

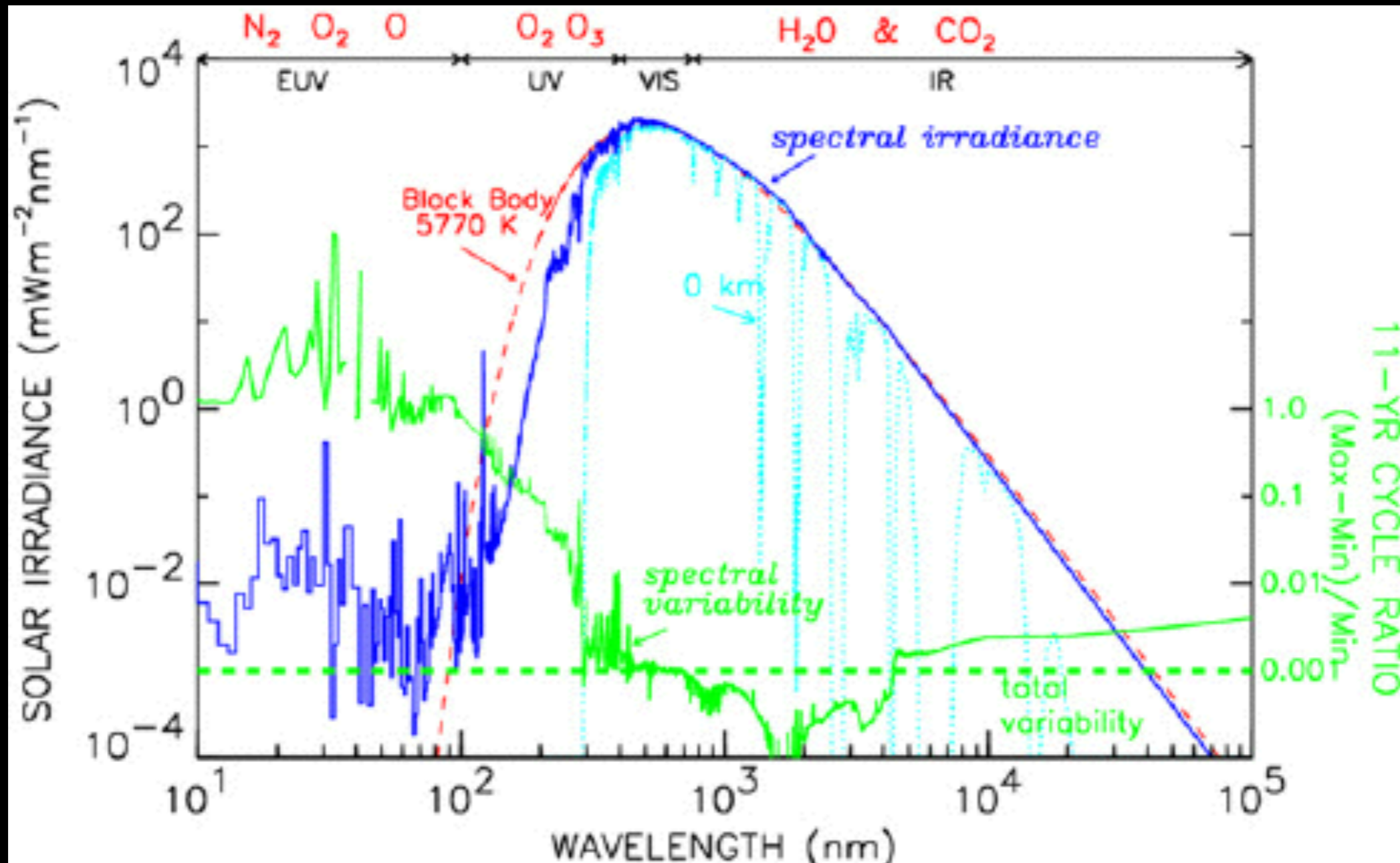


The solar ultraviolet spectral slope during the last 270 years

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Slide from Francesco



