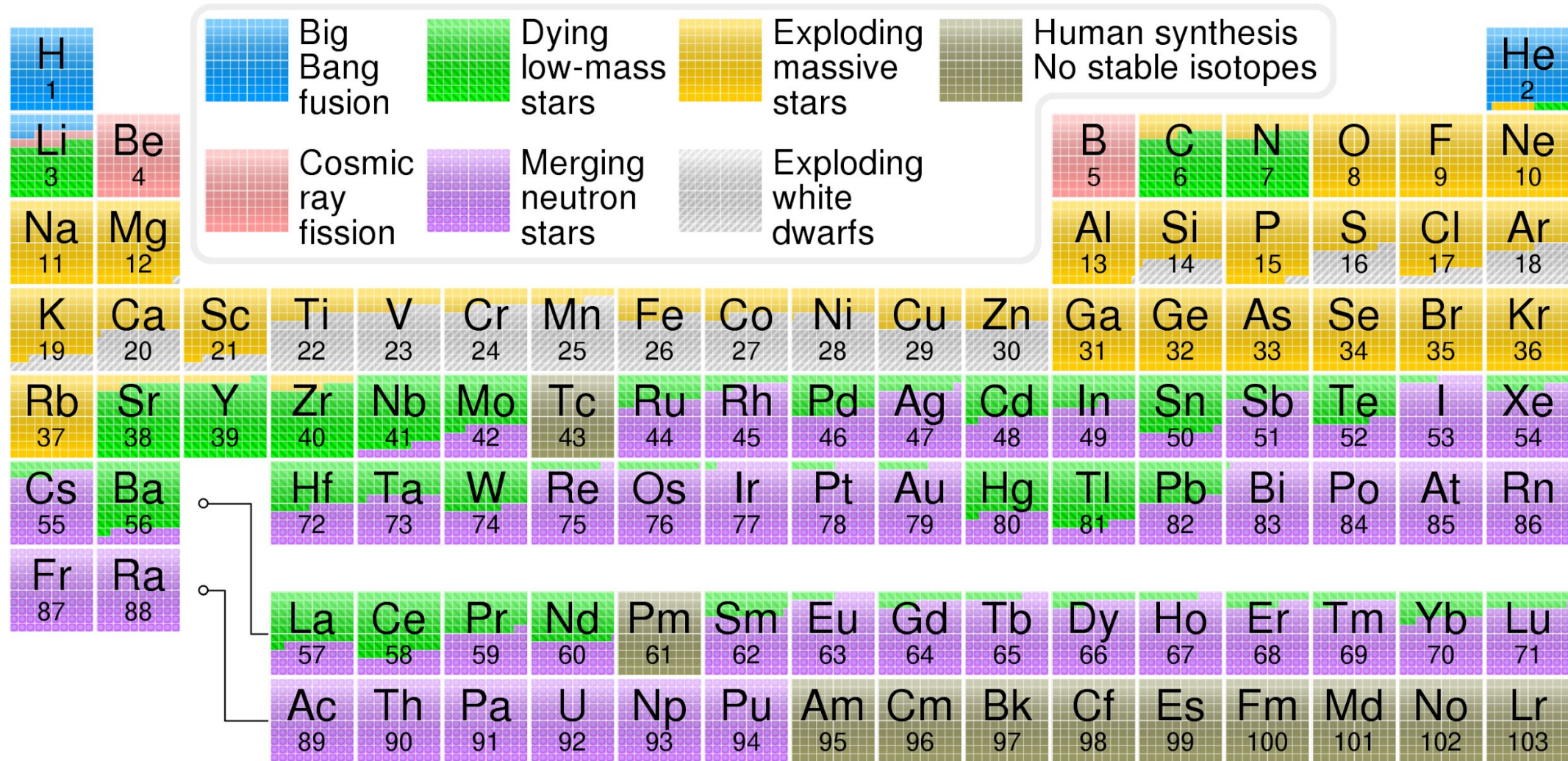
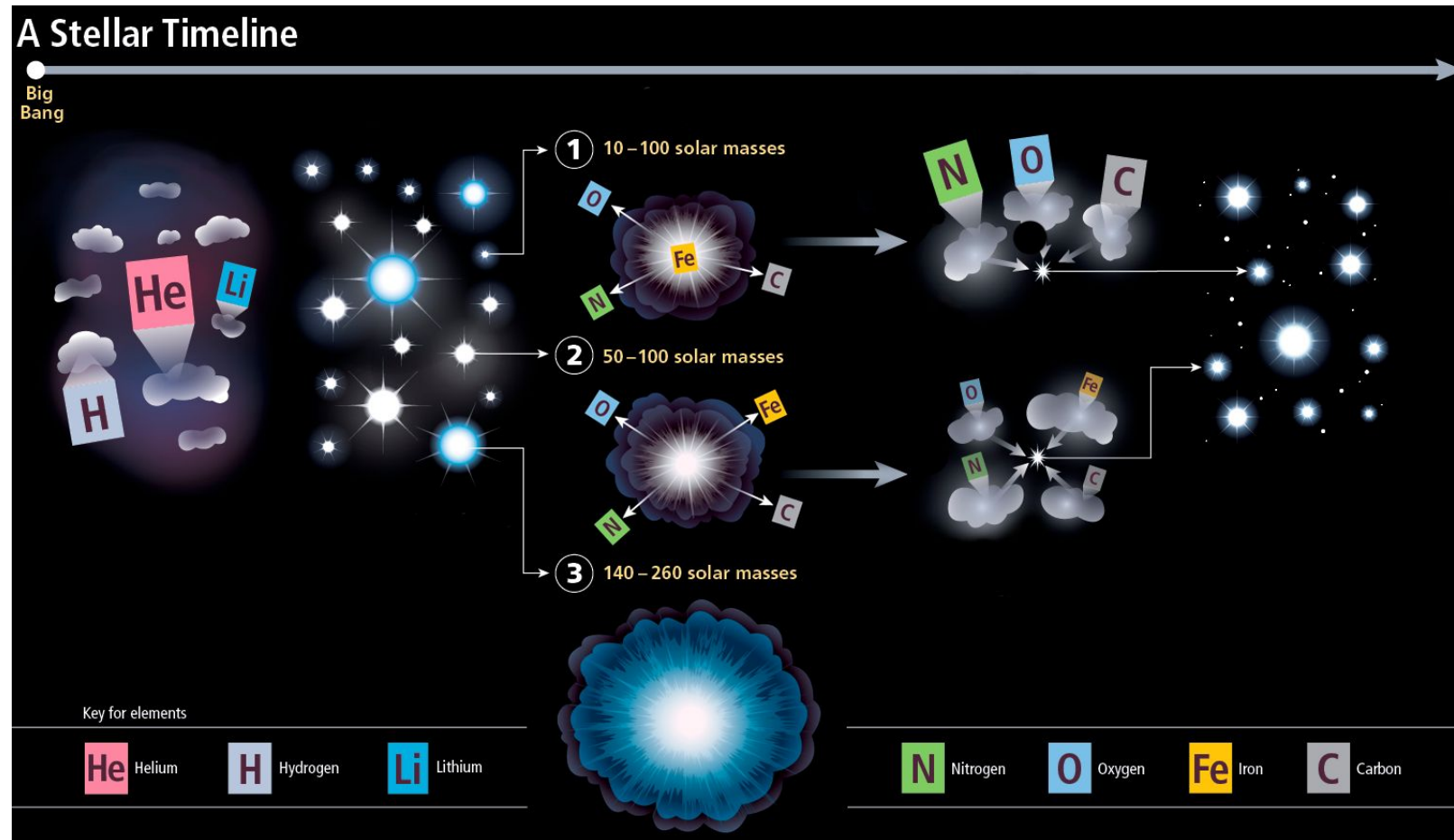


