

# Bremen composite MgII index

Mark Weber

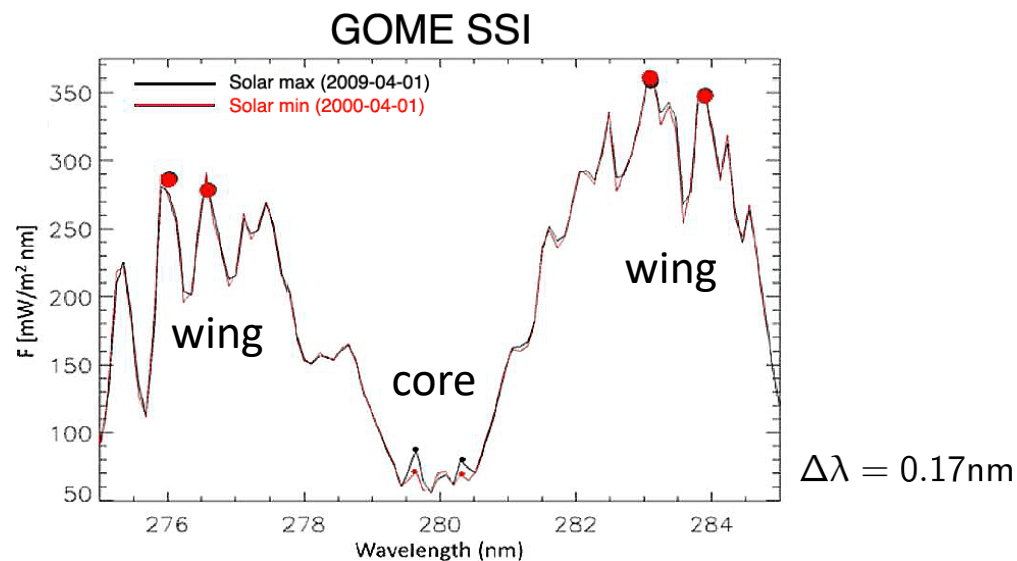
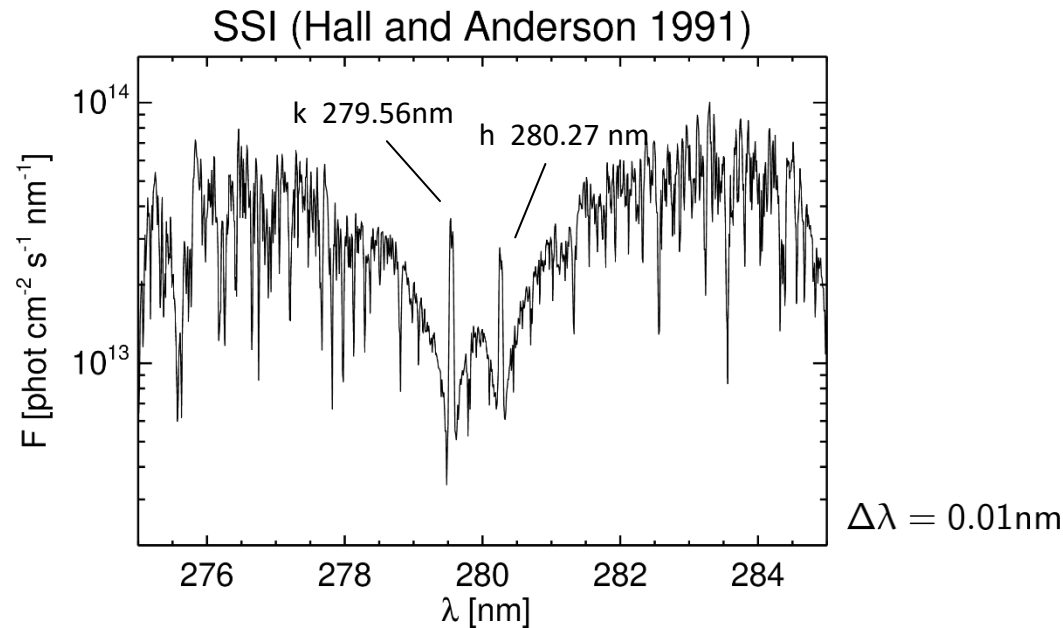
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GSICS UVN-S Subgroup Solar Meeting, virtual meeting, 30<sup>th</sup> May 2024