courtesy: Judith
Lean

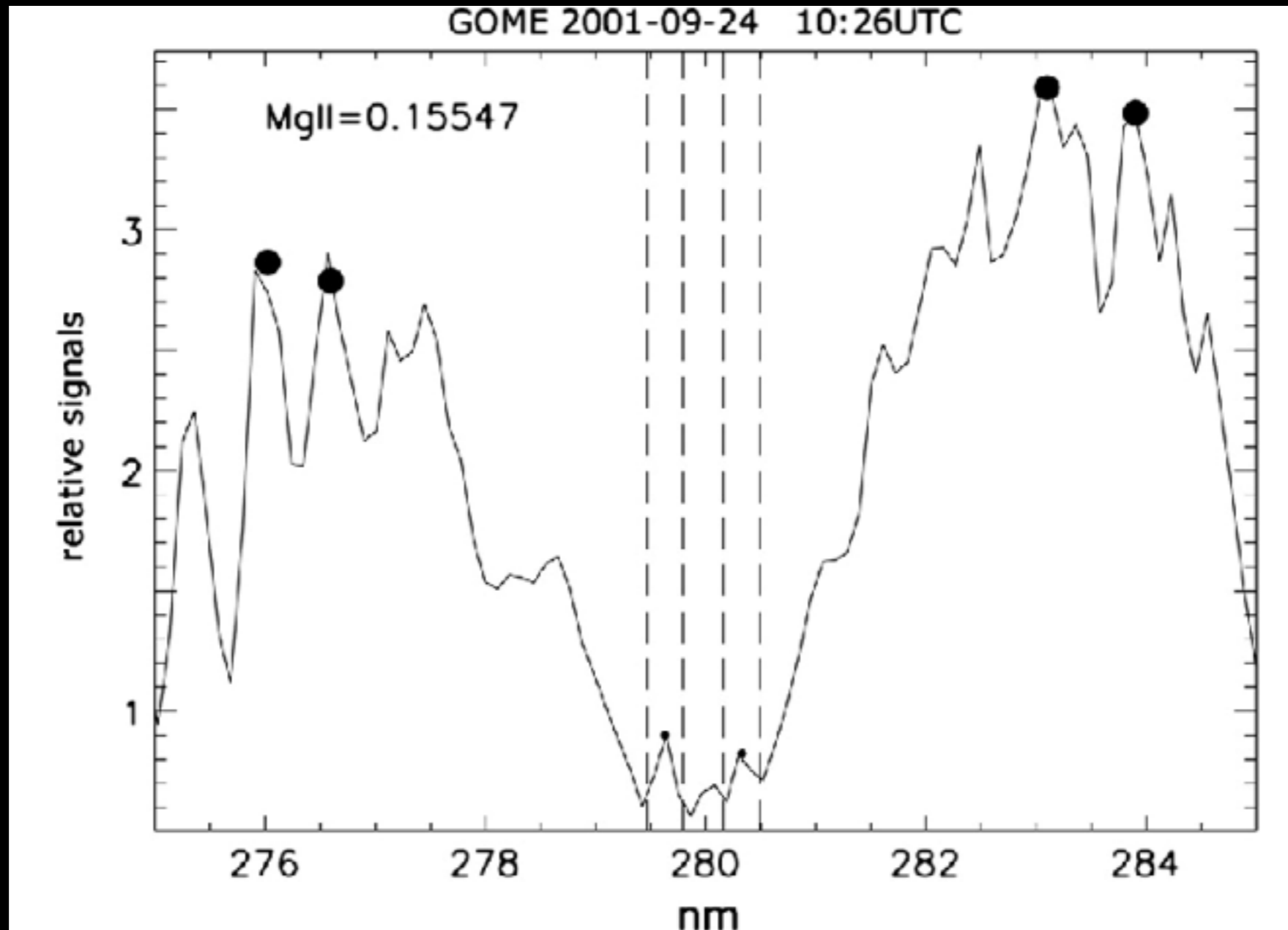
[FUV-MUV] Color Index

SOLSTICE data:

- FUV (115-180nm)
- MUV (180-310nm)