Making good use of bad weather: a chemically pristine star found through the clouds with Gemini

Vinicius Placco (NSF's NOIRLab)

GSM 2022

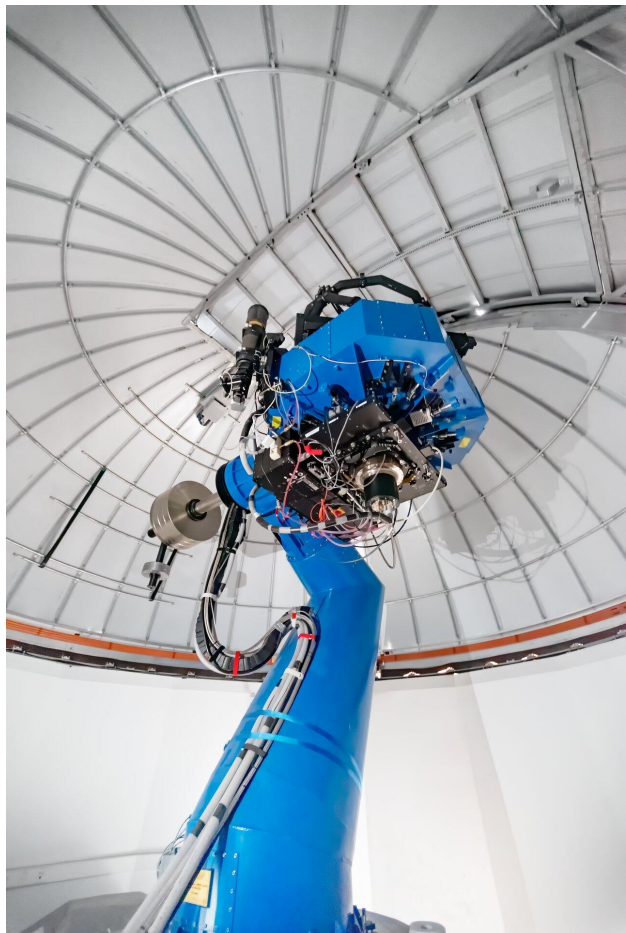




Solar type
[Fe/H] ~ 0

Ultra Metal-Poor
[Fe/H] < -4

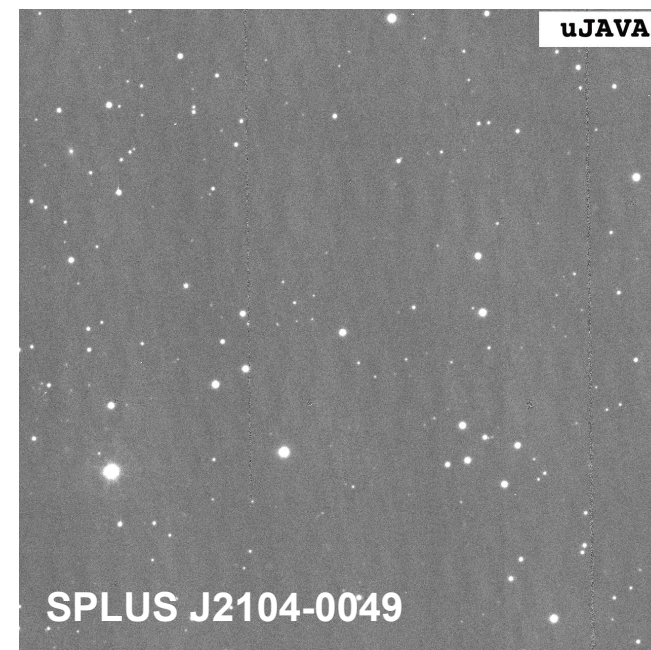
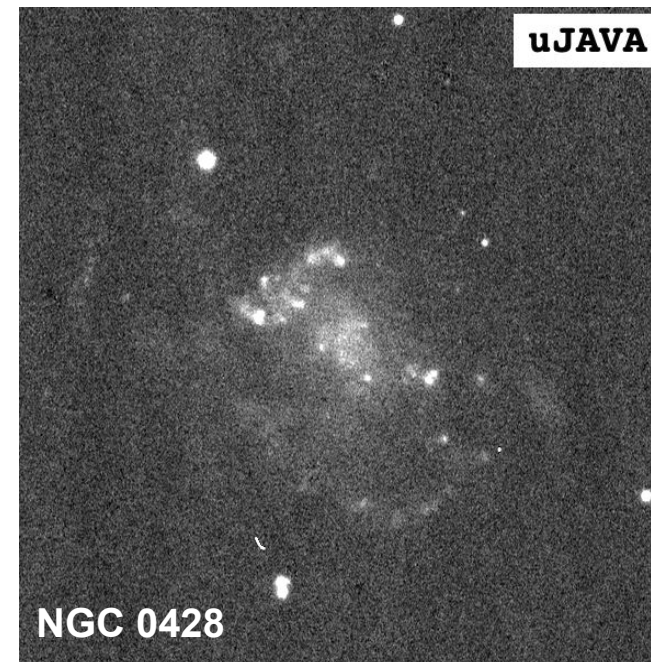
S-PLUS (Southern Photometric Local Universe Survey)