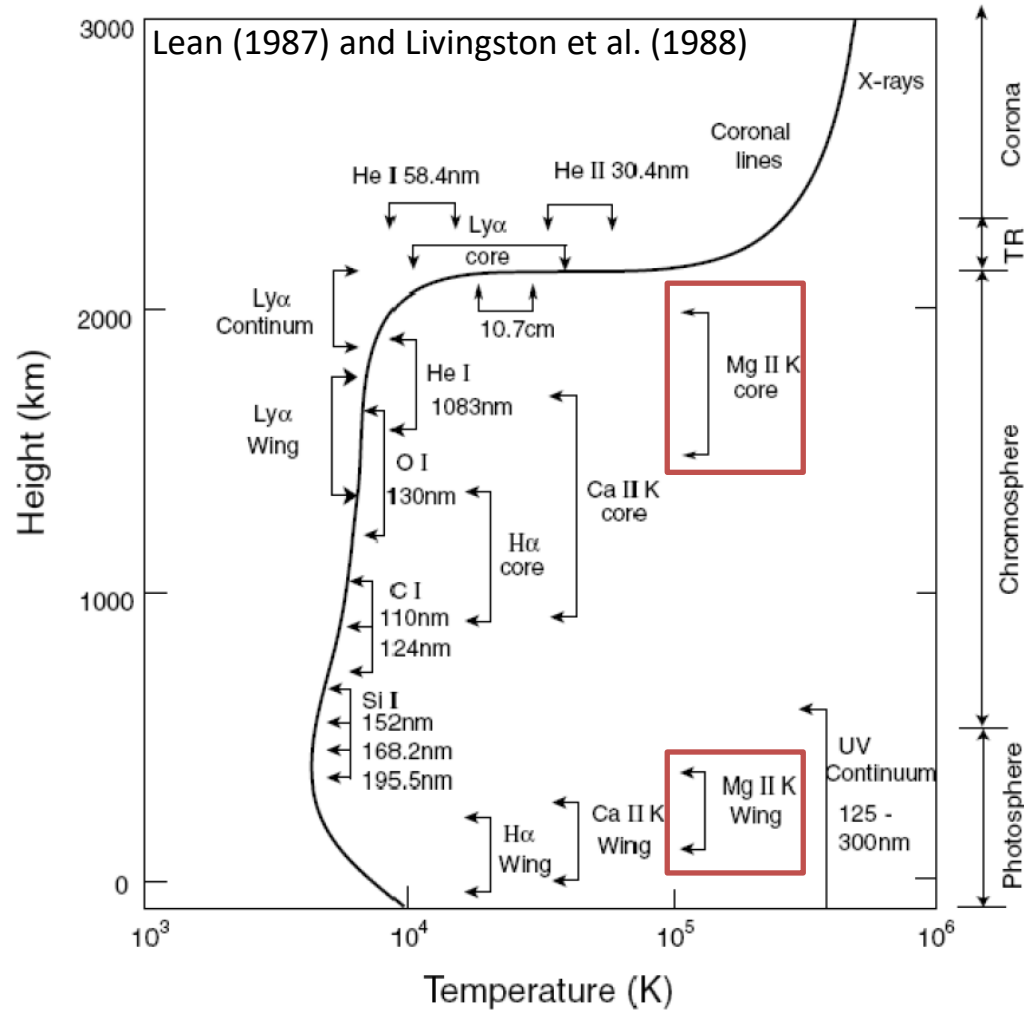
# Mg II index



## Mg II index

- core-to-wing ratio of Mg II doublet (280 nm)
- original definition by Heath & Schlesinger (1986)
- different definitions (no absolute scale, dependent on SSI spectral resolution)
- insensitive to optical degradation (first order)
- correlates with UV&vis SSI variability
- used as a proxy in SSI reconstructions (e.g. NRLSSI2)
- useful for SSI recalibration/degradation correction (e.g. compare SSI at different times but for the same MgII index value)