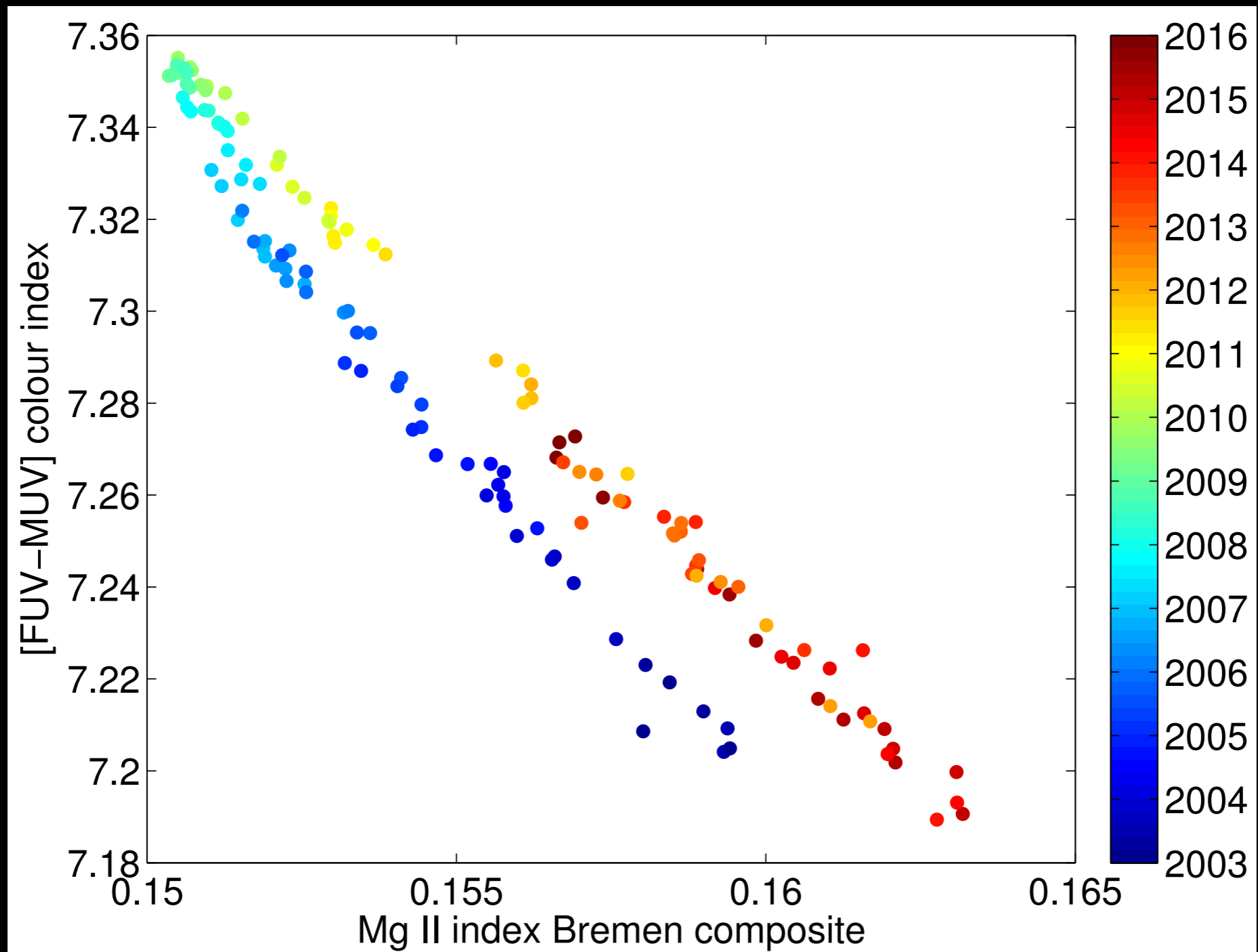
$$[FUV - MUV] = -2.5 \log \frac{F_{FUV}}{F_{MUV}} + Z_{FUV} - Z_{MUV}$$

