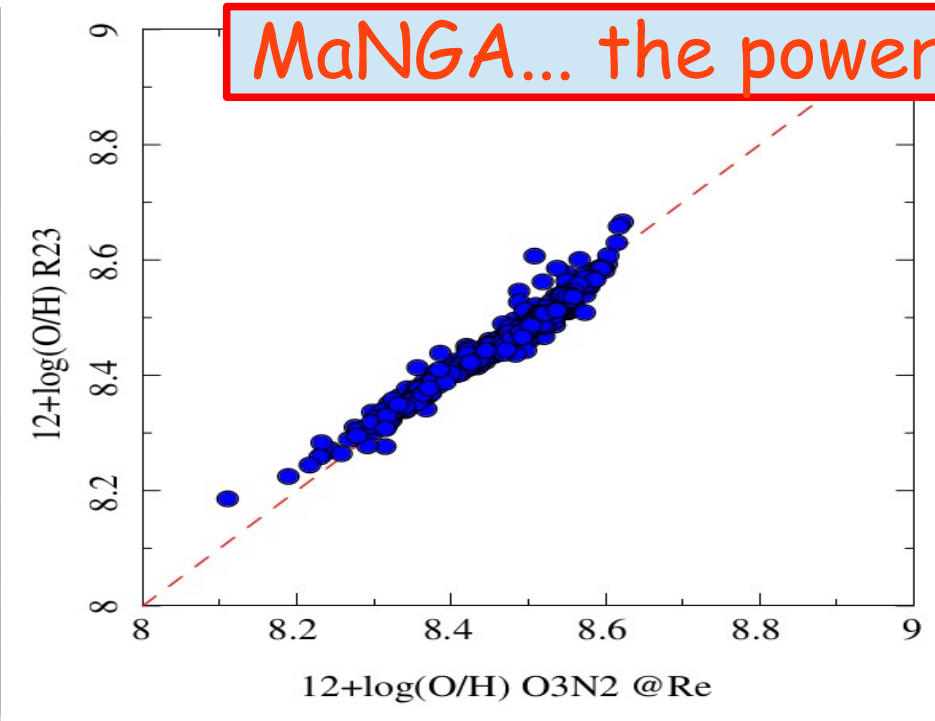


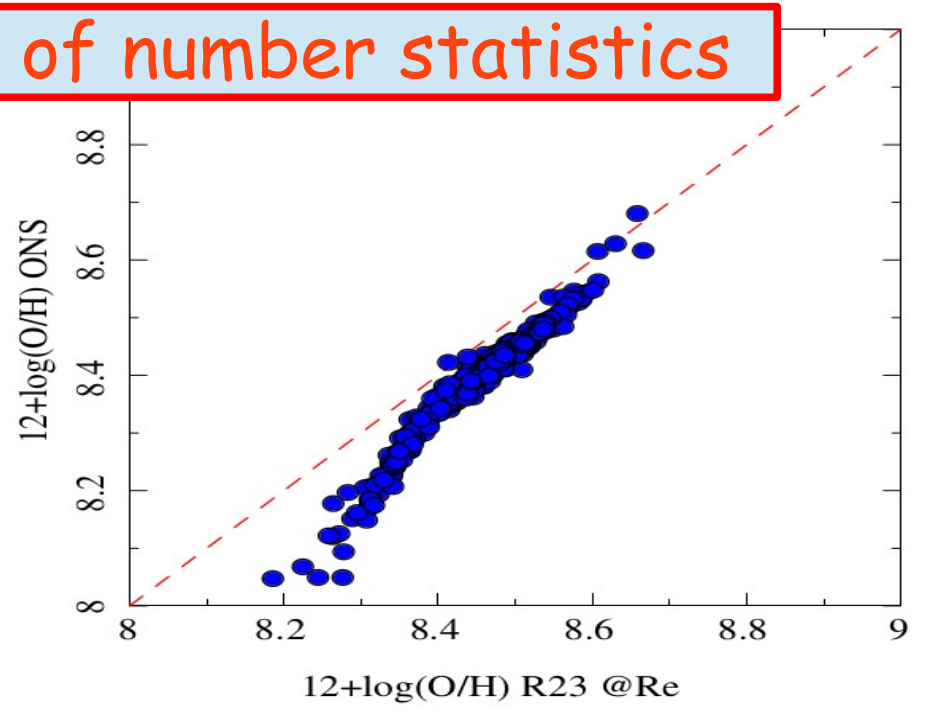


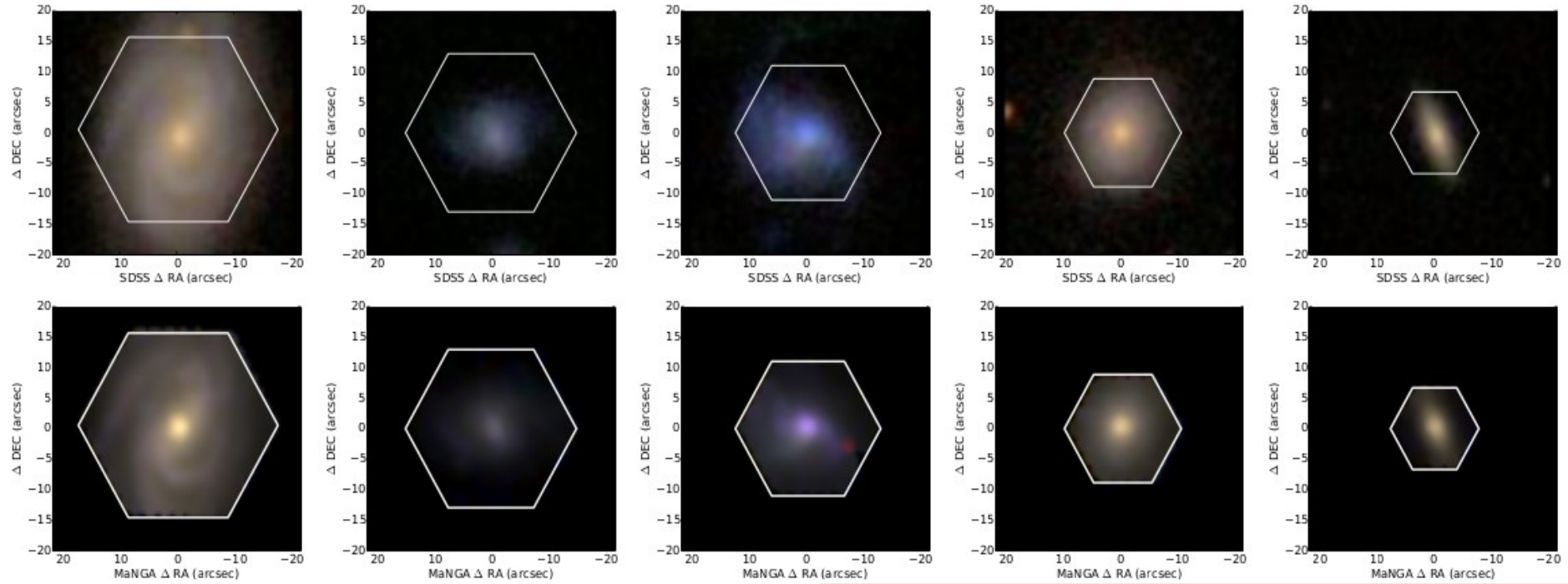




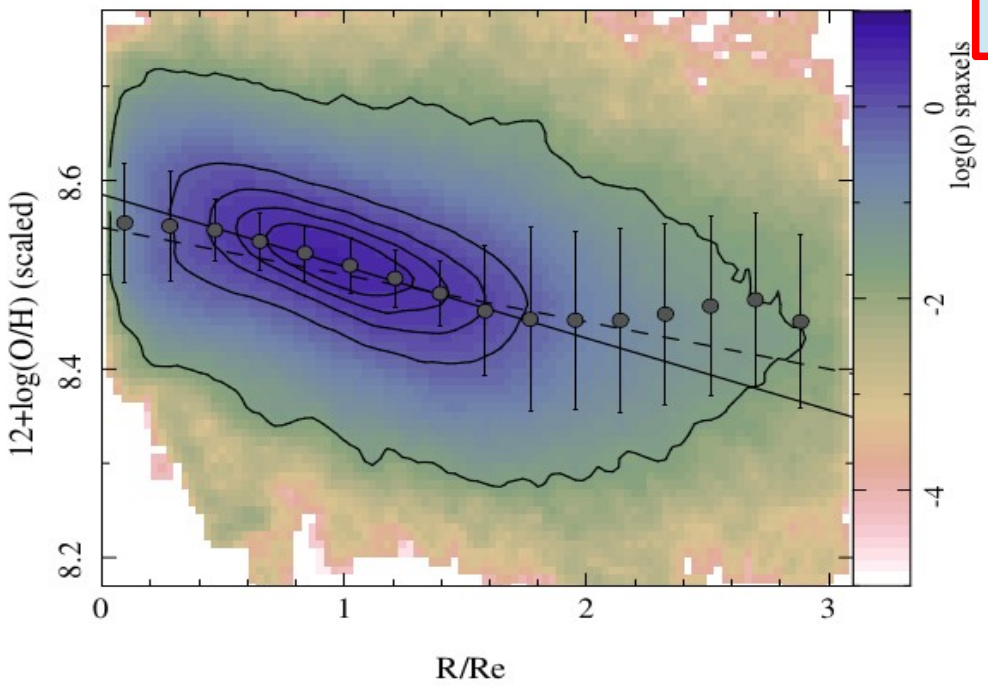
MaNGA... the power of number statistics

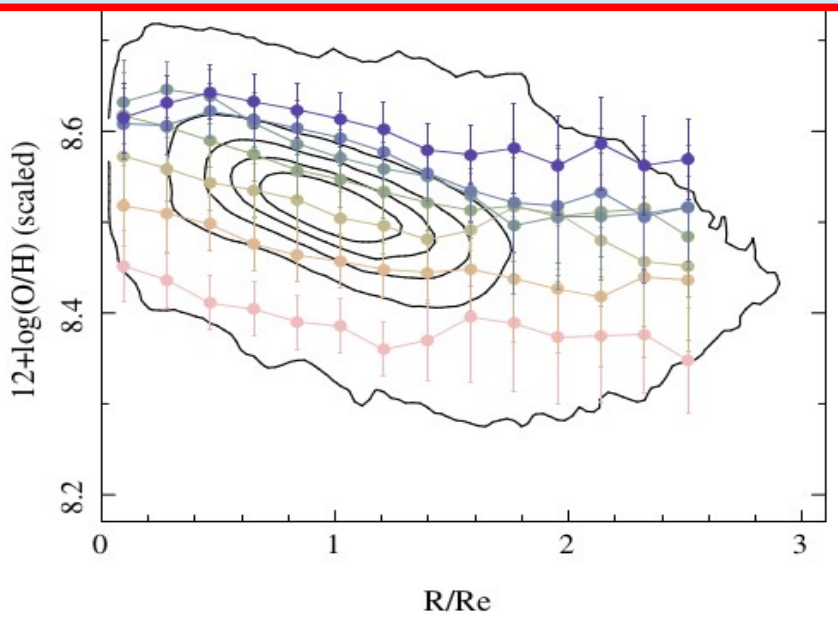


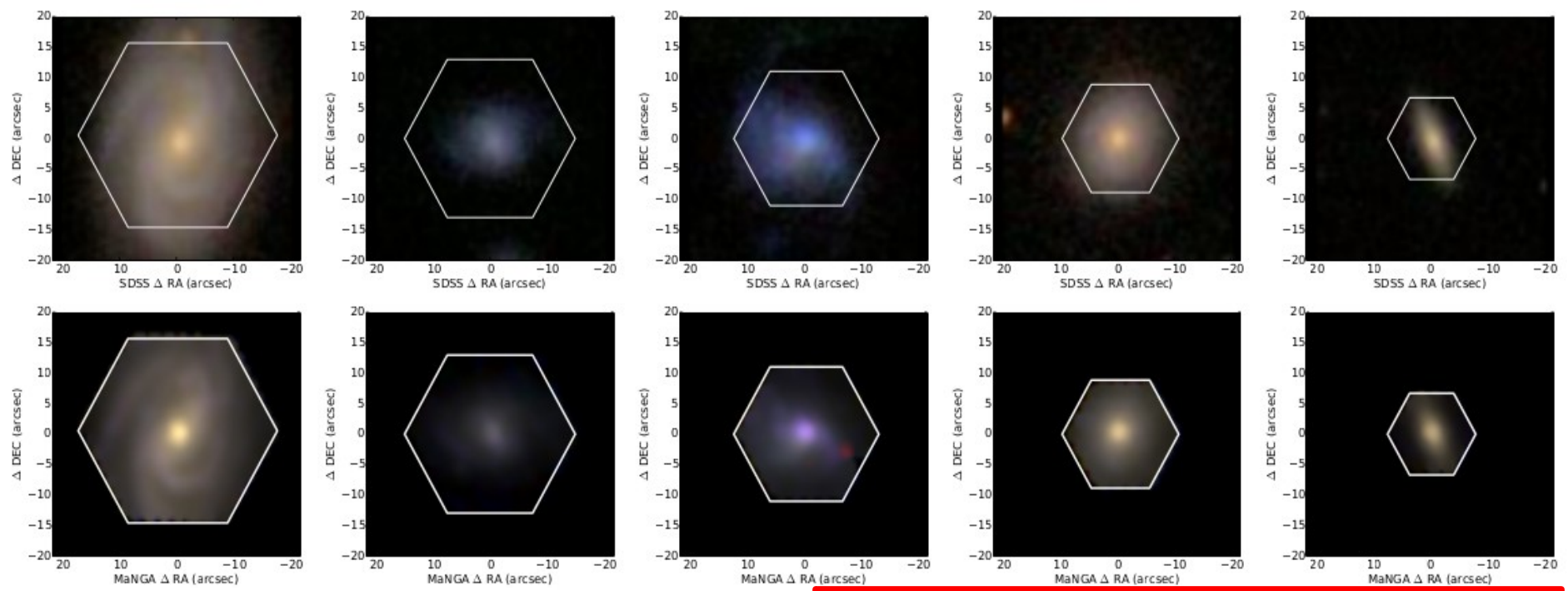




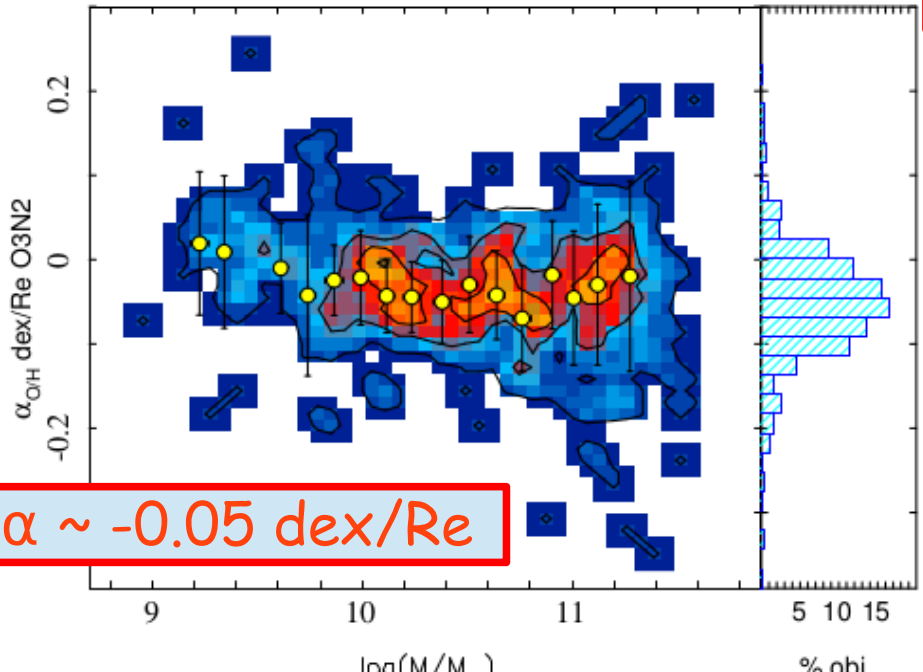
