Changes in Solar Behaviour Before and During Cycle 23, and into the Extended Minimum

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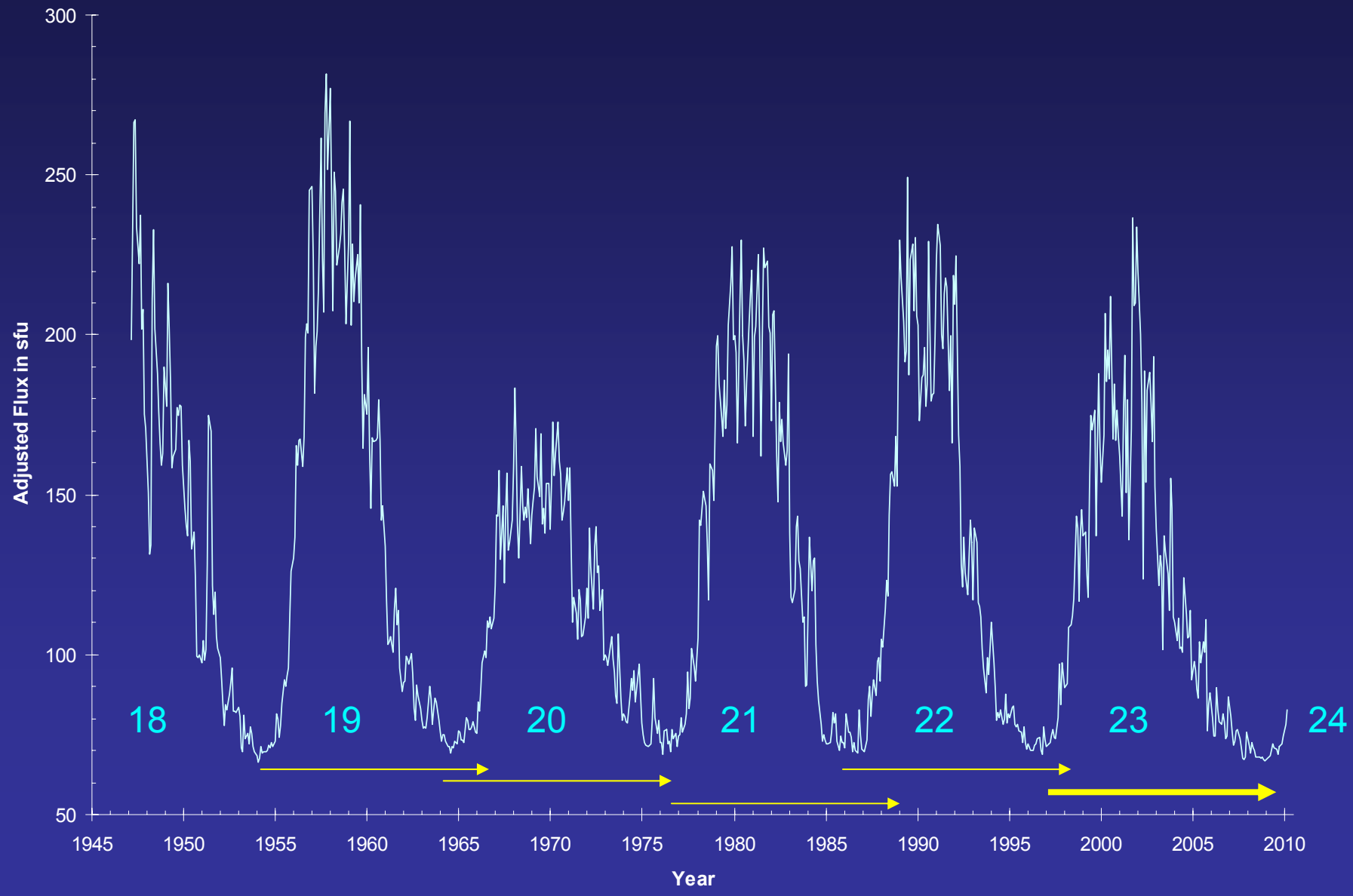
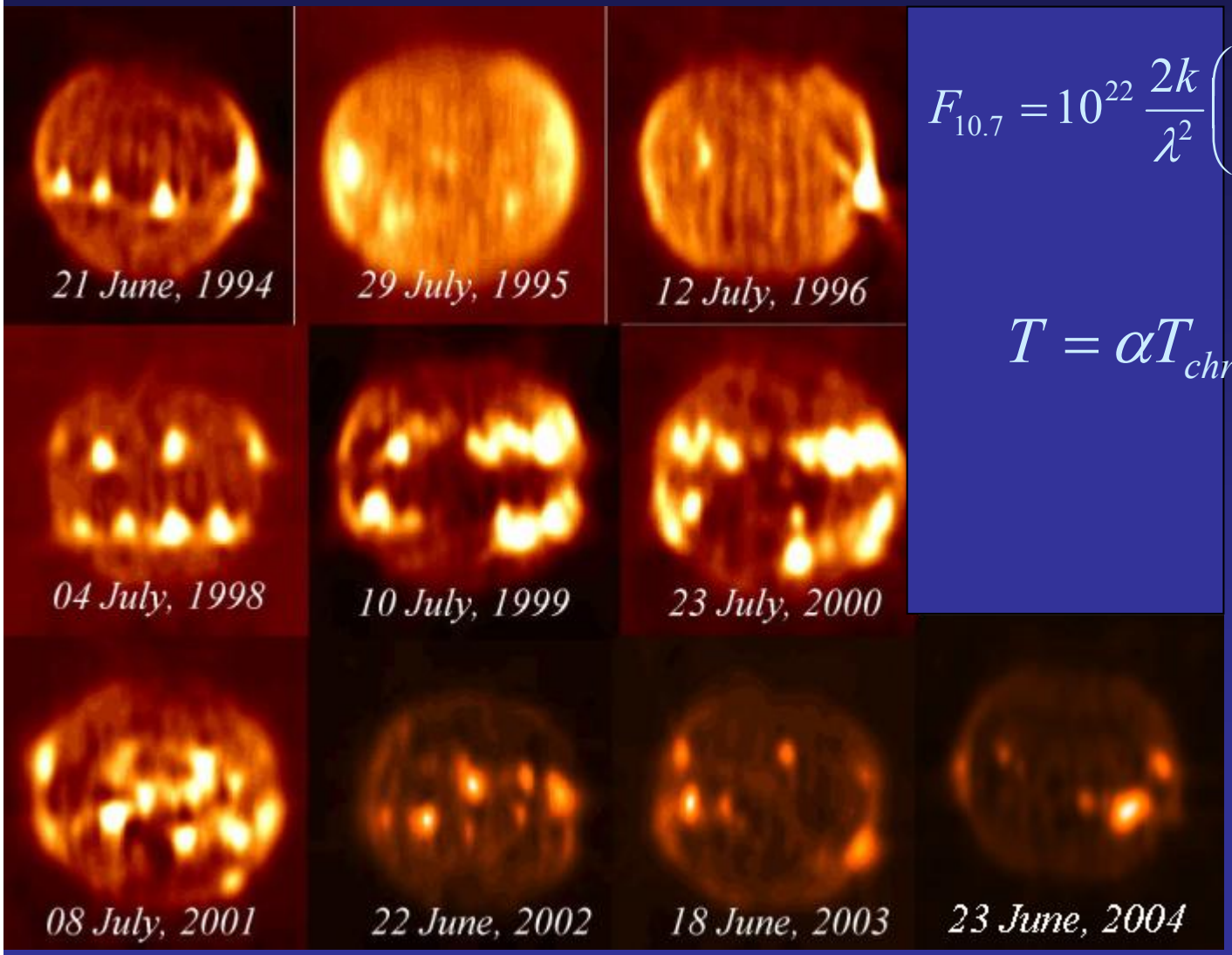
