Understanding the chemical evolution of C, O, N, Ne, S, Cl and Ar in the Milky Way using H II regions

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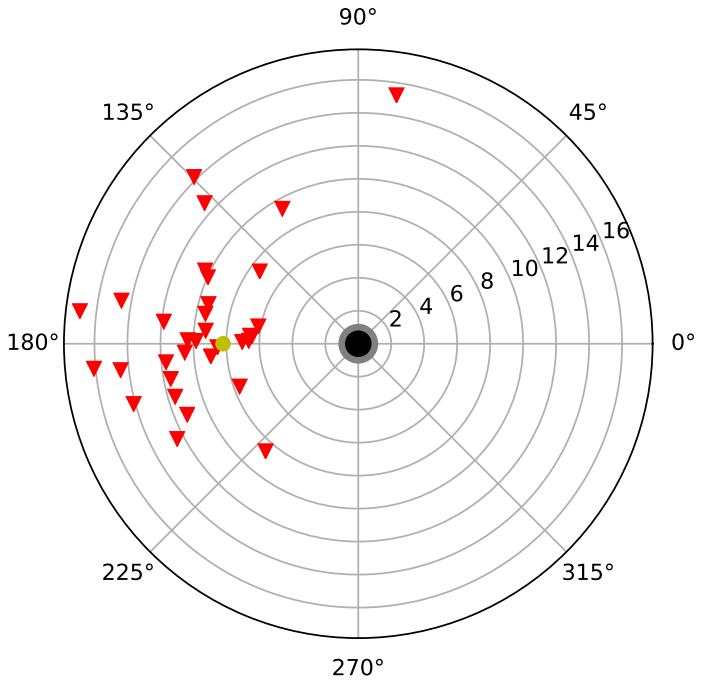
Arellano-Córdova et al. (2020, MNRAS, 496, 1051)

We use a sample of 33 H II regions with high and intermediate resolution spectroscopy to analyze the radial distribution of different elements in the Milky Way. This sample covers Galactocentric distances from 6 to 17 kpc, which have been revised using *Gaia* DR2 parallaxes. We calculate physical conditions and chemical abundances using updated atomic data. We compare and discuss different ionization correction factors and considerations about the temperature structure of the nebula to improve chemical abundance determinations. We determine the radial abundance gradients with an unprecedented precision. The re-evaluation of the distances using *Gaia* DR2 parallaxes produces an O gradient that disproves previous claim of a possible flattening of the gradient in the inner zones of the Galaxy. The radial distribution of Ne/O, S/O , Cl/O and Ar/O are almost flat confirming a lockstep evolution of those elements respect to O. Our Galaxy also shows an almost flat N/O gradient, in contrast with the common behavior in other spiral galaxies. However, C and C/O show stepper gradients than the other elements in agreement with the results of other spiral galaxies.

Reassessment of the chemical abundance gradients of C, O, N, Ne, S, Cl and Ar



New Galactocentric distance determinations using *Gaia* DR2 data (Méndez-Delgado et al. 2020, in press)
6 -17 kpc

Sample

GTC and **VLT** spectra compiled from the literature

(García-Rojas et al. (2004, 2006, 2007), Esteban et al. (2004, 2005, 2017), Esteban & García-Rojas (2018), Fernandez-Martín et al. (2017).