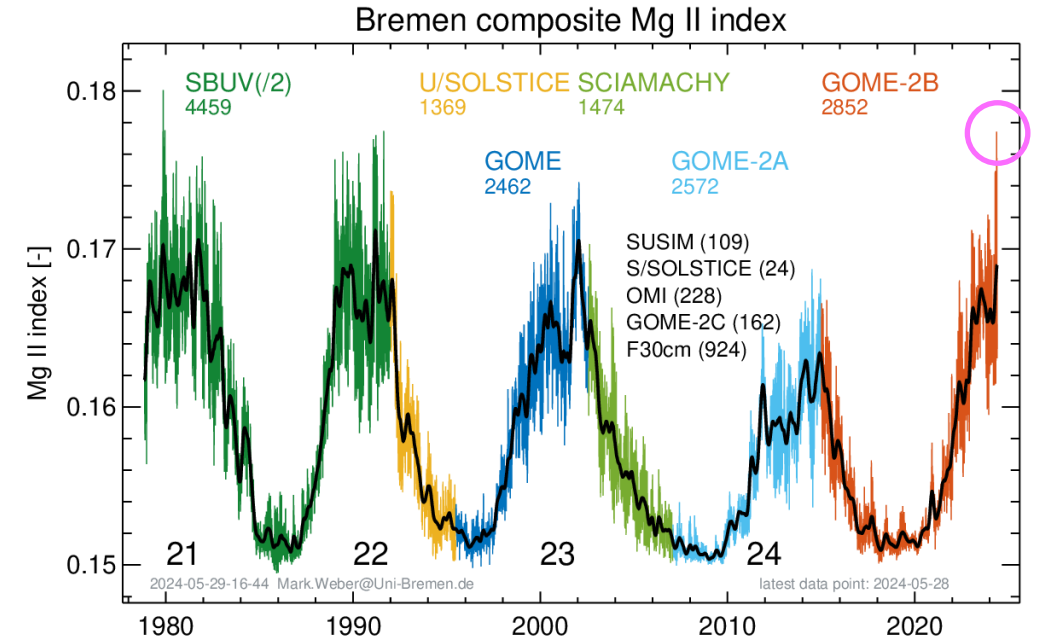
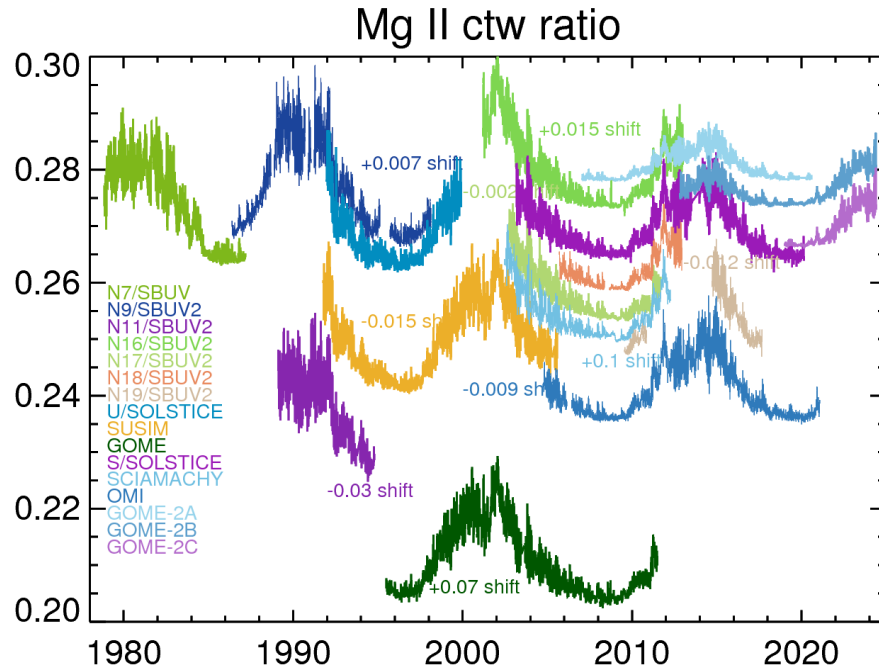
# Origin of Mg II emission and absorption