F10.7 Flux Monthly Means



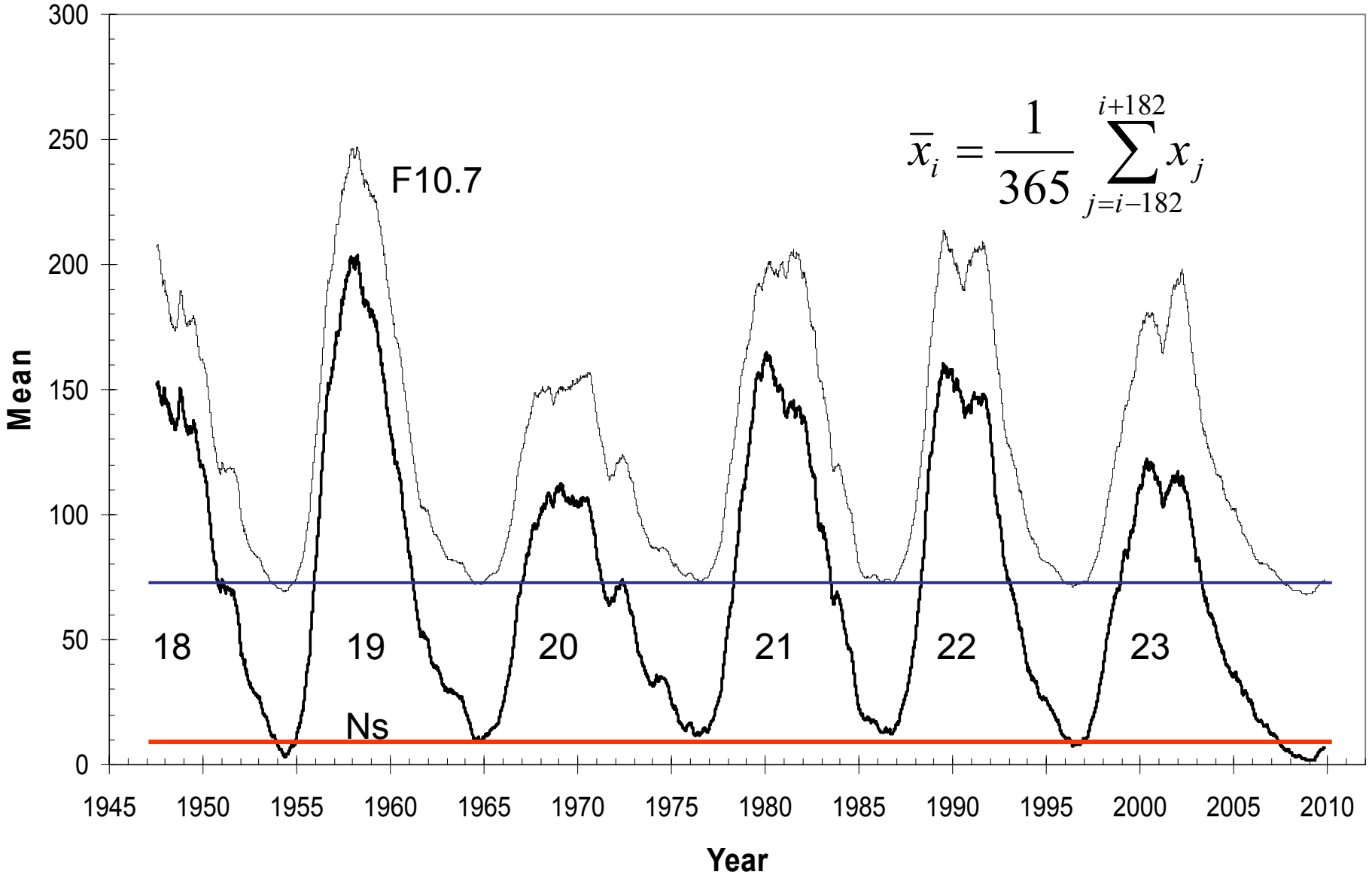
What Is F10.7?