Mg II Index



Snow et al., 2014

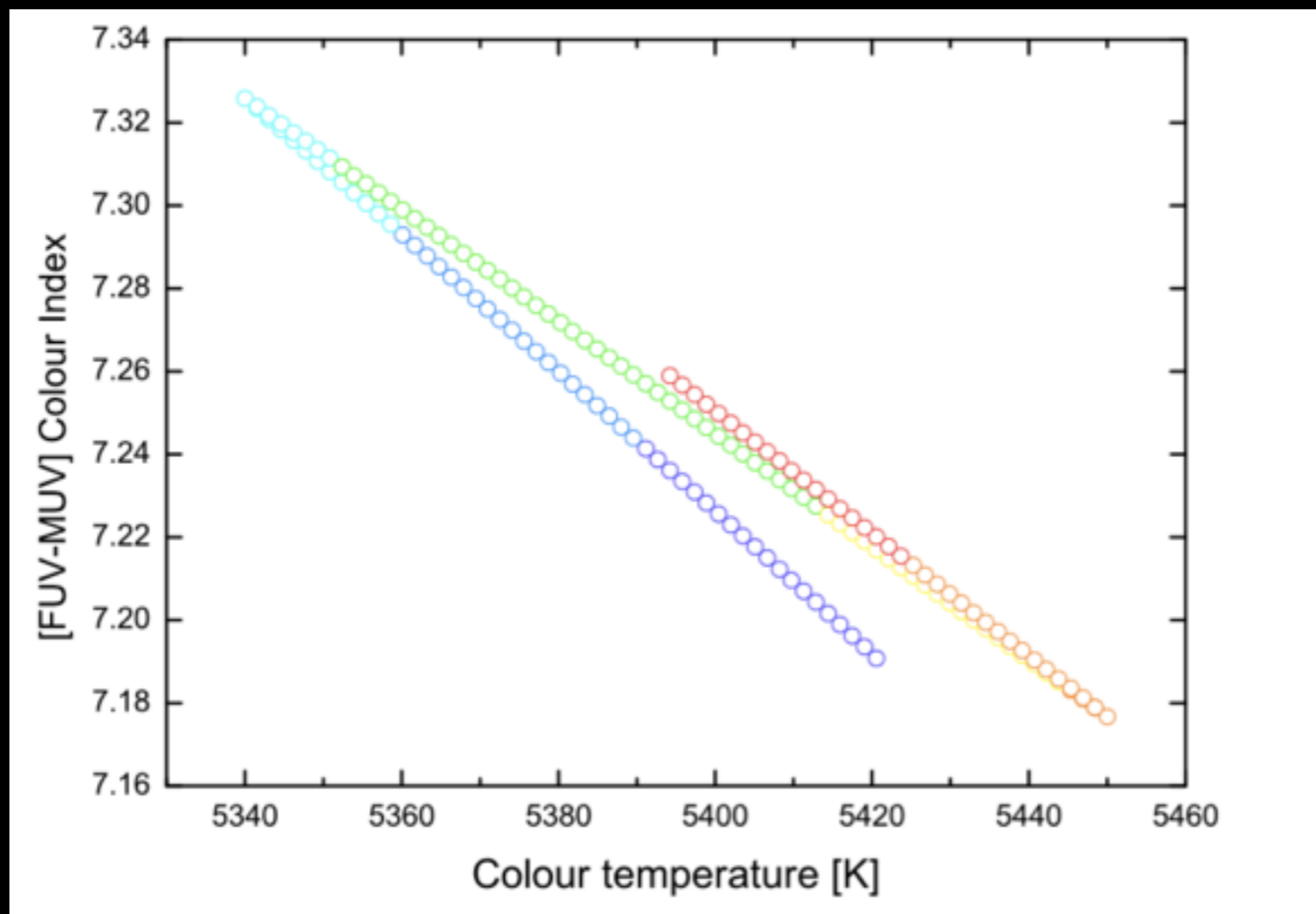
The Color Index vs. Mg II Index



Lovric et al.,
2017

[FUV-MUV] Color Temperature

$$[FUV - MUV] = -2.5 \log \frac{\lambda_{MUV}^5}{\lambda_{FUV}^5} \frac{\frac{hc}{e^{\lambda_{MUV} k_B T_c}} - 1}{\frac{hc}{e^{\lambda_{FUV} k_B T_c}} - 1}$$