MaNGA...Similar results



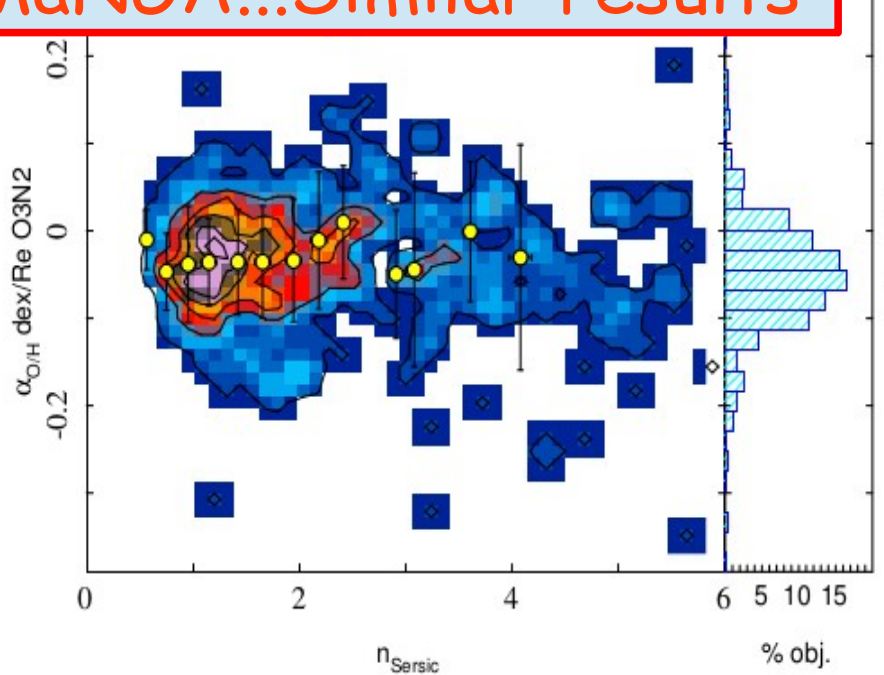


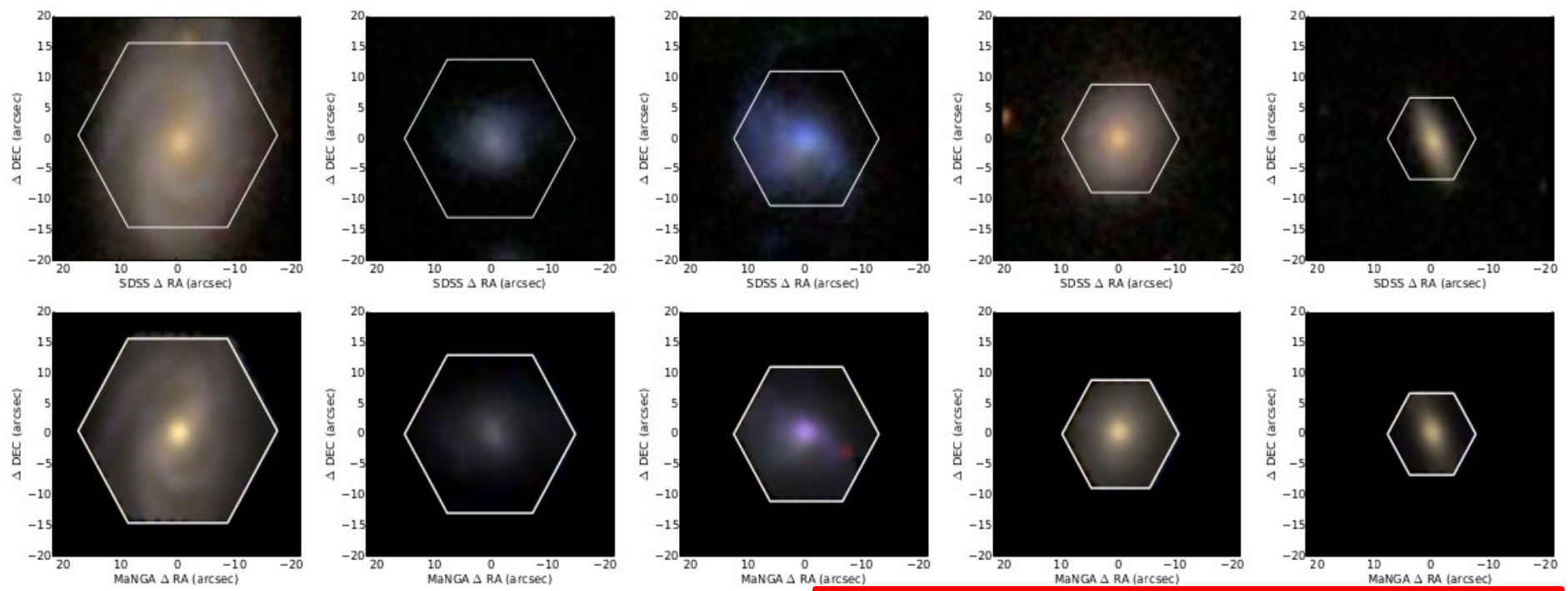


MaNGA...Similar results

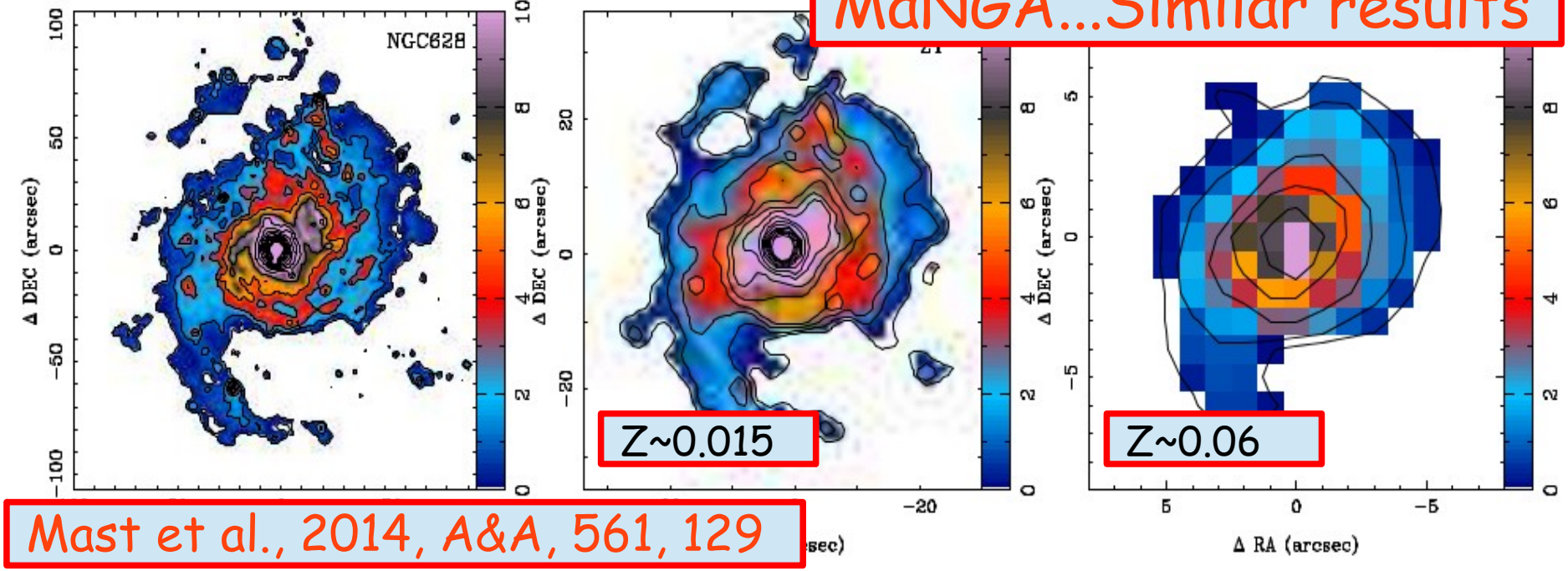


α ~ -0.05 dex/Re

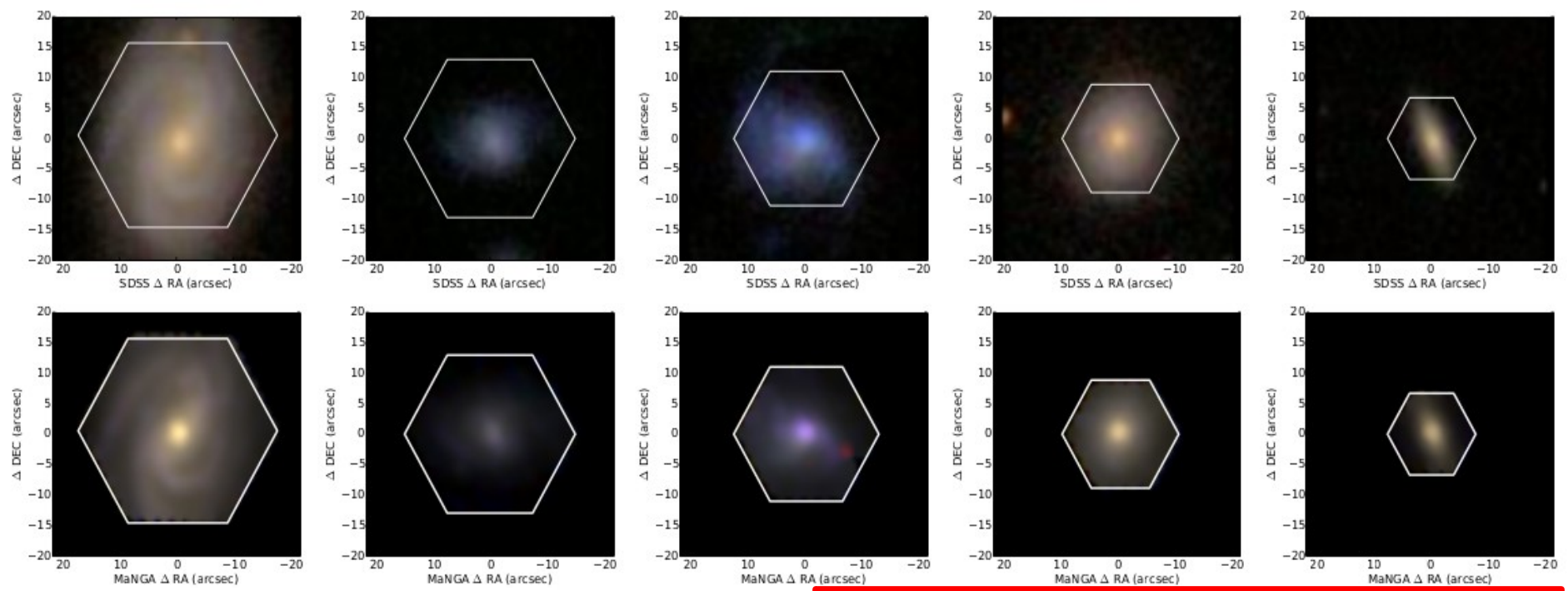




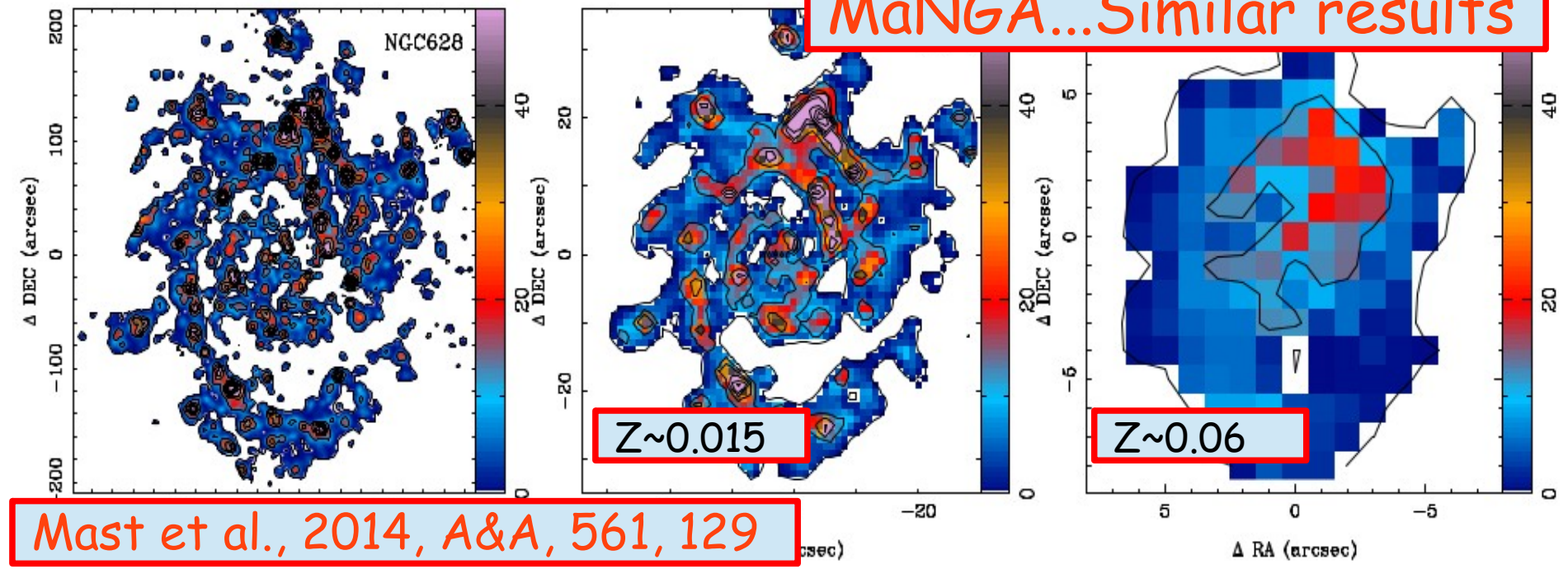
MaNGA...Similar results



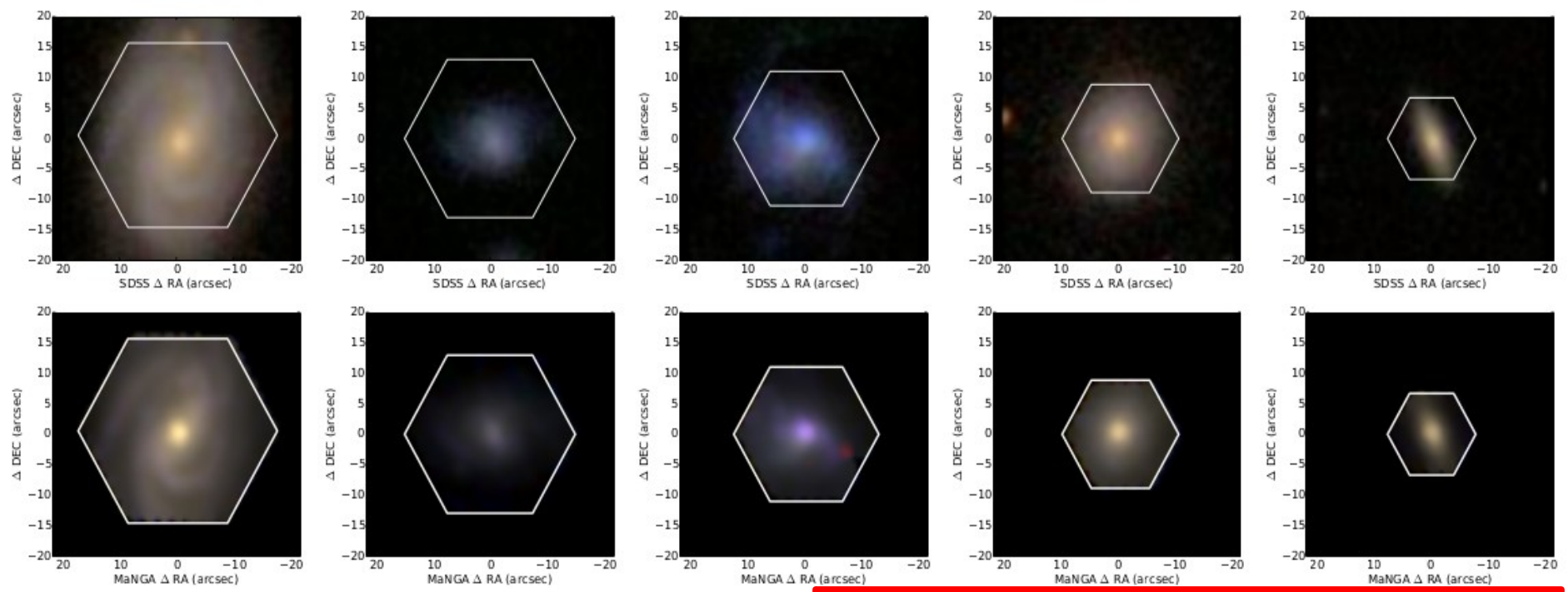