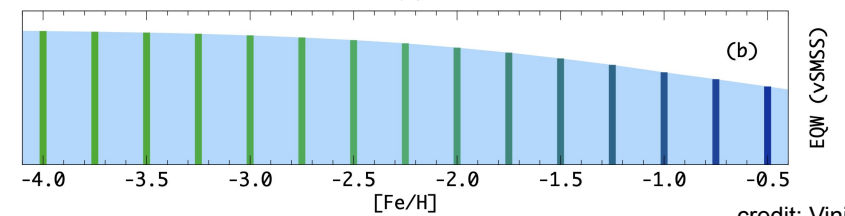
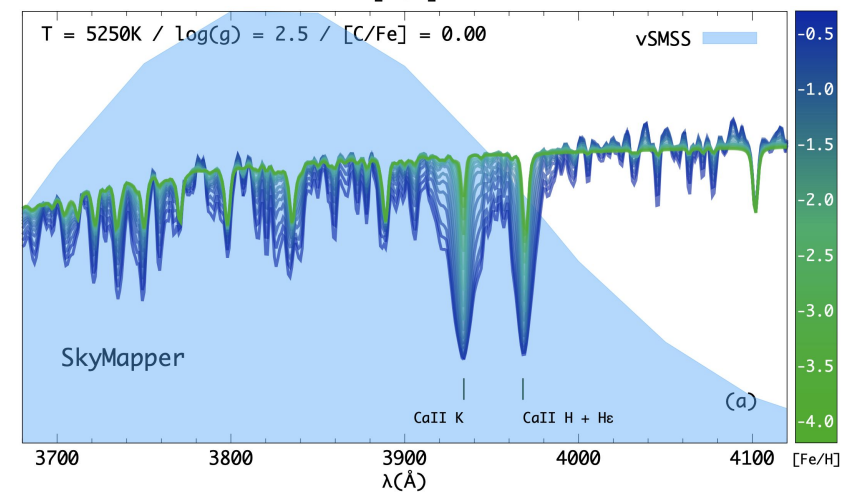
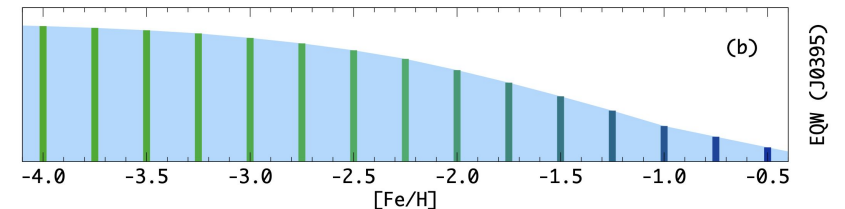