Lovric et al.,
2017

SOLSTICE Ageing Model

$$E_{age}(t) = 1 - D e^{-\frac{t}{\mathcal{T}}}$$

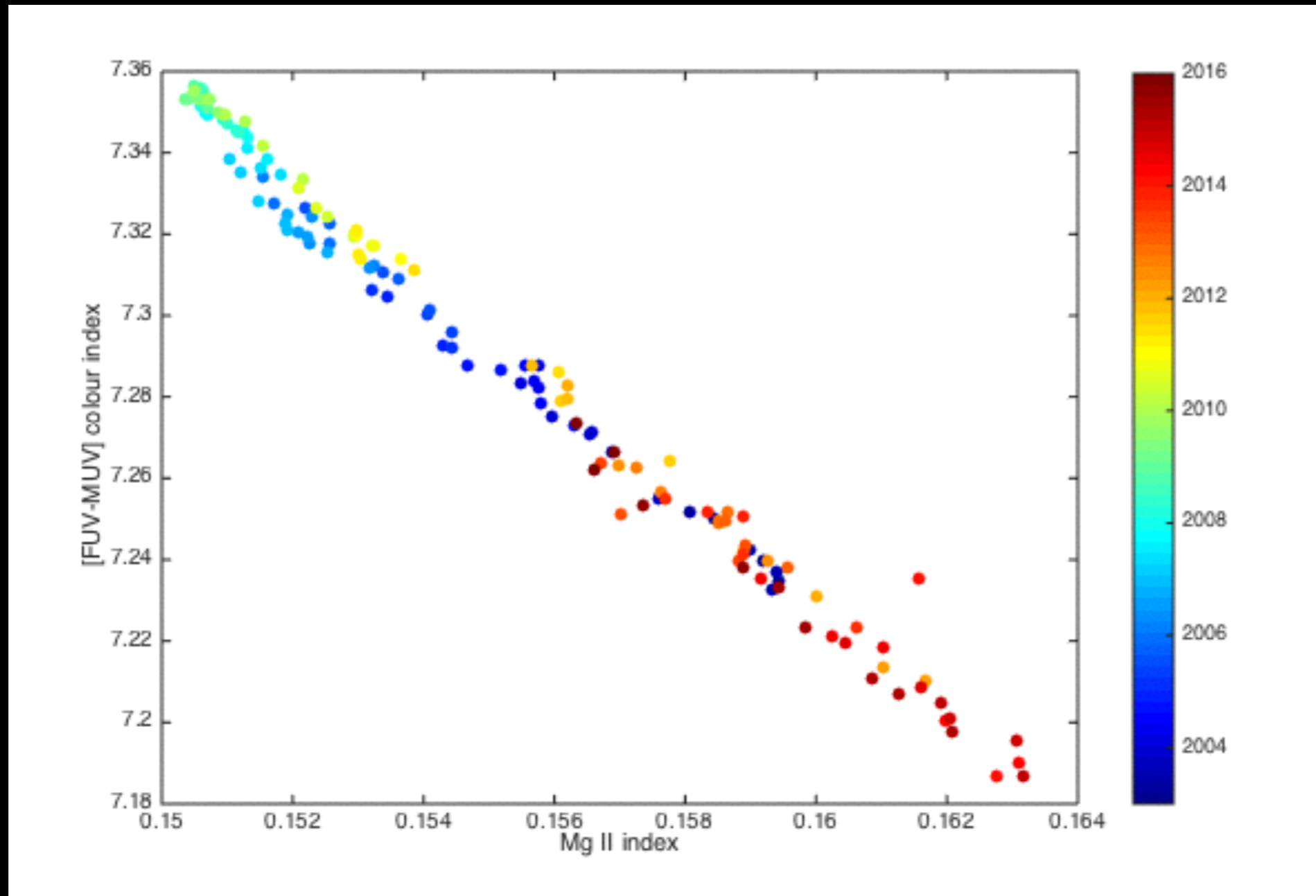
$E_{age}(t)$ - deviations from the reference in the FUV spectral region

D - degradation constant (0.04)

