Coronal Heating and Micro-events in the Quiet Sun

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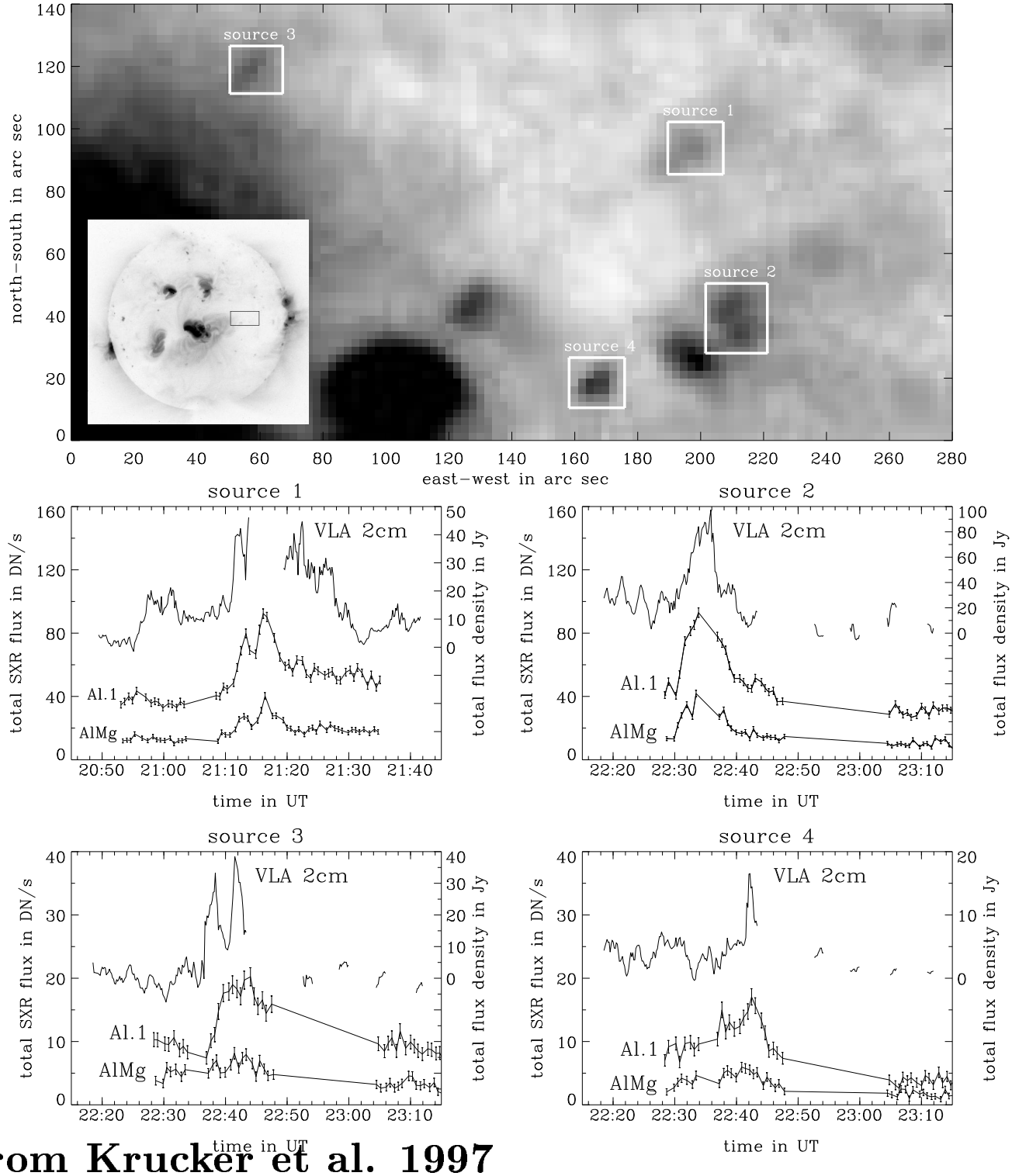
Thermal emission of micro-events (heating) in the quiet corona is observed in SXR (Yohkoh) and EUV (EIT, TRACE).

Radio observations tell us about NON-THERMAL emission.

Topics discussed today:

- Quiet Sun radio observations: counterparts of SXR/EUV micro-events
- temporal variations: what is real?
- What will FASR allow us to observe?

Quiet-Sun events: micro-events



from Krucker et al. 1997

VLA 2cm quiet Sun emission

What is real. see movie presented by Ch. Keller.