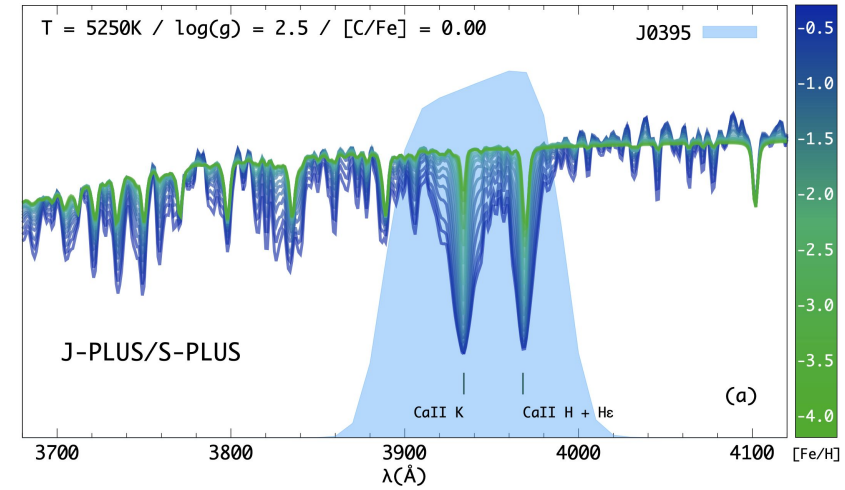
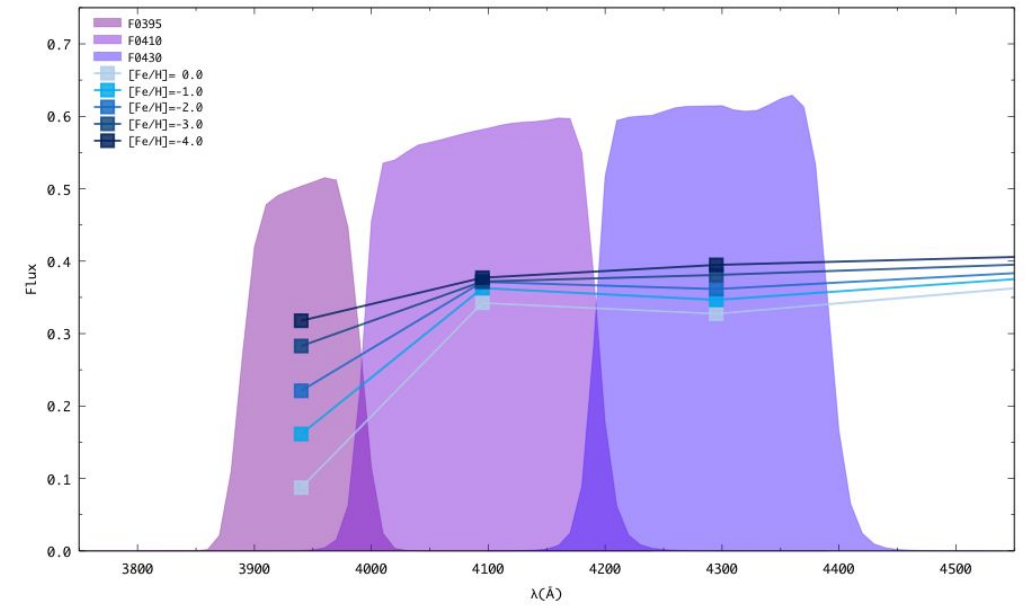
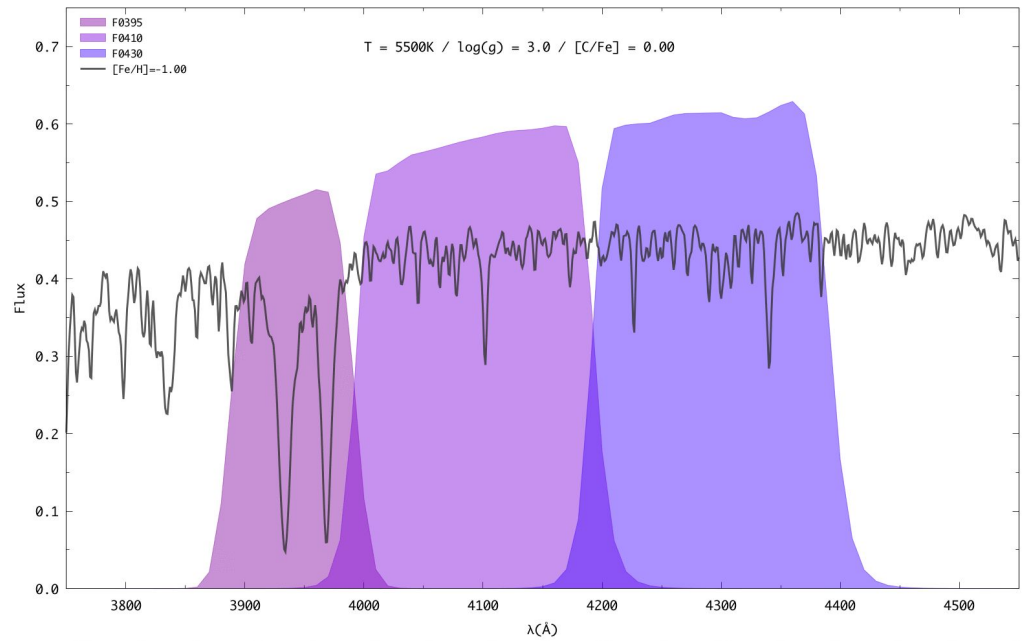
Credit: Felipe Almeida-Fernandes