Mast et al., 2014, A&A, 561, 129



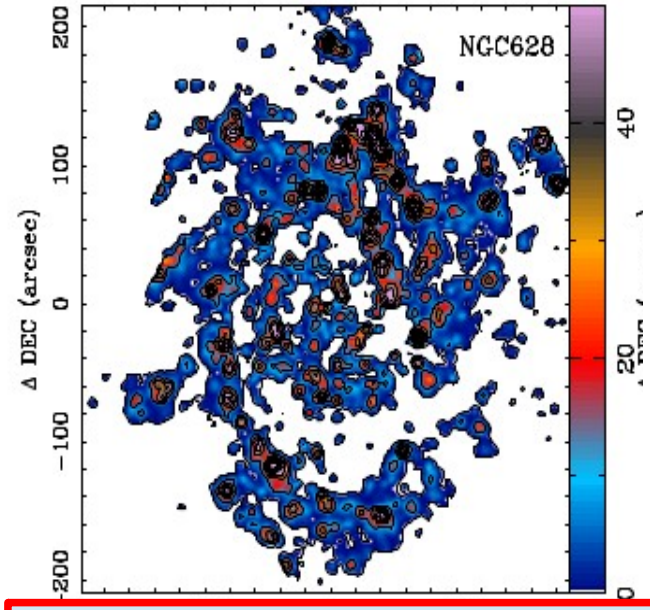
MaNGA...Similar results

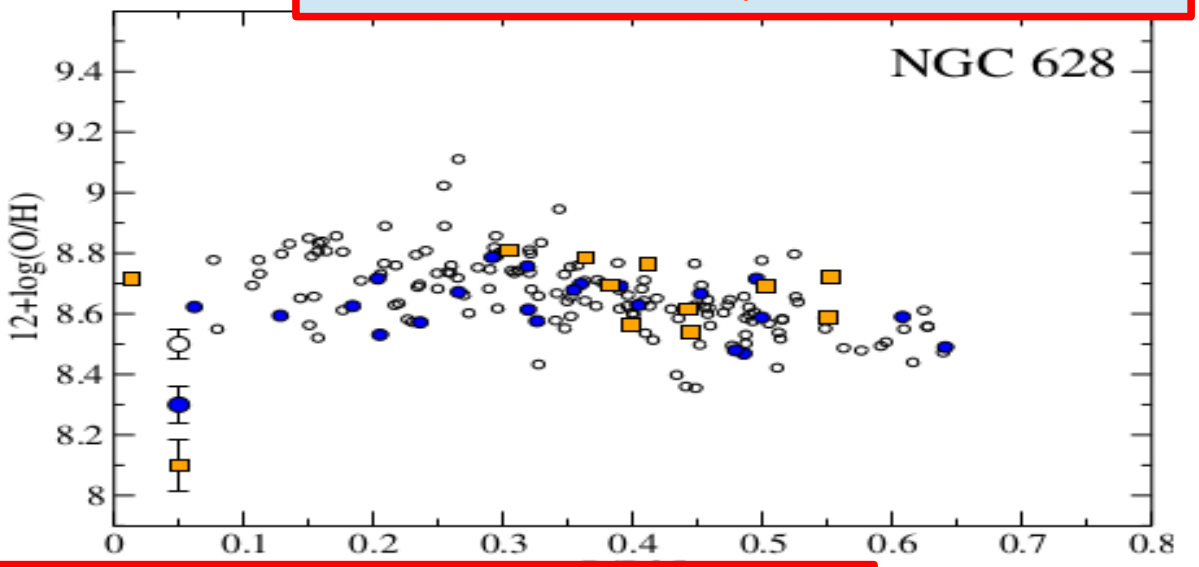


Mast et al., 2014, A&A, 561, 129



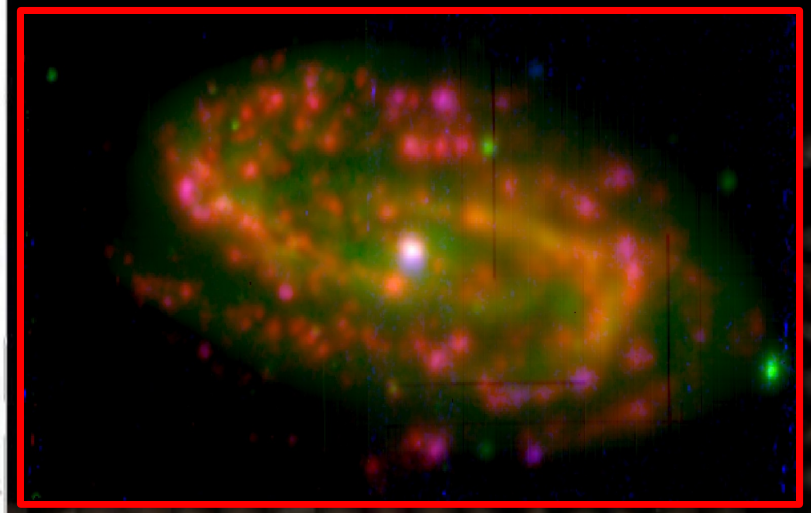
MaNGA...Similar results



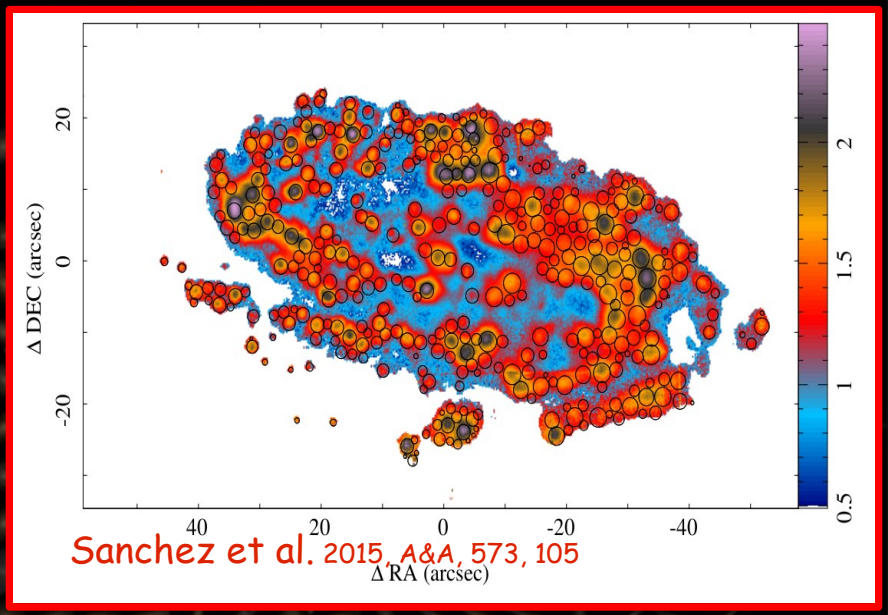