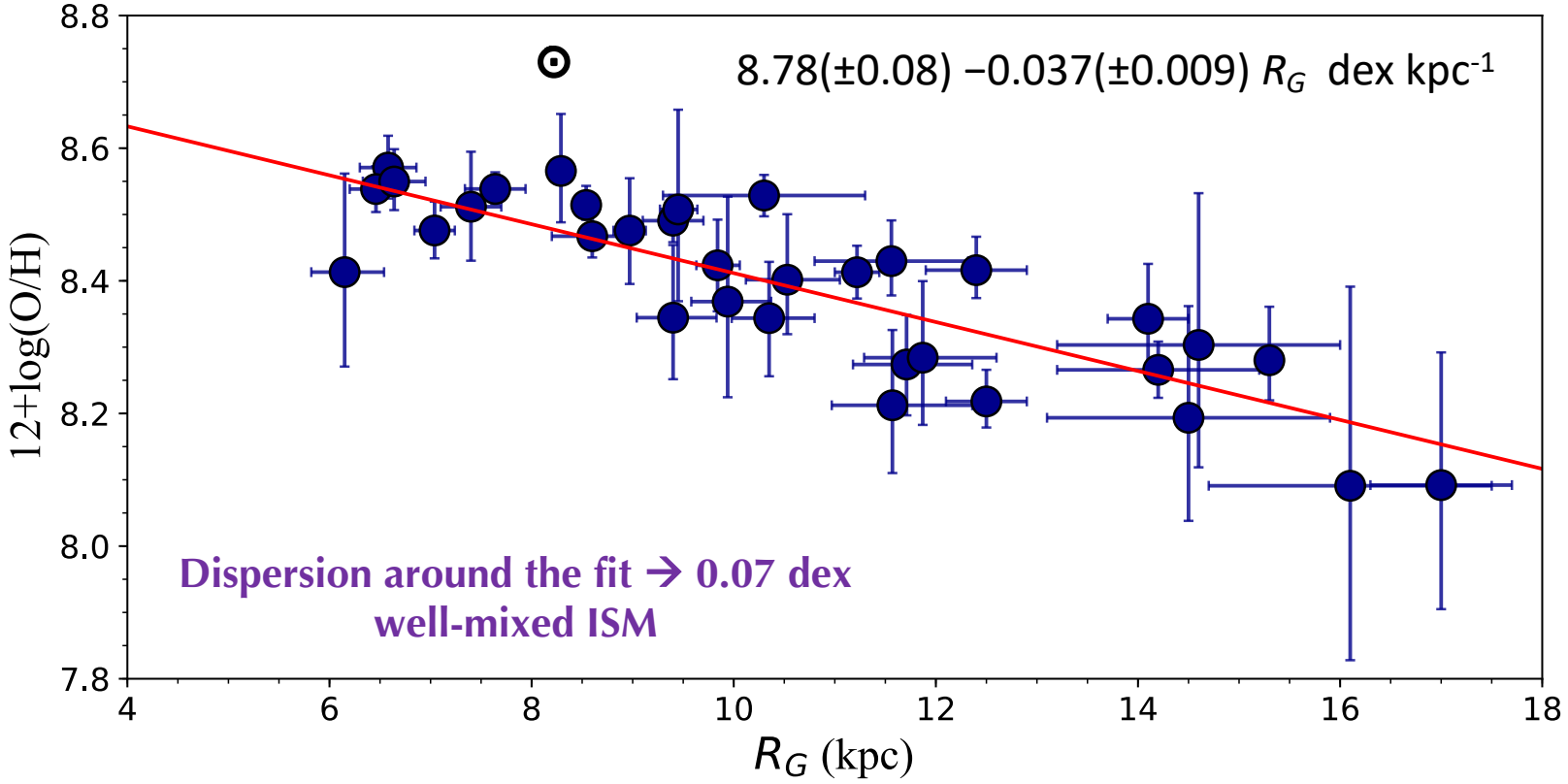
Determinations of physical conditions and chemical abundances

- ❖ Atomic data
- ❖ Temperature structure
- ❖ Ionization correction factors (ICFs)

Credits: M8 – ESO/VPHAS+team, M16 – ESO. M17 – ESO/INAF–VST/OmegaCAM.. Sh-2-298 *Robert Gendler* (http://www.robgendlerastropics.com).

Arellano-Córdova et al. (2020, MNRAS, 496, 1051)

Results: The radial oxygen abundance of our Galaxy



- ✓ Intermediate-high spectral resolution
- ✓ Updated atomic data
- ✓ **Measurements of electron temperature for all the objects!**