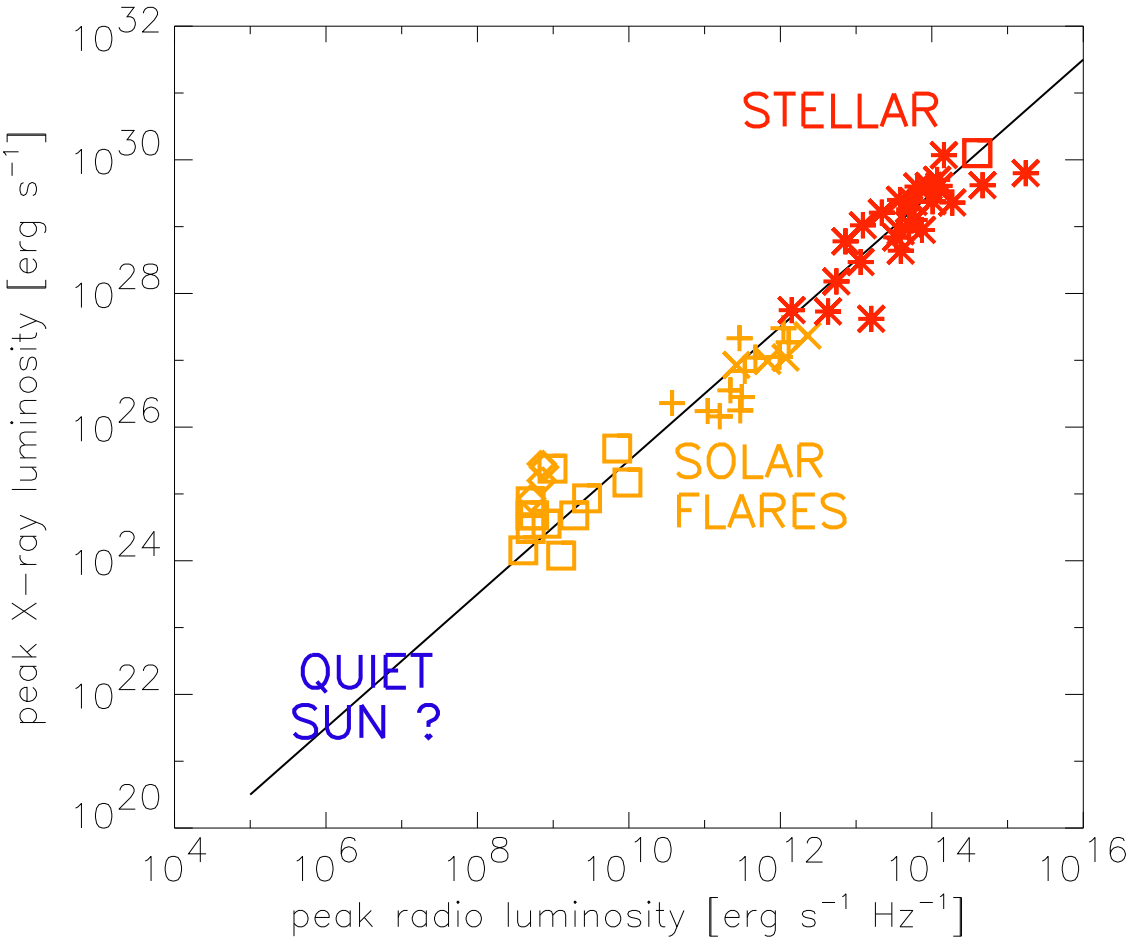
Solar and stellar flares

Benz & Güdel (1994) found a general relation between

- gyro-synchrotron radio luminosity (measure of non-thermal input) and
- SXR luminosity (measure of thermal energy input)

in solar and stellar flares.