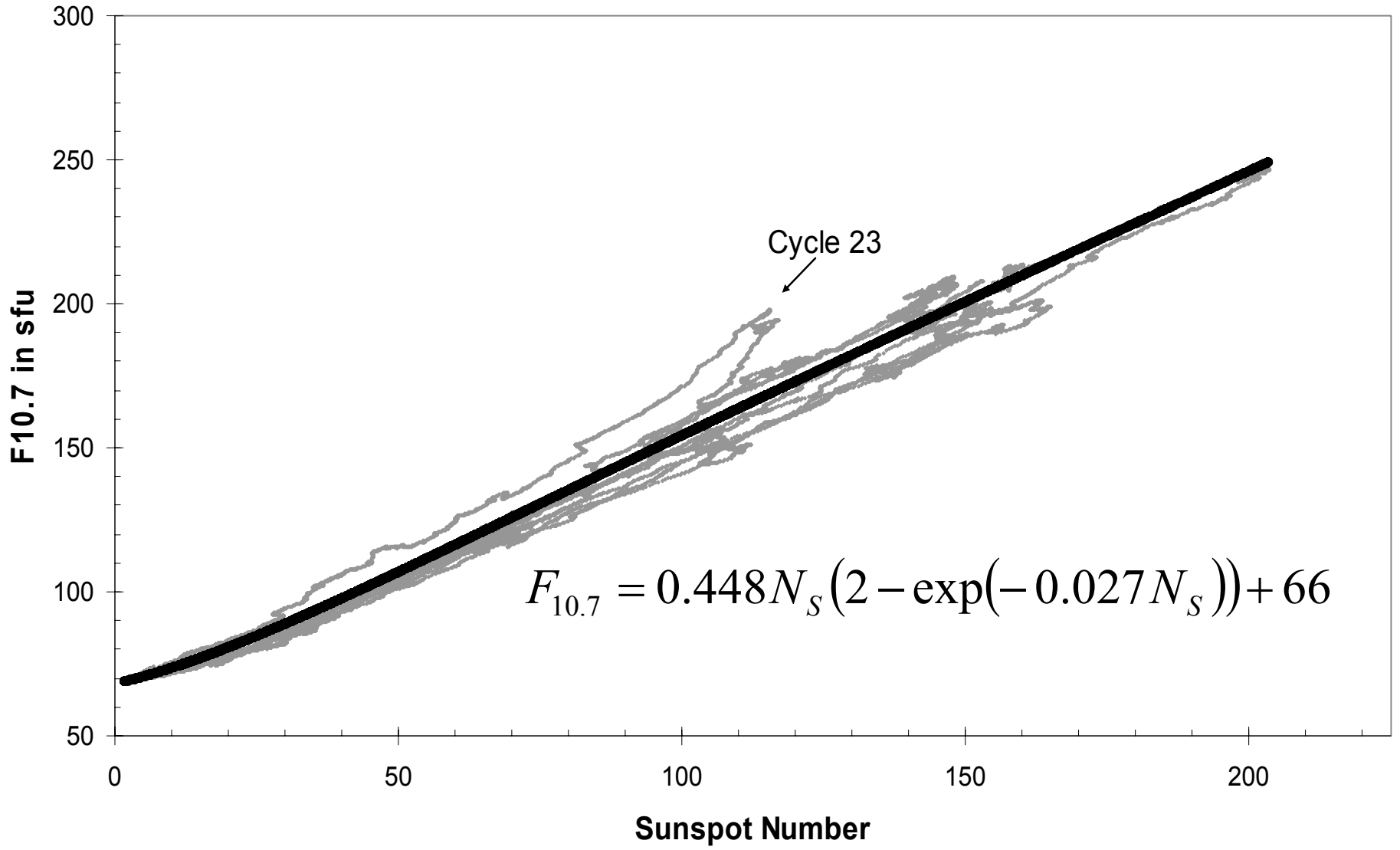
$$F_{10.7} = 10^{22}\frac{2k}{\lambda^2}\left(\sum_i (T_i - T_0)\Omega_i + \Omega_0 T_0\right)$$