T80 South: 80cm
FOV: 2 deg²
Footprint: 8,500 deg²



S-PLUS (metallicity indicator)



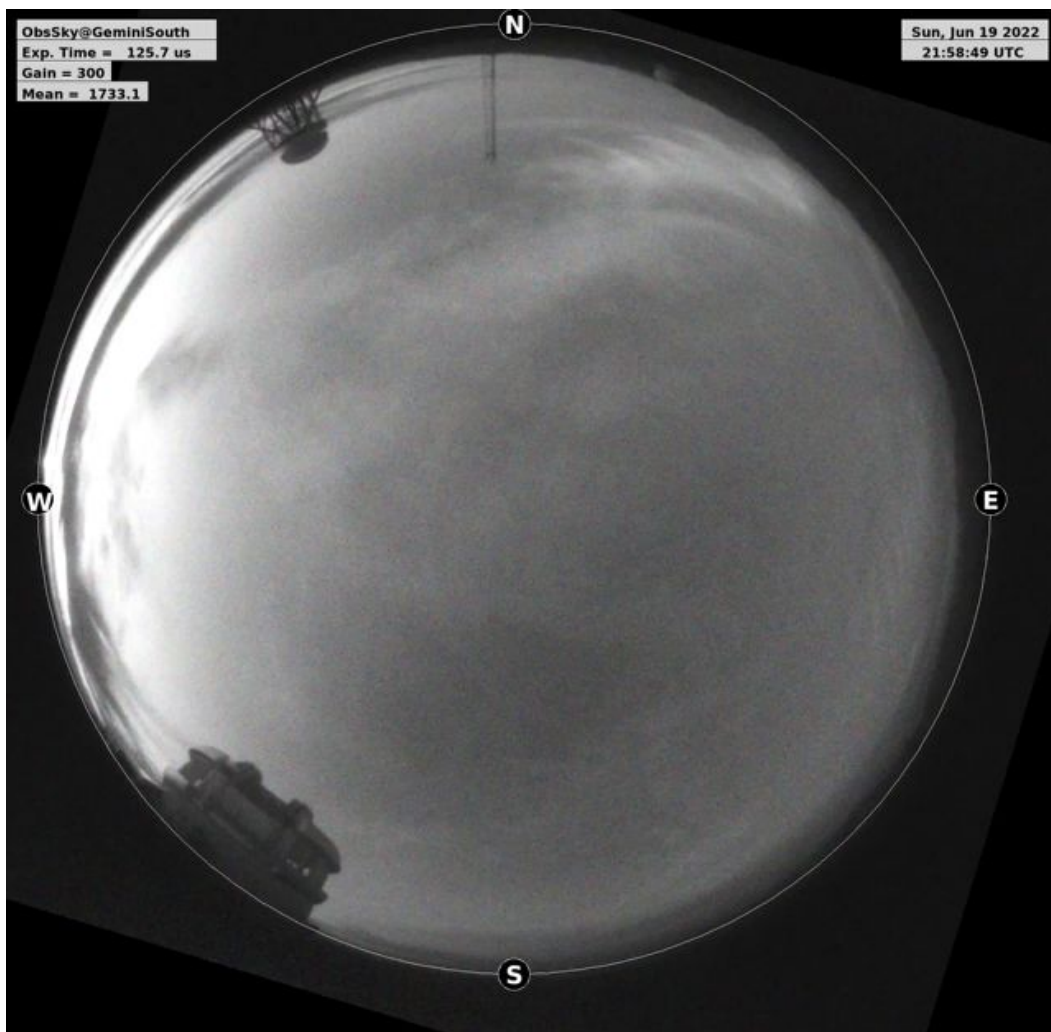


S-PLUS ([Fe/H]-sensitive colors)