Mast et al., 2014→ gradients flatter due to resolution

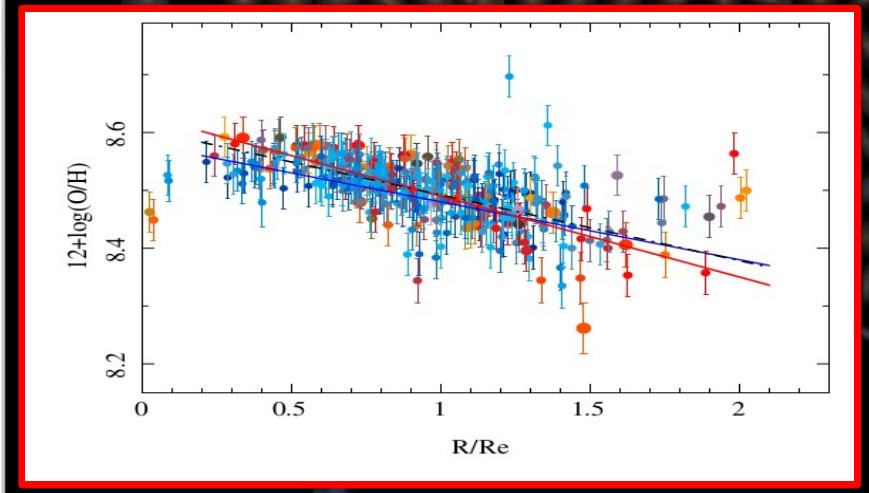
MUSE Science Verification: NGC 6754

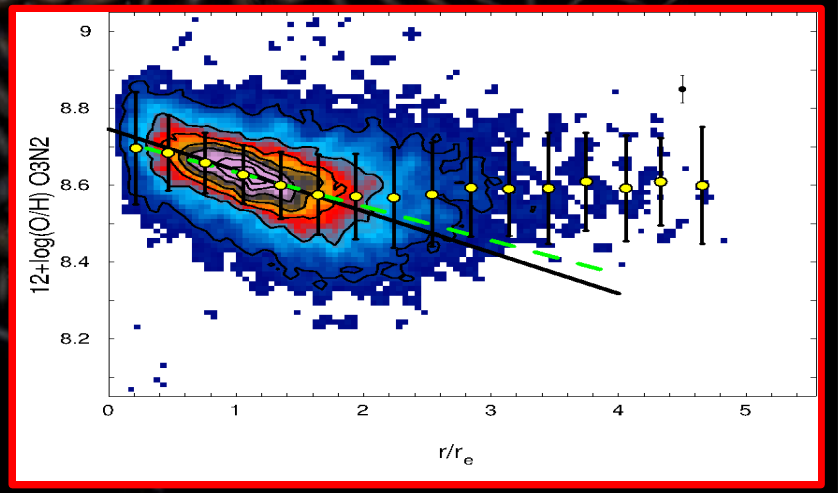


NGC 6754, SBb spiral galaxy, i~60°
Z=0.0108, B~13 mag, r_{25}~1 arcmin

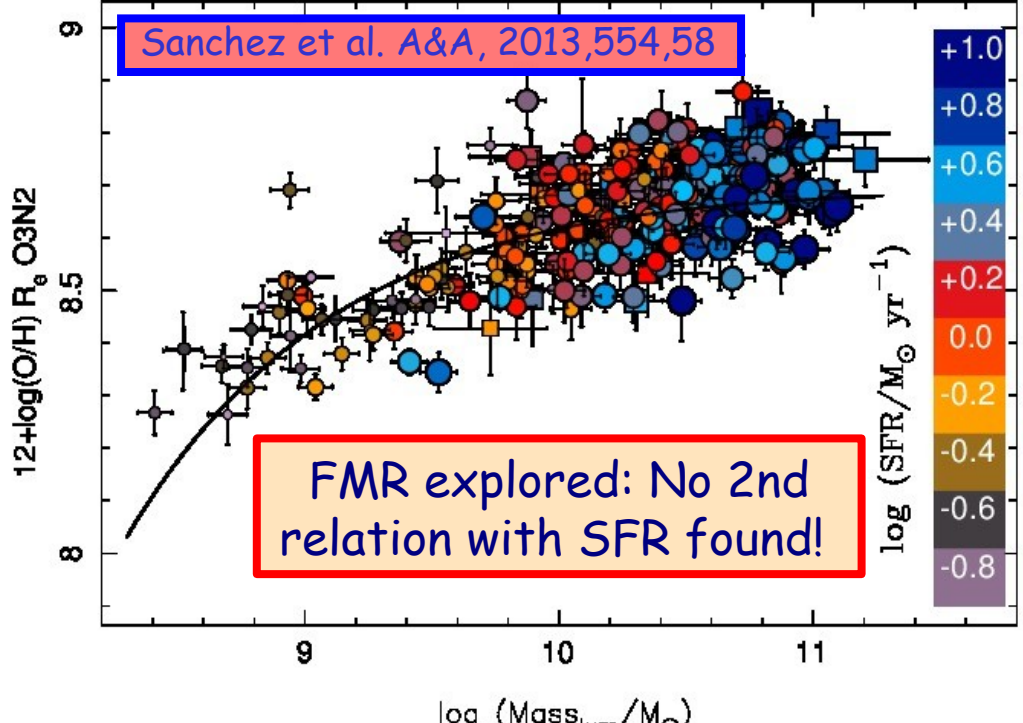


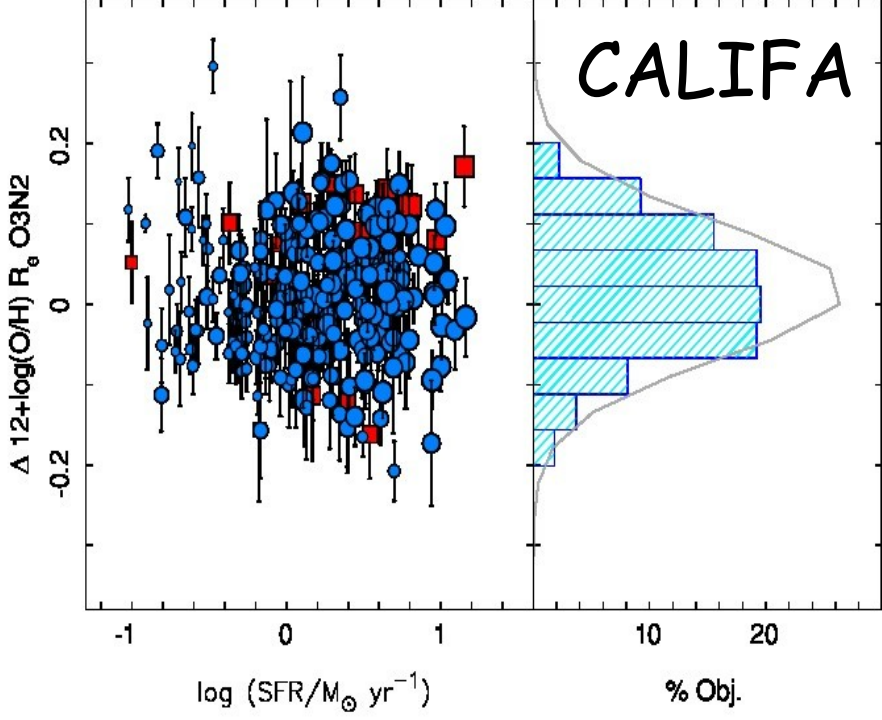
Sanchez et al. 2015, A&A, 573, 105