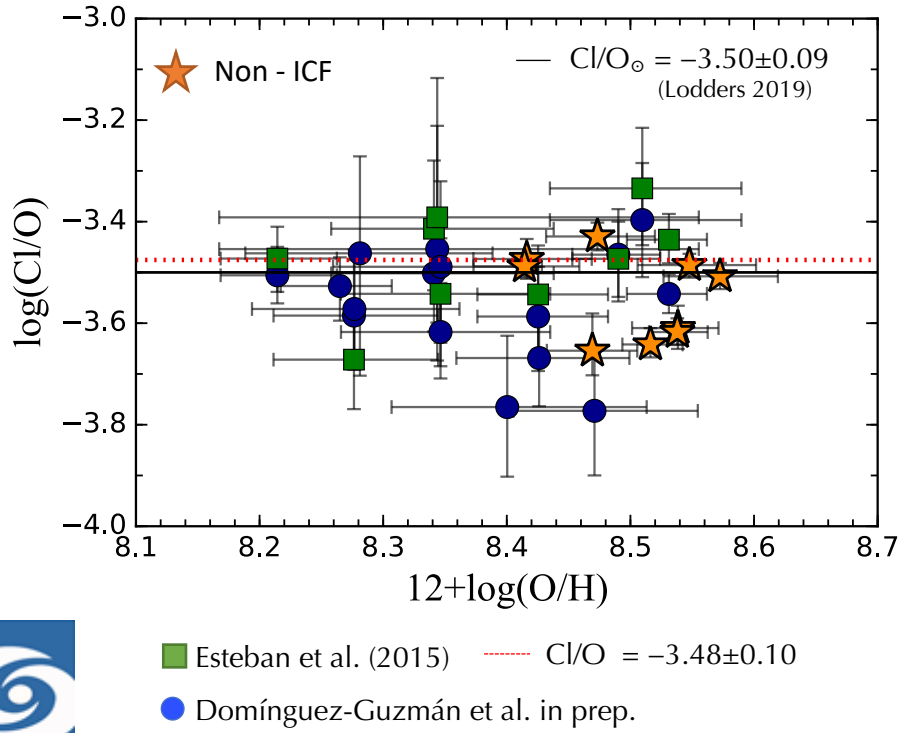
For the rest of the elements... for example.. chlorine....

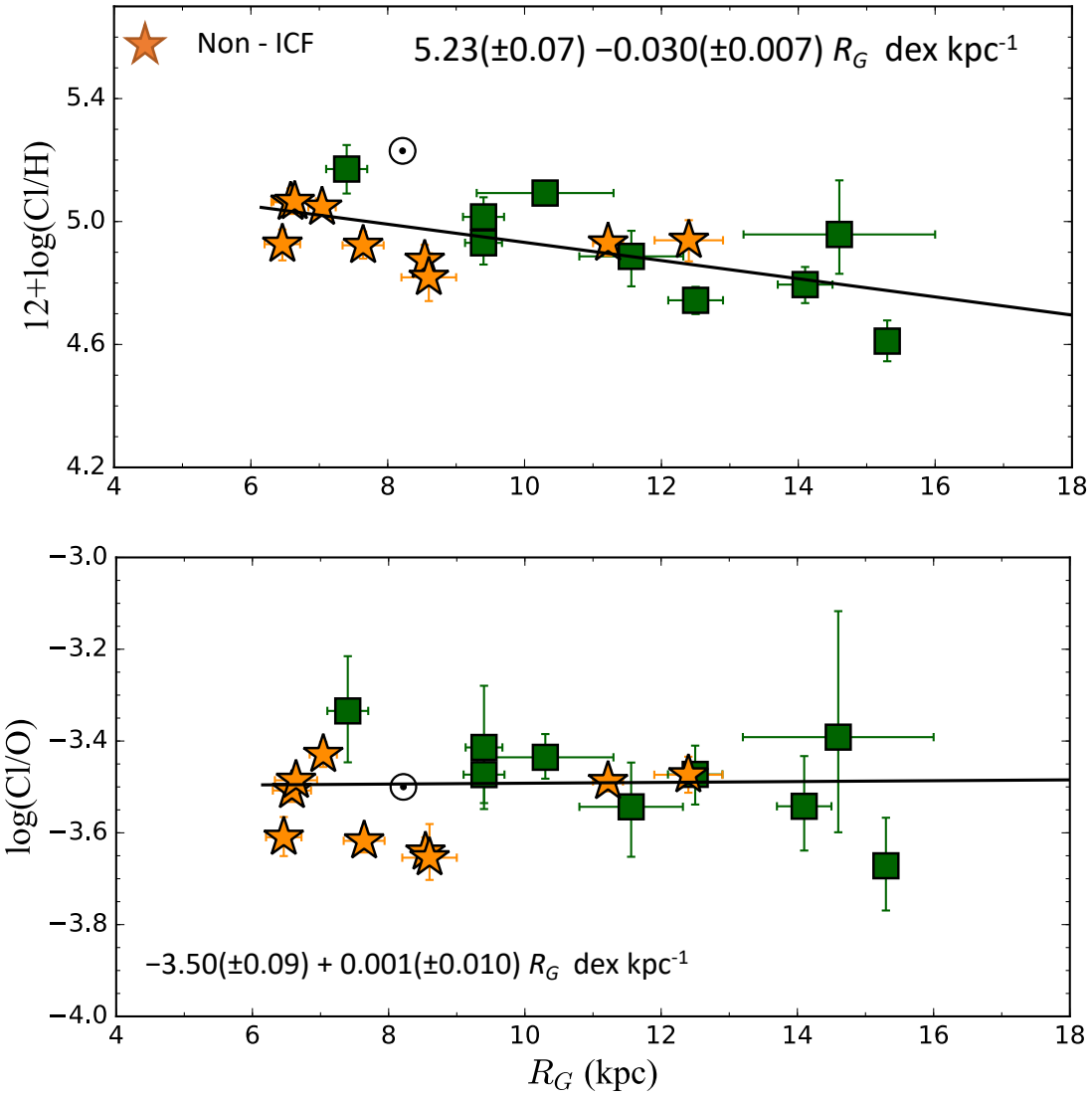
Results: ICFs analysis and abundance gradients