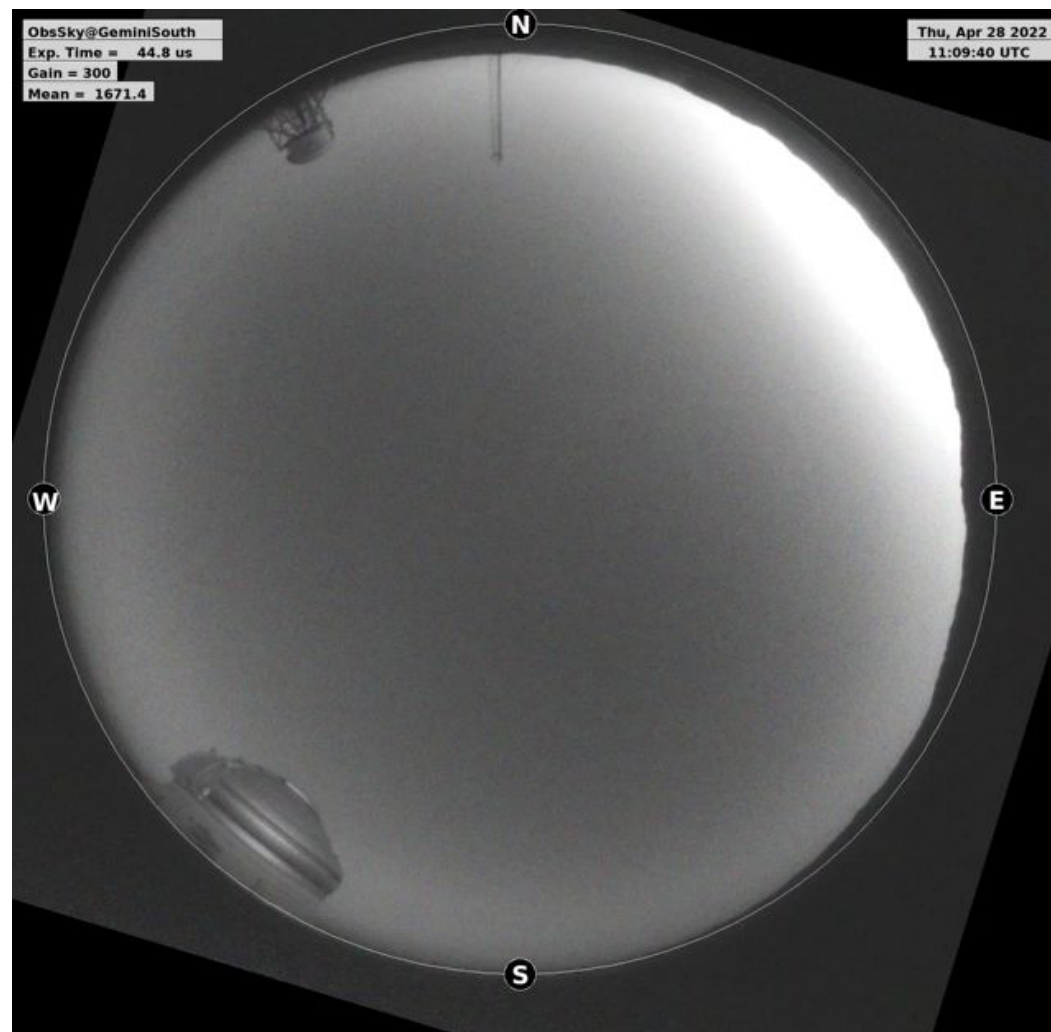




The good, the bad, and the poor (weather)



[link to video](#)

