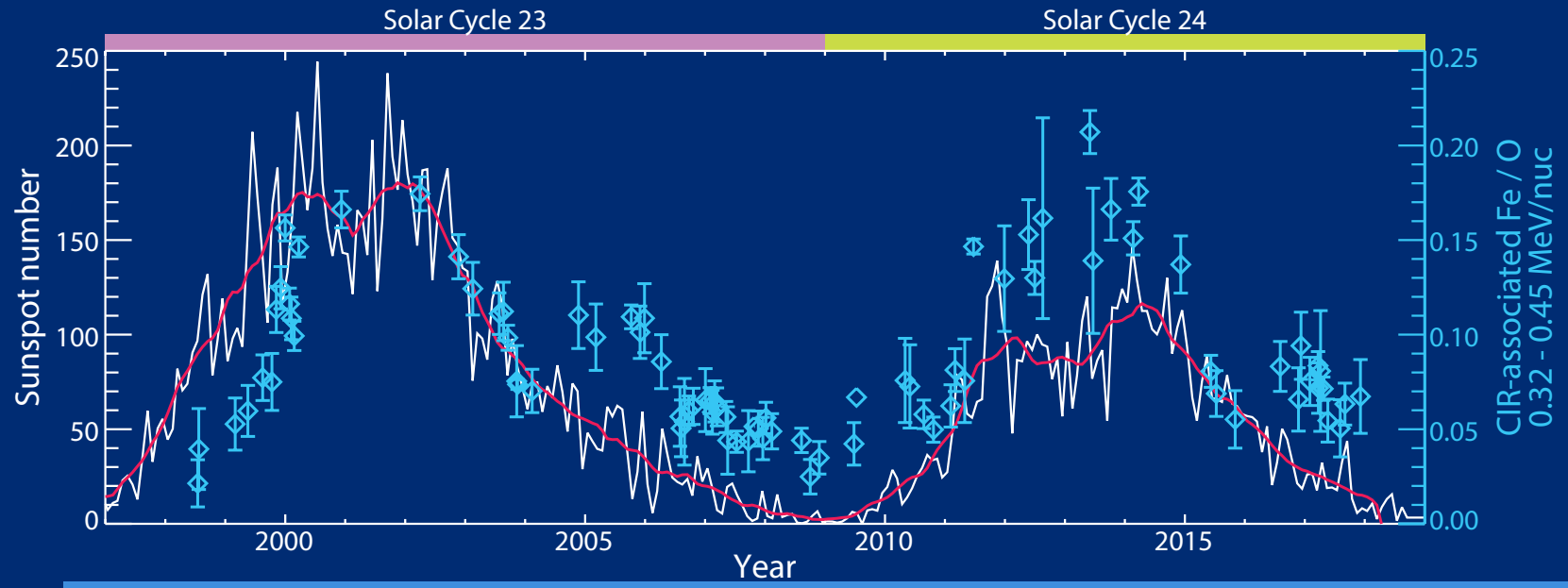
Composition of Suprathermal Ions in Corotating Interaction Regions

- 20 years (1998-2018) of ACE ULEIS data provide an unprecedented insight in CIR solar cycle variations
  - CIR-associated compositional variations were nearly identical during solar cycle 24 as in solar cycle 23.
  - A small, previously unreported, enhancement in CIR-associated Fe/O during the declining phase was observed for both solar cycle 23 and 24, suggesting the seed populations may be different between the declining and ascending phase, since such an enhancement is not observed during the ascending phase.
  - The CIR-associated Fe/O ratio is found to be correlated with both the event-averaged Fe and O intensities, which are found to have a slight solar cycle dependence. As such, the processes leading to enhancing the Fe intensities during solar maximum may be preferentially accelerating Fe rather than O.
  - The ratios of relative ion abundances during CIRs are found to be virtually the same for both solar cycle 23 and 24. For both solar cycles, the abundances were found to be near the fast solar wind abundance, with the exception of He and Ne. The fact that the CIR-associated energetic ion composition for both solar cycle 23 and 24 share so much in common can point to what is likely to be observed in solar cycle 25



Parker Solar Probe and Solar Orbiter missions will may provide further insight into the seed populations and processes that energize ions into suprathermal ion pool inside 1 AU.

The composition of CIRs exhibits clear correlation with solar activity