## Mg II emission and absorption

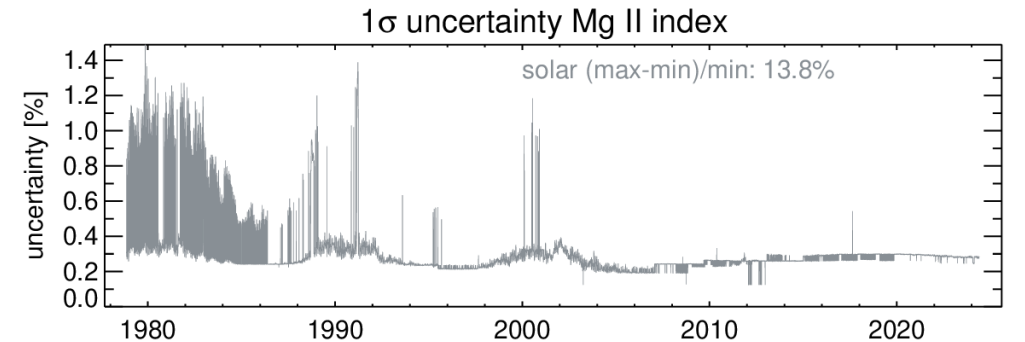
- emission core  $\rightarrow$  chromosphere
- wing absorption  $\rightarrow$  photosphere
- variability in the emission core (chromospheric activity)