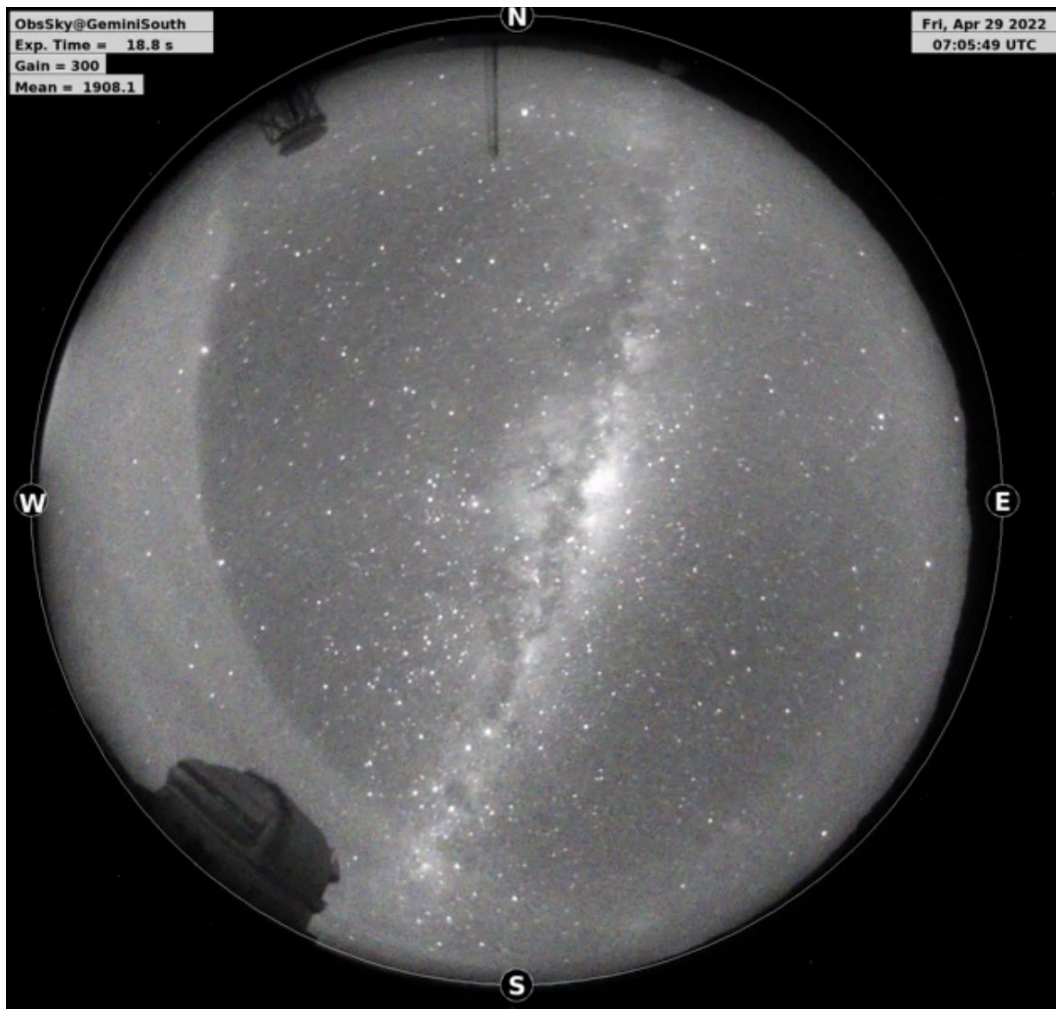
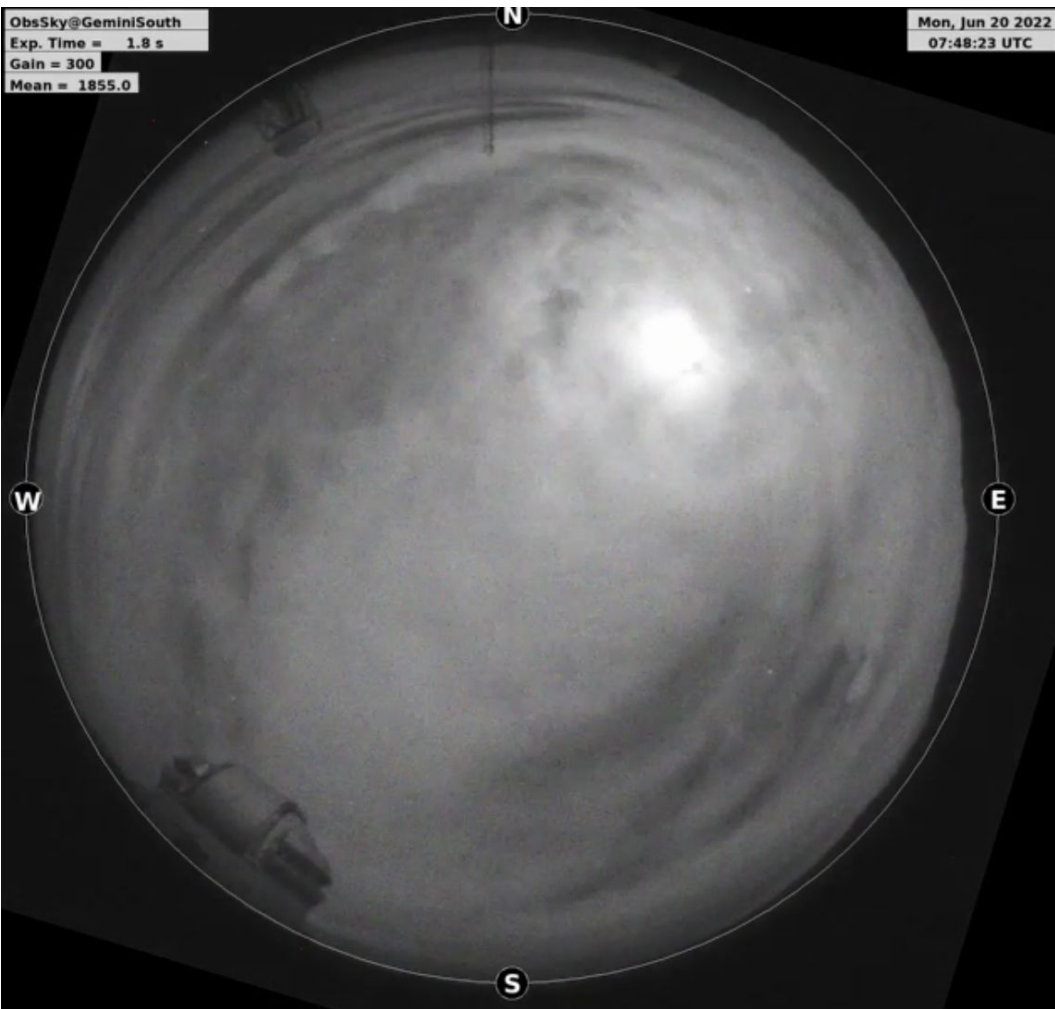
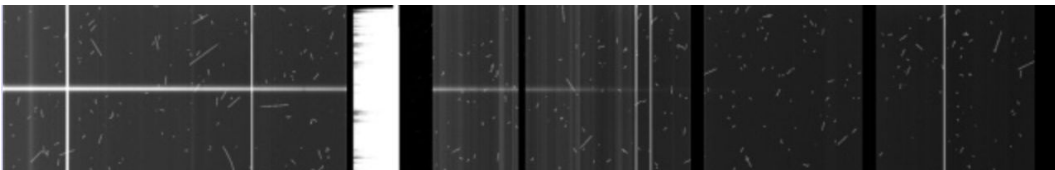


[link to video](#)





The good, the bad, and the poor (weather)