$$T = \alpha T_{chrom} + (1-\alpha)T_{cor}$$

One-Year Running Mean for F10.7 and Sunspot Number



Mean F107 v Mean Sunspot Number

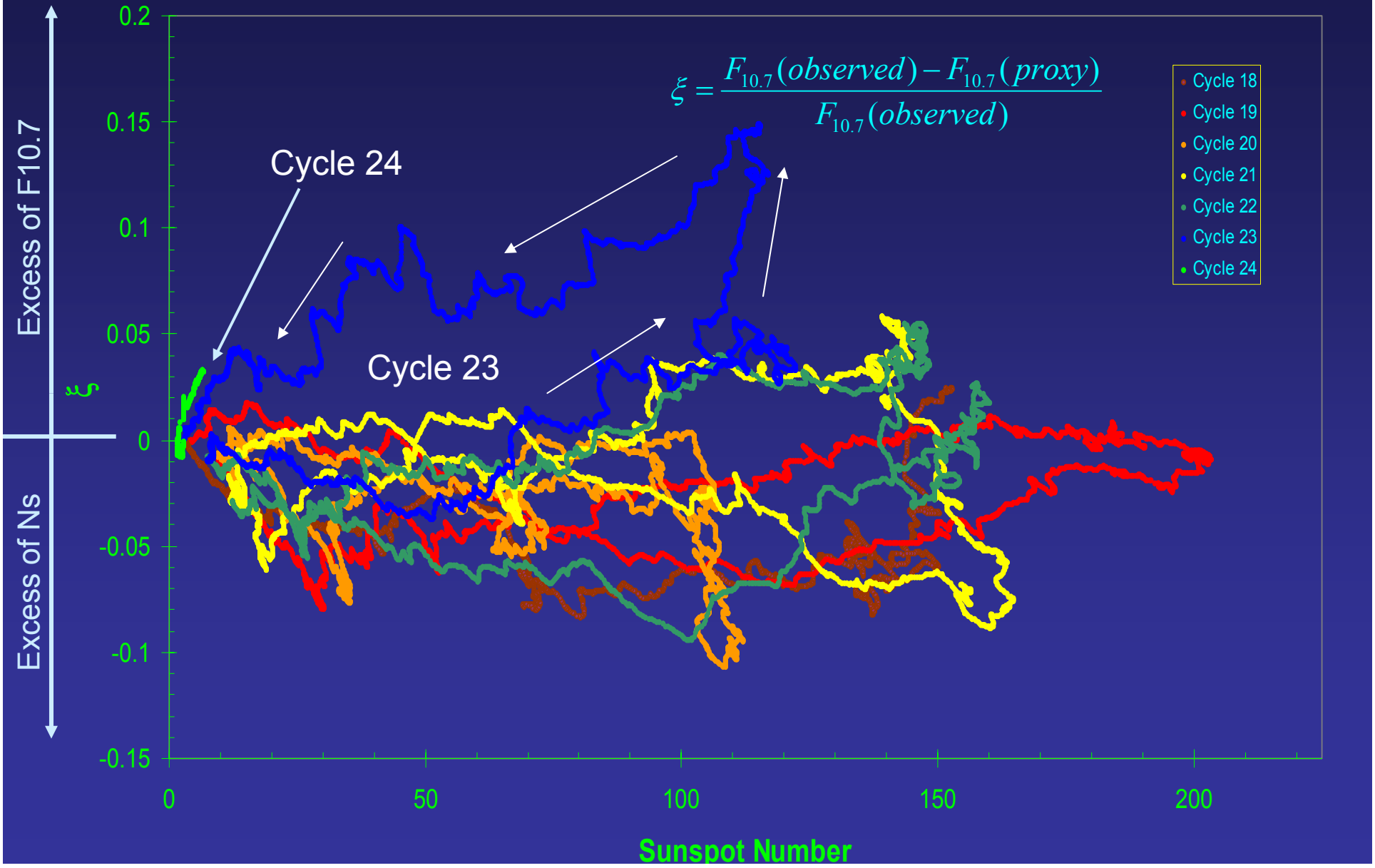