# Mg II datasets & Bremen composite MgII index

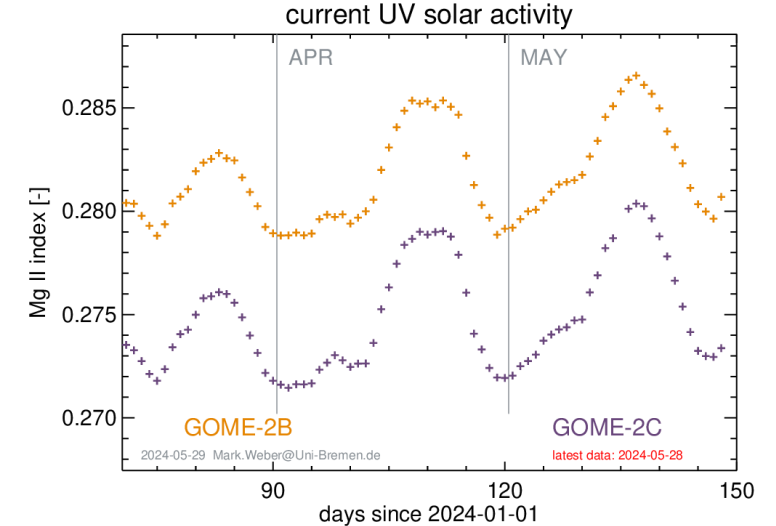
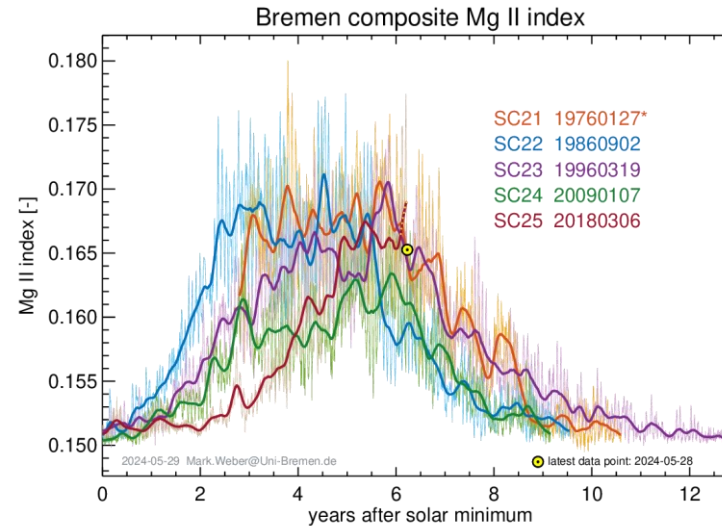
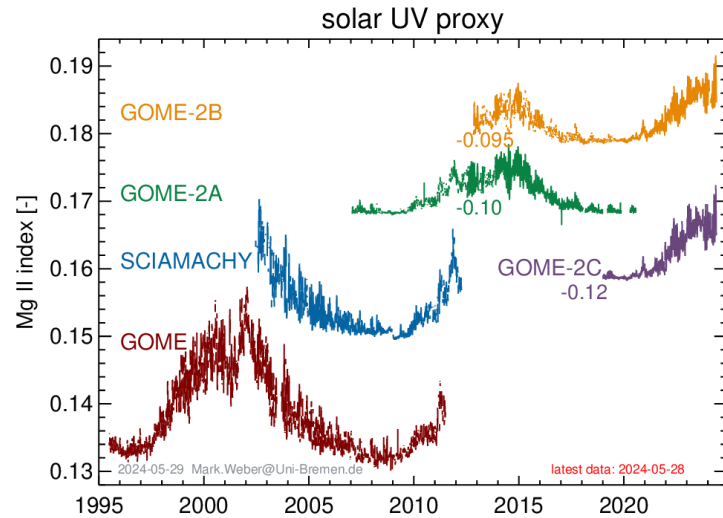