Observing constraints ☐ IQ/CC/WV/SB = ANY/ANY/ANY/ANY





Gemini/GMOS + Blanco/COSMOS

Placco+2022





Effectiveness in finding $[Fe/H] < -2$ stars





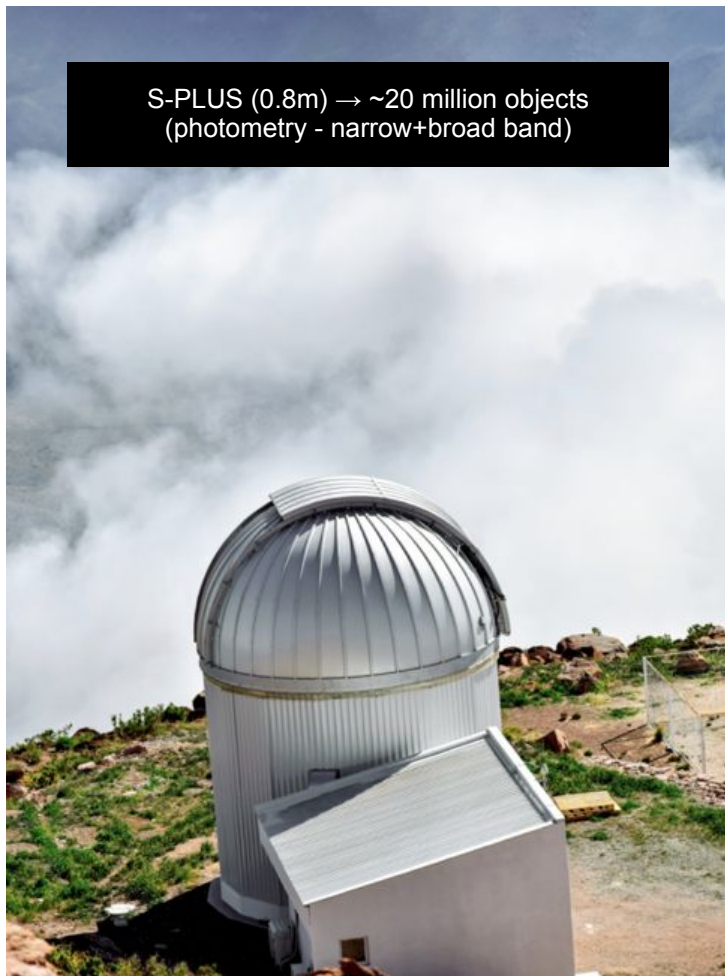
SPLUS J210428.01-004934.2





SPLUS J2104-0049 □ lowest carbon ever measured for a MW UMP





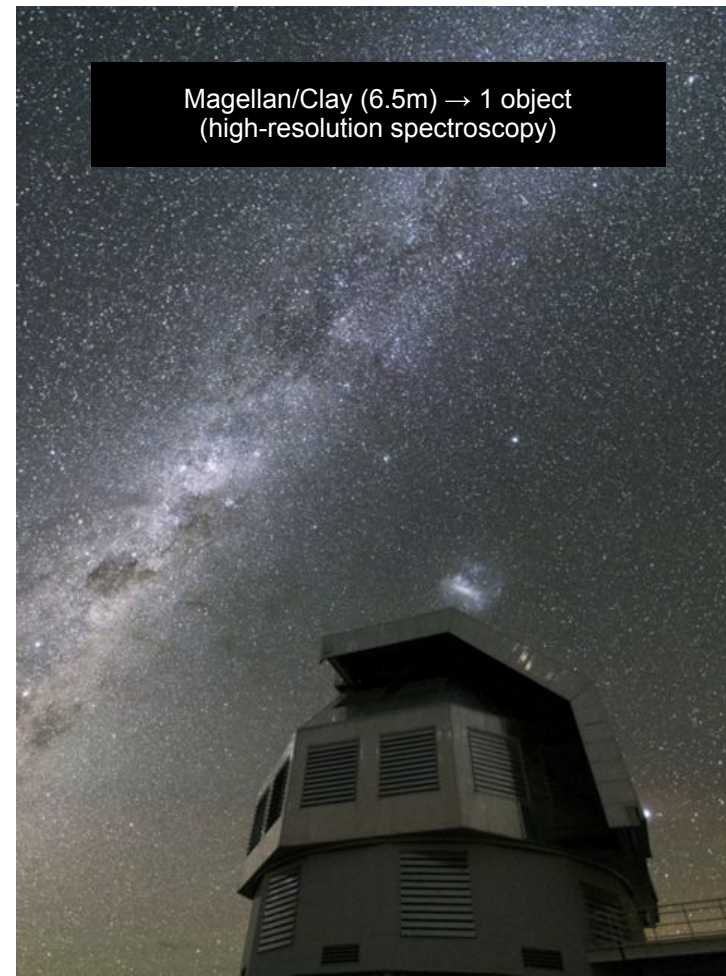
S-PLUS (0.8m) → ~20 million objects
(photometry - narrow+broad band)

Almeida-Fernandes+2022



Gemini South (8.0m) → 138 objects
(medium-resolution spectroscopy)
(GMOS - Poor weather program)

Placco+2022



Magellan/Clay (6.5m) → 1 object
(high-resolution spectroscopy)

Placco+2021



The path forward

Gemini band 4 programs:

- poor weather \neq weather loss
- poor weather = opportunity!

Narrow-band photometry:

- Accurate T_{eff} , $\log g$ (maybe?), and $[\text{Fe}/\text{H}]$
- Selected chemical abundances (C, Mg, Ca, N, Si)

Stellar parameters and abundances:

- Statistics on metal-poor stars (10^7 stars)
- Conduct detailed chemical studies ☐ GMOS and GHOST

Near-Field Cosmology:

- Provides pieces to our large collective “Astro Puzzle”
- Potential for discovery and “incremental science”