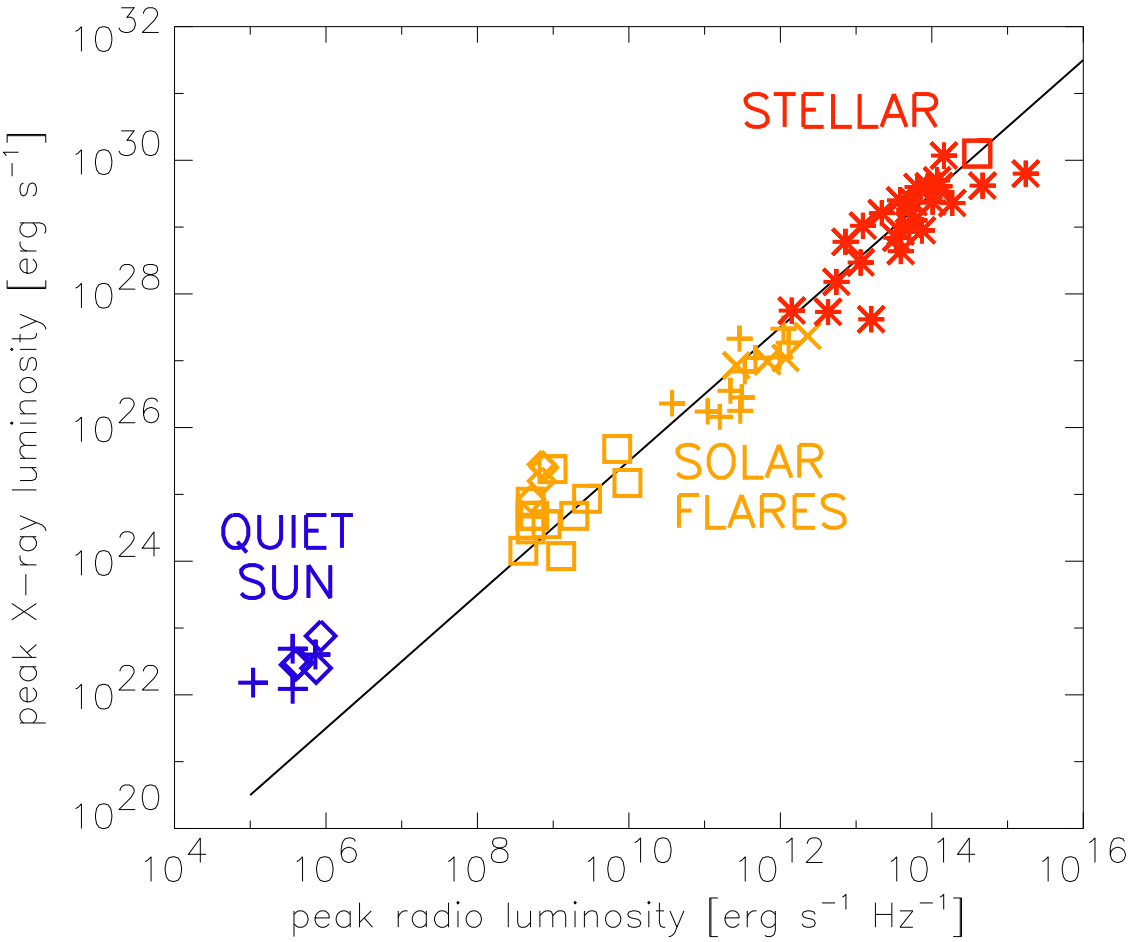
The more non-thermal input, the more thermal heating.



Do QS micro-events show the same behavior?

COMPARISON with solar and stellar flares

Micro-events in the QUIET corona are RADIO-POOR
(Yohkoh/VLA and EIT/VLA observations):
the radio emission is about 10 times smaller.



Furthermore, in about half of the QS events, the radio spectra are consistent with thermal emission (Krucker & Benz 2000).

CONCLUSIONS:

- single frequency observations show radio counterparts of SXR/EUV micro-events in QS.
- is radio emission real? likely: there are at the right location and occur at the right time.
- is radio emission non-thermal? possible
  - implusive radio emission, peaks often before SXR/EUV
  - sometimes polarized, sometimes not
  - radio-poor compared to flares in AR
  - 'spectrum' sometimes non-thermal, sometimes thermal
- VLA does not provide simultaneous spectral information.

$\Longrightarrow$ QS micro-events likely form a different class of events as solar flares in AR.

FASR observations

- FASR will see full disk: signal to noise of 1000:1 or better needed
- FASR is solar dedicated: wait for best observing condition (wait for times without large ARs)
- Sensitivity/Polarization: could be similar to VLA, EVLA is better! FASR could average over a wide frequency band.
- If quiet Sun study is part of FASR proposal, the sensitivity question has to be addressed.
- big plus: spectral information
  - is source seen simultaneously at several frequencies? if yes, then source is most likely real!
  - diagnostics: thermal or non-thermal spectrum?
- Tim proposed possible extra correlators just for quiet Sun studies.