## Bremen MgII composite index

- major „planks“: SBUV(/2), U/Solstice, GOME, SCIAMACHY, GOME-2A/B
- gap-filling using remaining MgII datasets
- final gap-filling with F30cm flux (about 924 days)



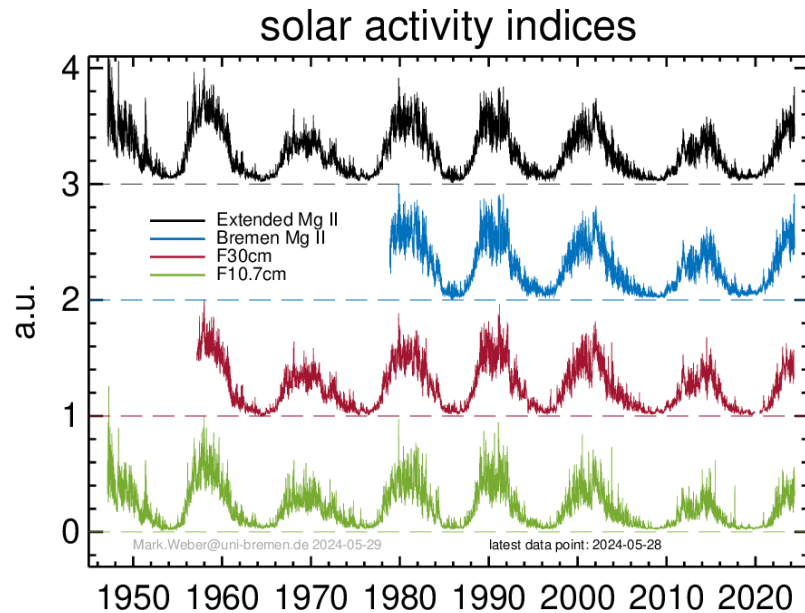
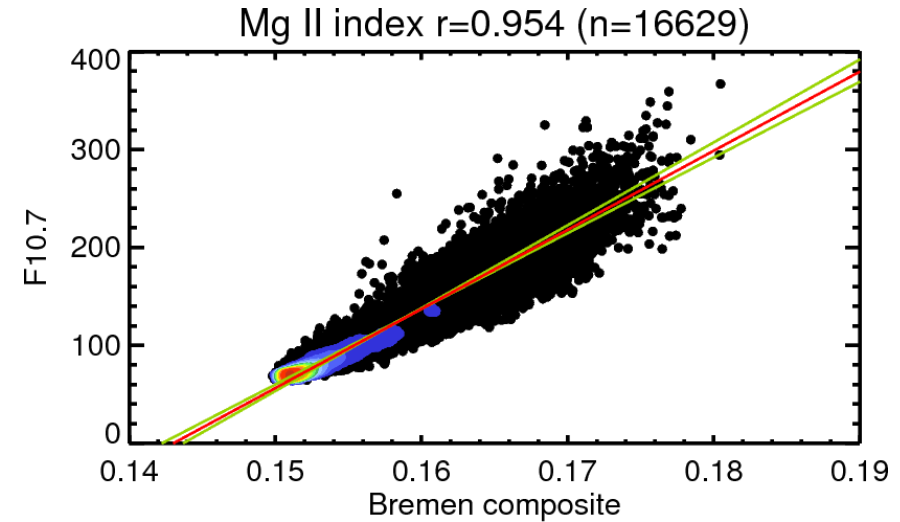
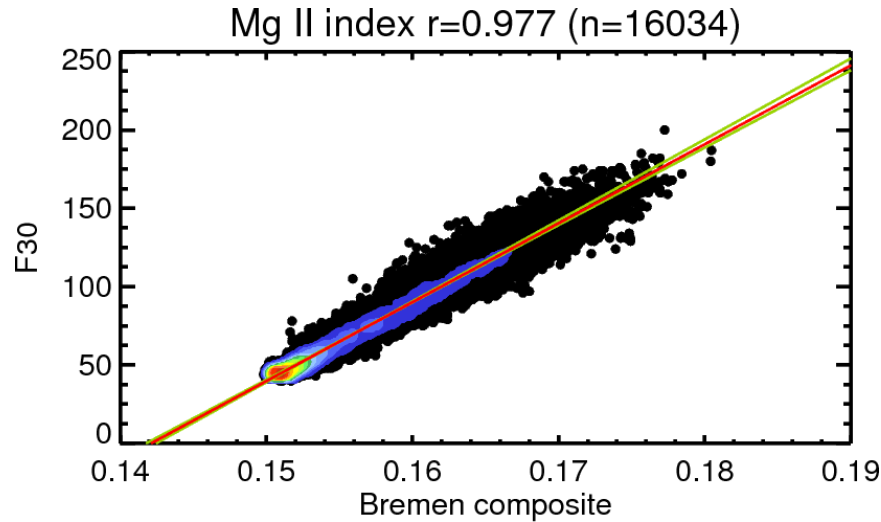
# Data availability