Arellano-Córdova et al. (2020, MNRAS, 496, 1051)

Detailed analysis of the ICFs for each element

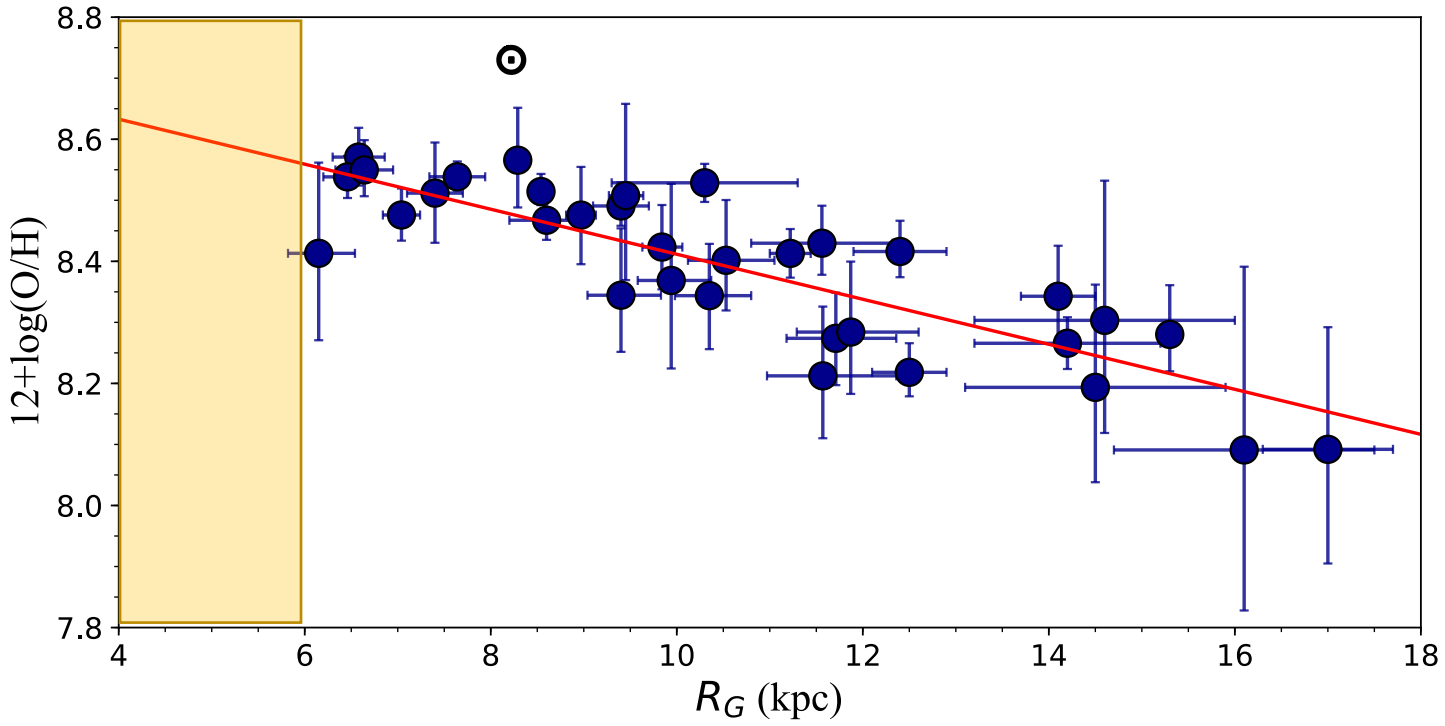
For chlorine:





Coming soon…

New sample of H II regions from GTC!



- ✓ Objects with very low degree of ionization
- ✓ **Measurements of electron temperature!**
- ✓ **Non-ICF for N**

To understand the chemical evolution of N and O in our Galaxy…