F10.7 Observed versus Proxy

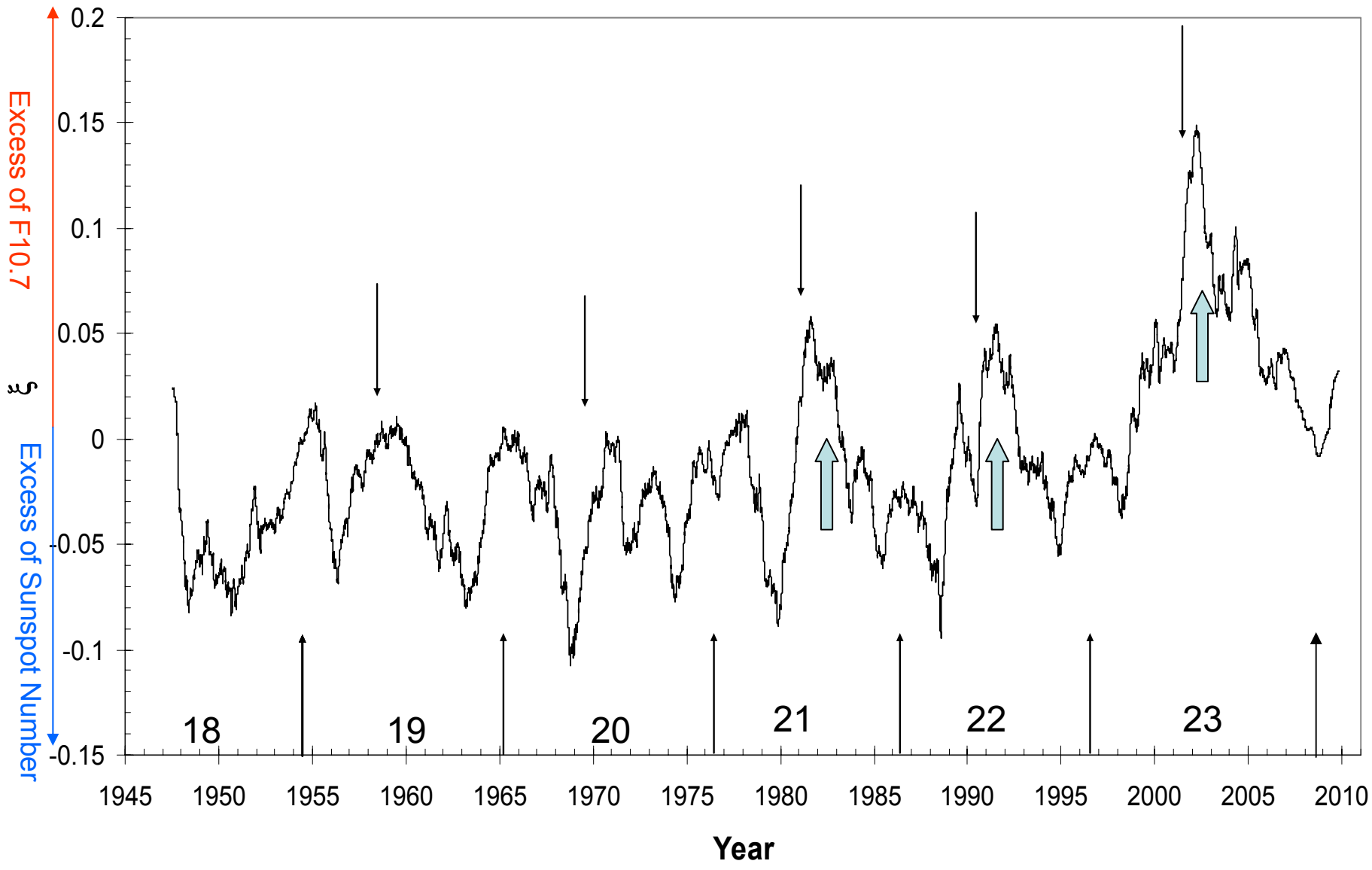
$$F_{10.7}(proxy) = 0.448 N_S \left(2 - \exp\left(-0.027 N_S\right)\right) + 66$$