<https://www.iup.uni-bremen.de/UVSAT/data/>

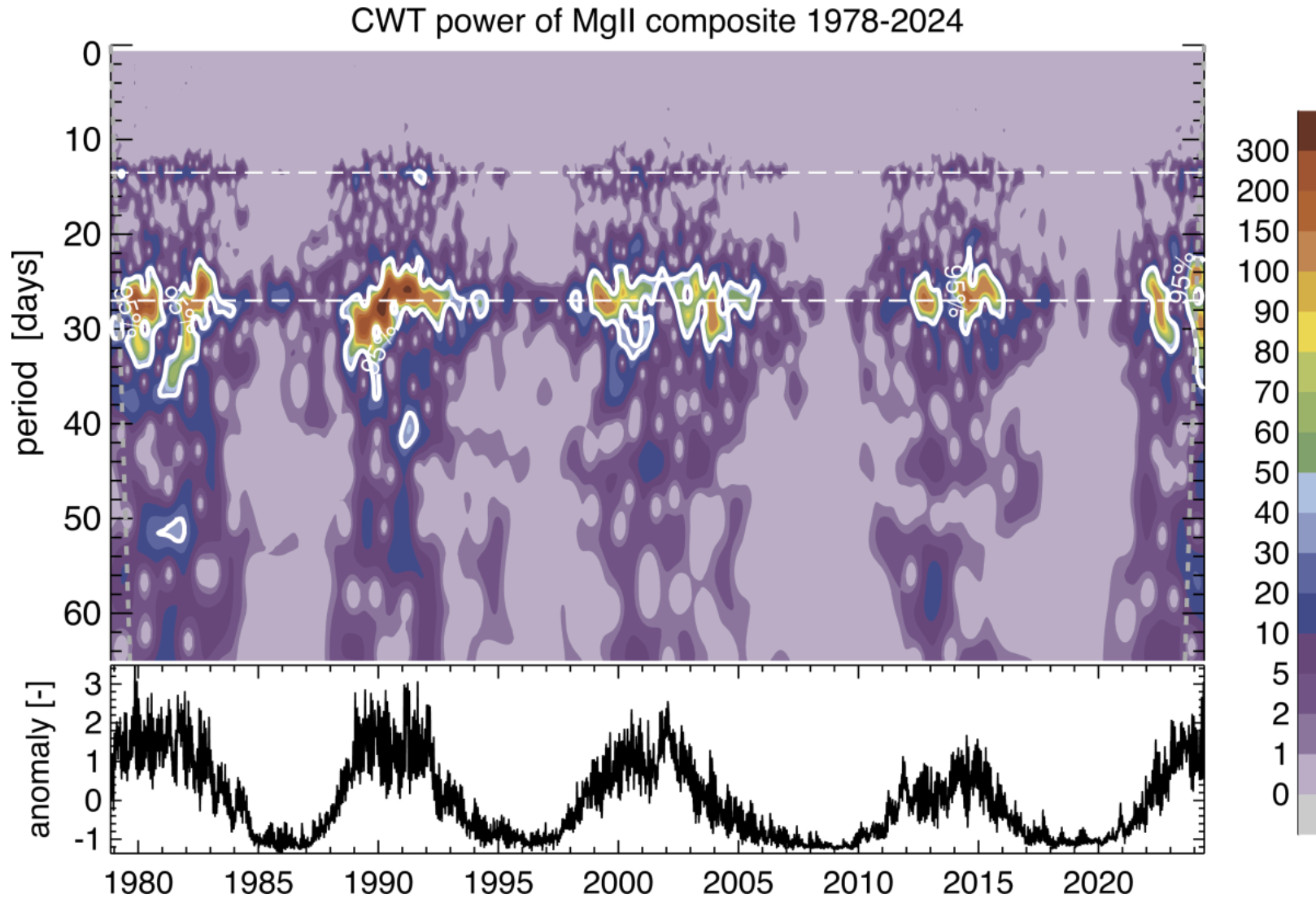
- GOME-2, SCIAMACHY, GOME-2A/B/C
- Bremen MgII composite index (1978-today)
- F10cm solar radio flux (1947-today)
- Japanese solar radio fluxes (e.g. F30cm, 1951-today)
- extended Mg II index (1947-today)

# Extend MgII index using solar radio flux



- Higher correlation with F30cm solar radio flux
- Extend Bremen composite index back to 1947 using successively F30cm and F10.7cm radio flux by linear regression

# CWT analysis of Bremen composite Mg II index



## Conclusion

- solar radio flux and Bremen Mg II are updated daily and available at <https://www.iup.uni-bremen.de/UVSAT/data/>
- adding new missions to the MgII data pool: TROPOMI, Sentinel-5/UVN, Sentinel-4/UVN,...
- integration of TSIS-1 and TSIS-2 (collaboration with LASP Colorado)
- some remaining issues to be tackled (when time permits!):
  - revisiting uncertainty calculations
  - composite MgII rising faster in solar cycle 25 than F30/F10.7 radio fluxes
    - degradation issues (signal-to-noise) with GOME-2
    - change in spectral resolution with time (GOME-2A/B)