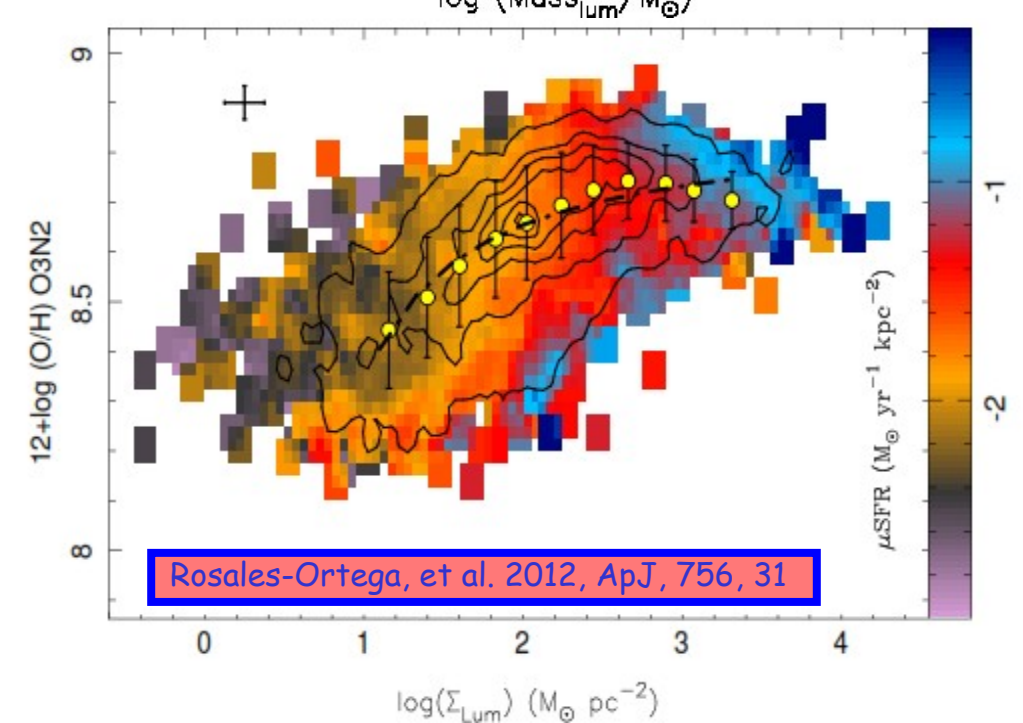


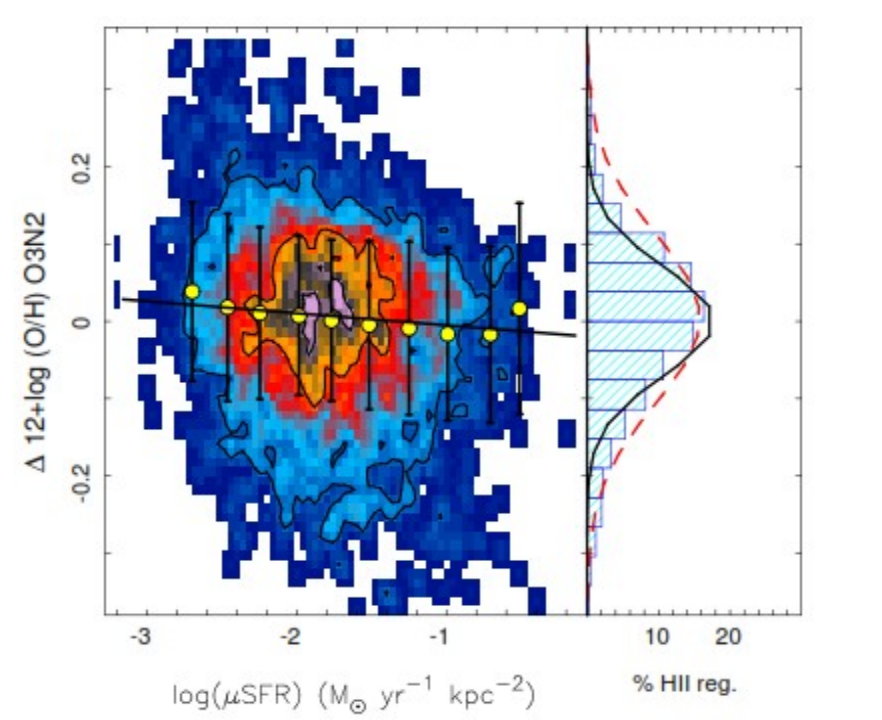


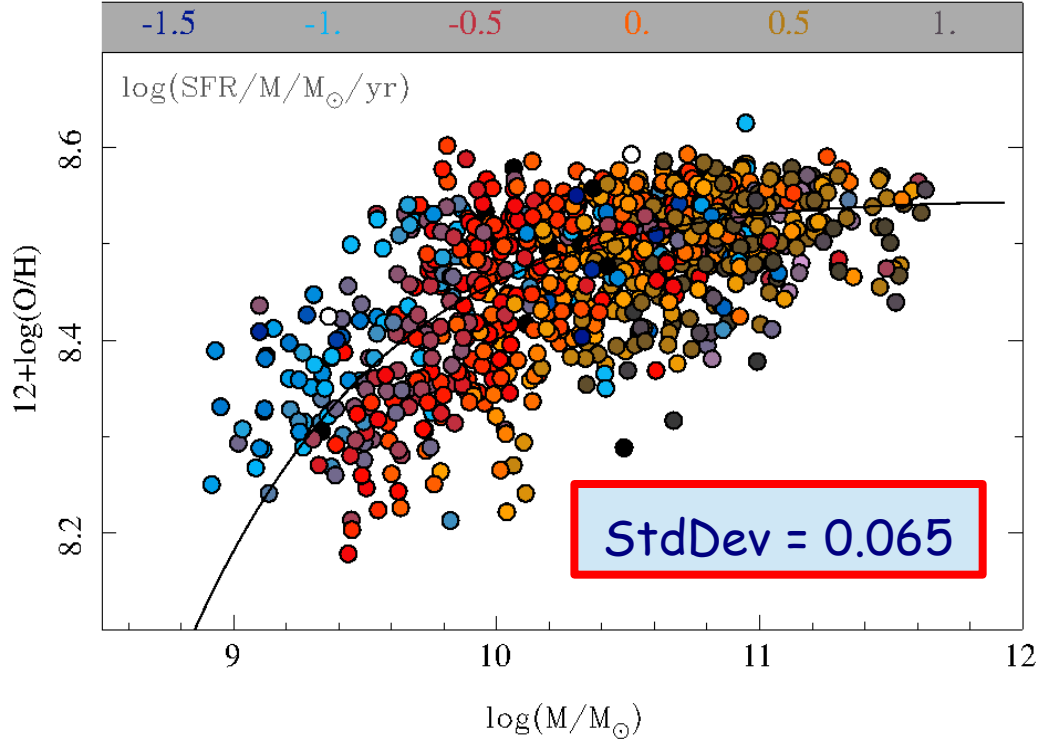
O/H based on O3N2, N2, S3O3, S23, Ar3O3 (Similar within ~0.07 dex)
Gradient slope a=-0.10+-0.02 dex/Re (~ common gradient)


Sanchez et al. A&A, 2013,554,58
FMR explored: No 2nd relation with SFR found!