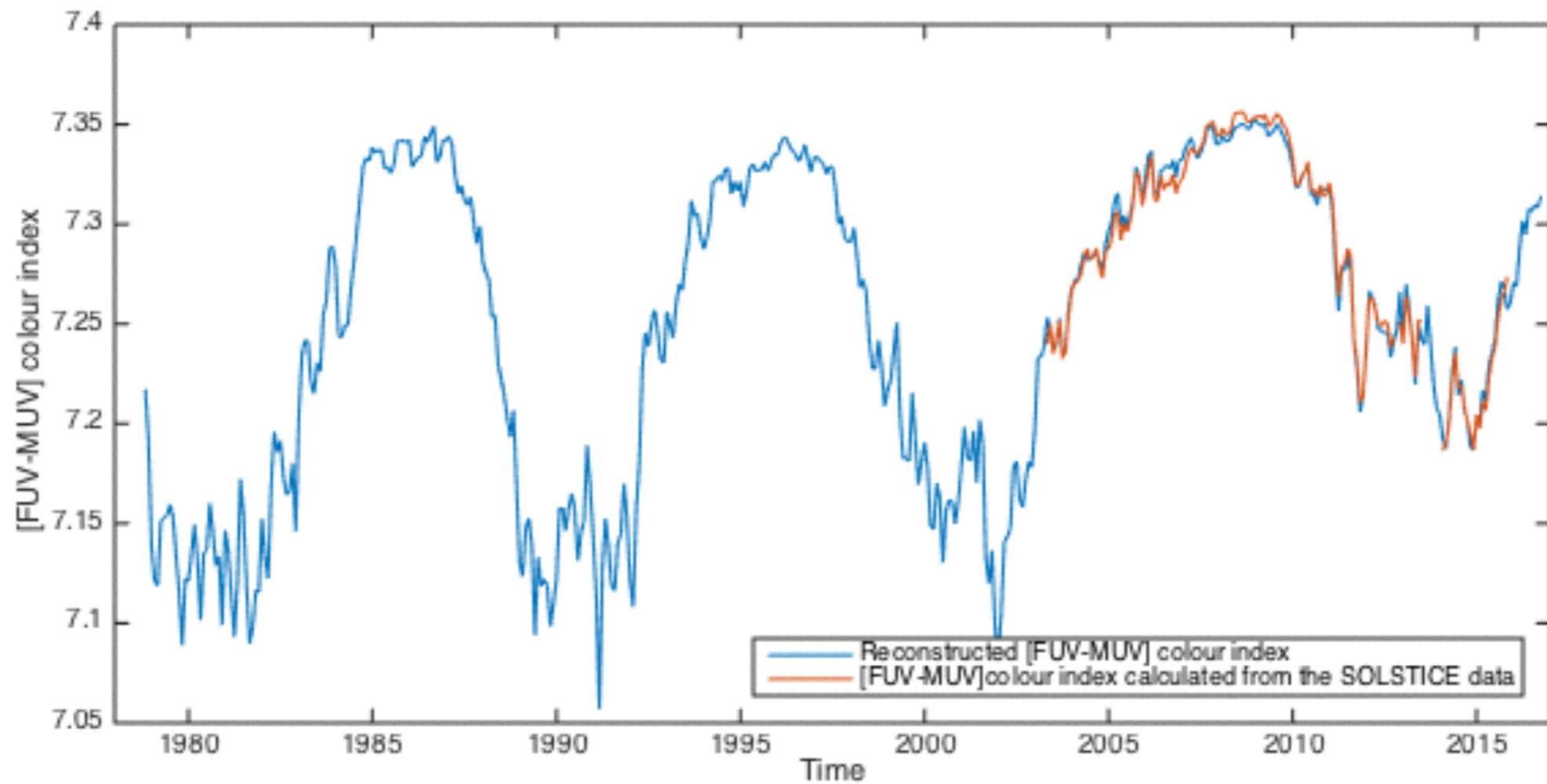
t - time expressed in months

\mathcal{T} - effective degradation lifetime in months (70)