$$\xi = \frac{F_{10.7}(observed) - F_{10.7}(proxy)}{F_{10.7}(observed)}$$

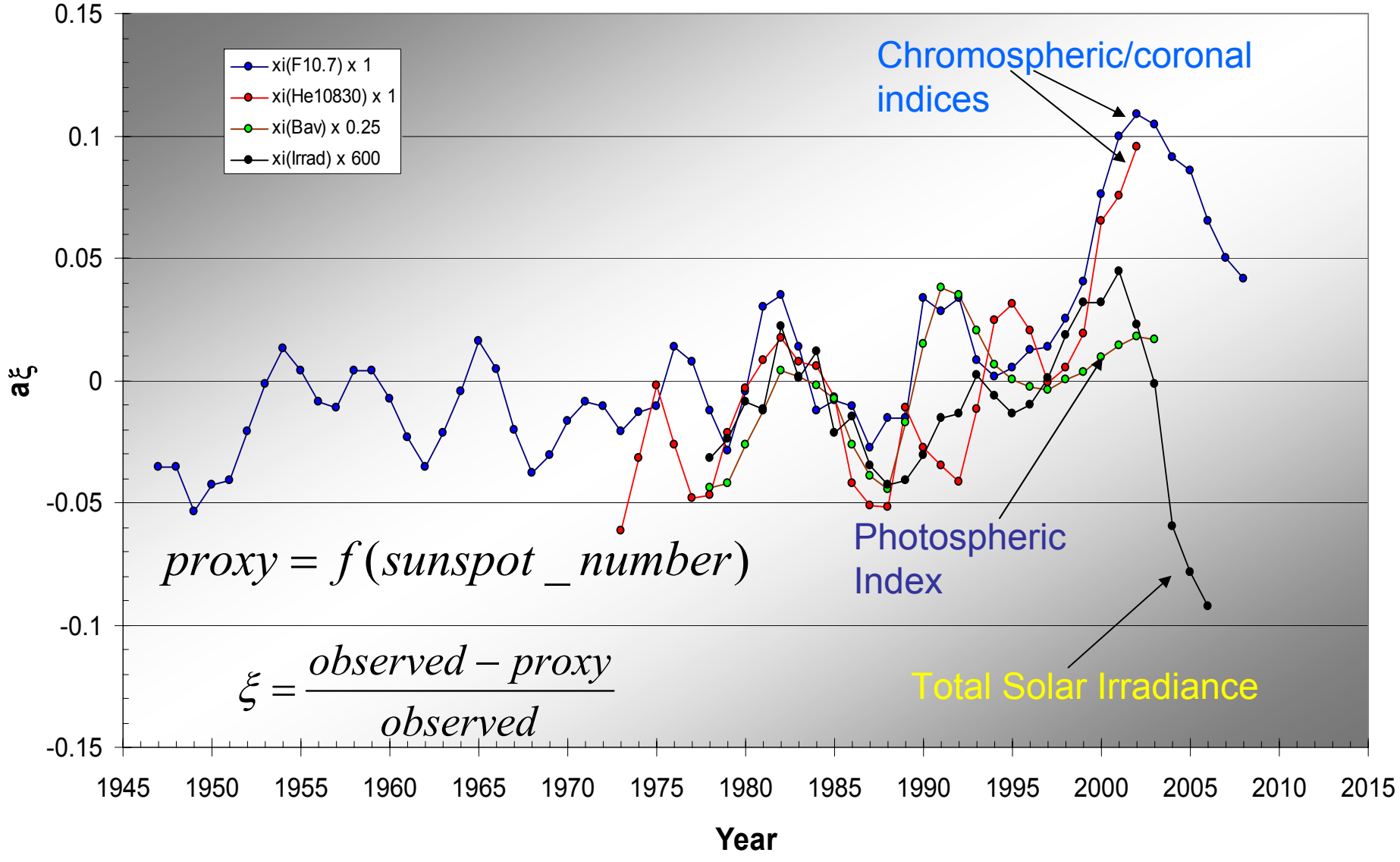
Cycle 23 was Different. Will Cycle 24 be?