12+log(O/H) R_e O3N2
log (Mass_lum/M_⊙)
log (SFR/M_⊙ yr^-1)
+1.0
+0.8
+0.6
+0.4
+0.2
0.0
-0.2
-0.4
-0.6
-0.8


CALIFA
Δ 12+log(O/H) R_e O3N2
log (SFR/M_⊙ yr^-1)
% Obj.


Rosales-Ortega, et al. 2012, ApJ, 756, 31
12+log (O/H) O3N2
log(Σ_Lum) (M_⊙ pc^-2)
μSFR (M_⊙ yr^-1 kpc^-2)

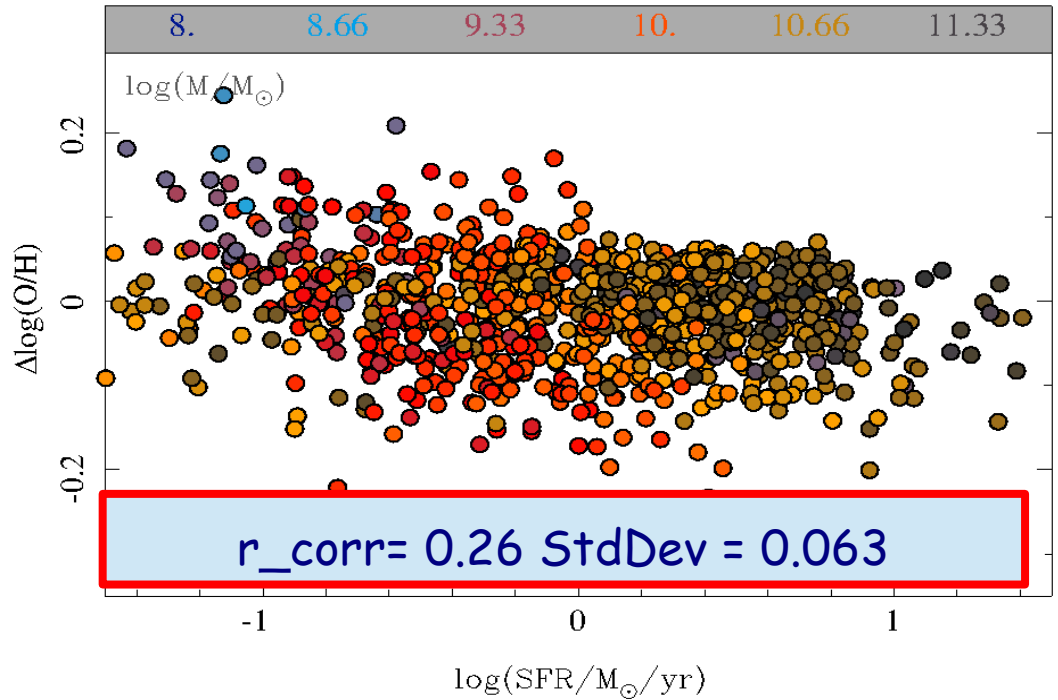

Δ 12+log (O/H) O3N2