SOLSTICE Ageing Model

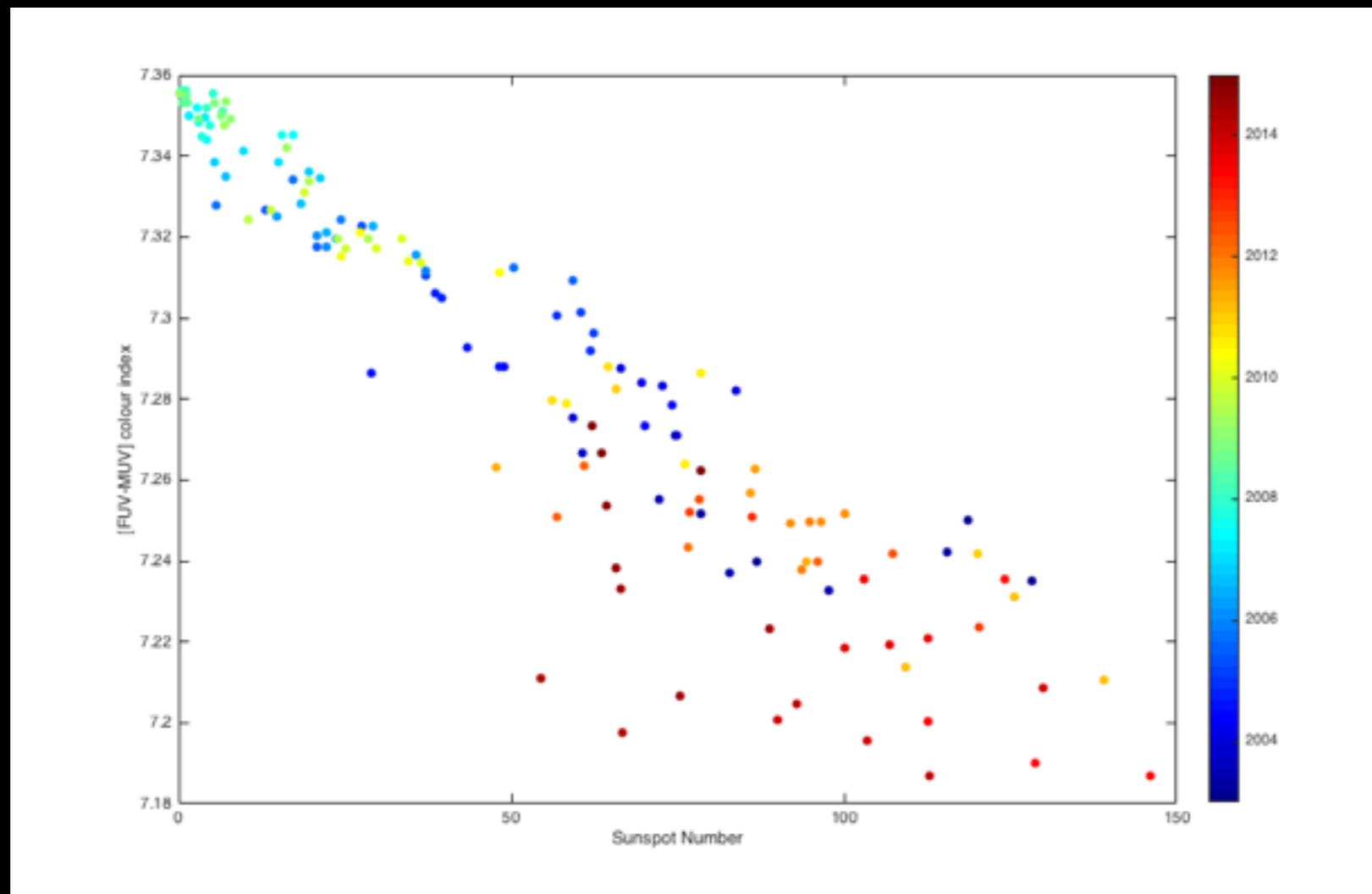


Reconstruction using Mg II Index

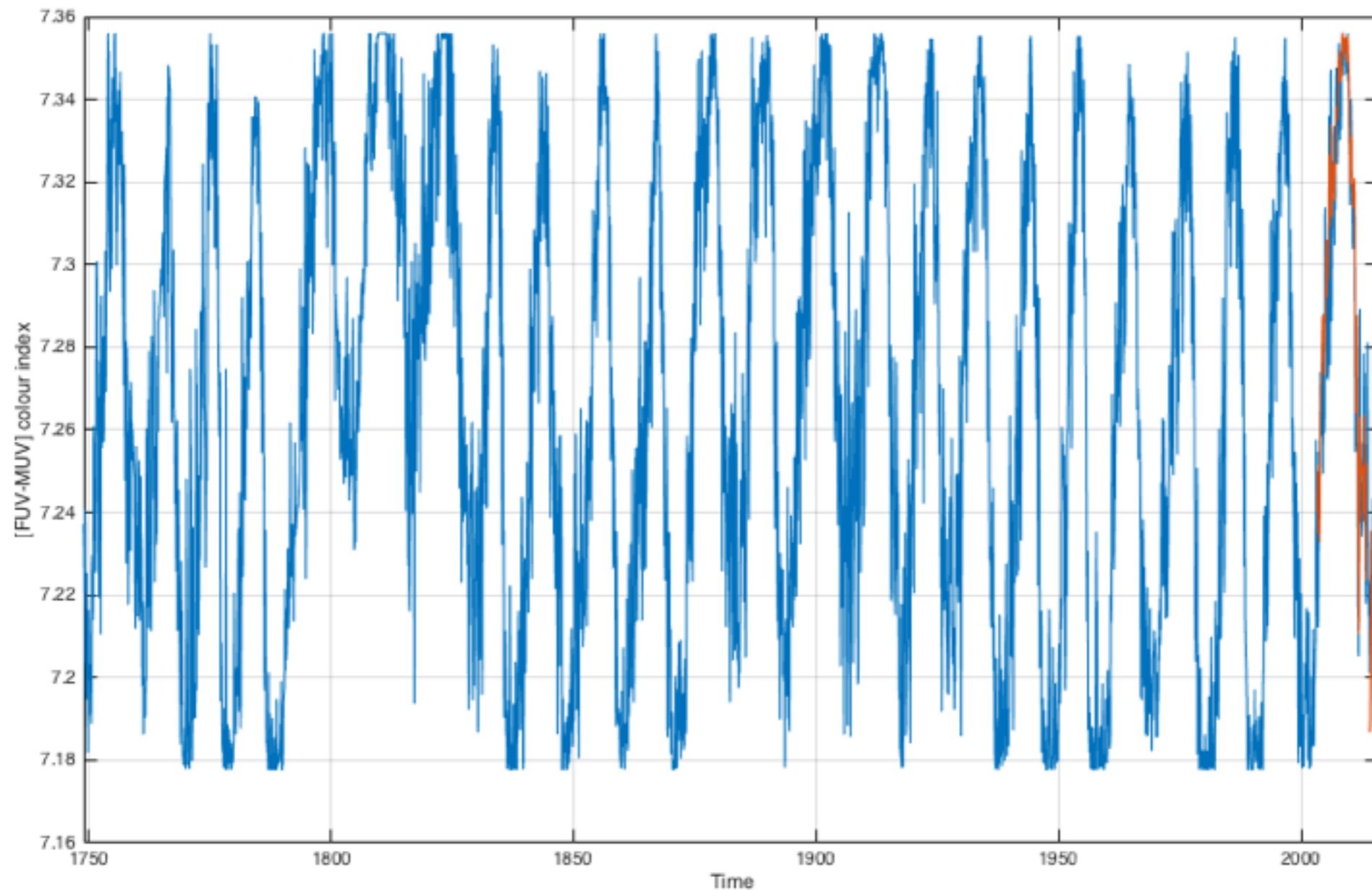


Sunspot Number

- Monthly mean data obtained from WDC-SILSO, Royal Observatory of Belgium, Brussels



Reconstruction using the Sunspot Number



SUMMARY

- Solar UV controls ozone production and destruction, and there is a lack of historical solar UV data. This is required to model historical ozone.
- We successfully reconstruct solar UV for the past 40 years using Mg II index.
- We also reconstruct this with sunspot number, which is a slightly poorer proxy for solar activity, but has the benefit of being recorded much further into the past.

Basic references

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