log(μSFR) (M_⊙ yr^-1 kpc^-2)
% HII reg.

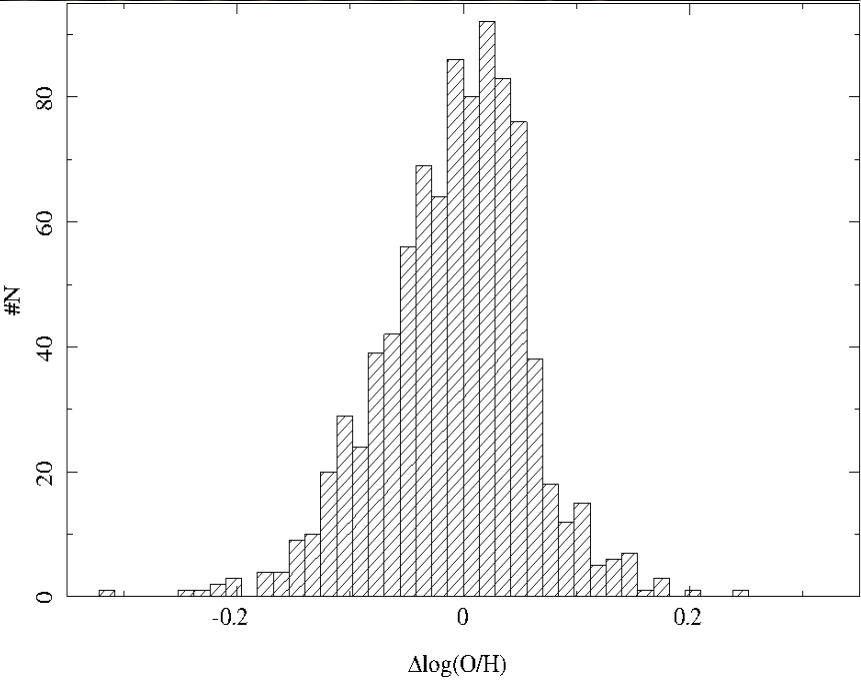


MaNGA

883 galaxies with O/H measured @Re

FMR explored (again!): No 2nd relation with SFR found!





Summary

- IFU surveys provide with unique datasets to understand the properties the Ionized Gas in galaxies.
- The Oxygen abundance present a common gradient in all galaxies, with a shape that changes with stellar mass.
- We reproduce the M-z relation, with a local relation (Σ-z) that seems to be more fundamental.
- We cannot reproduce the secondary relation with the SFR, neither with CALIFA nor with MaNGA.
- Results depends quantitatively on the calibrator, but not qualitatively.