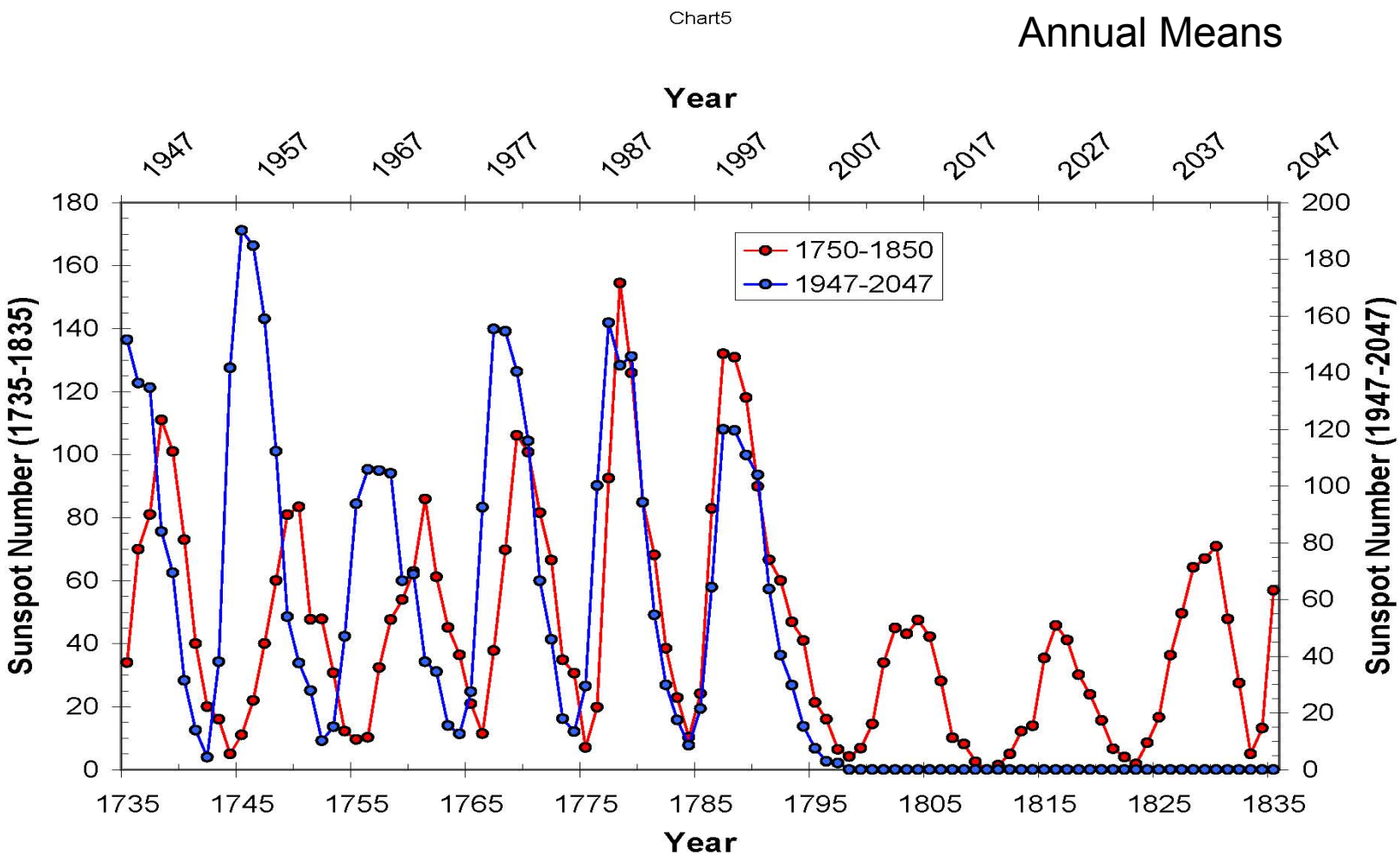
Changes in Behaviour in Earlier Cycles?



Other Indices



Has It Happened Before?

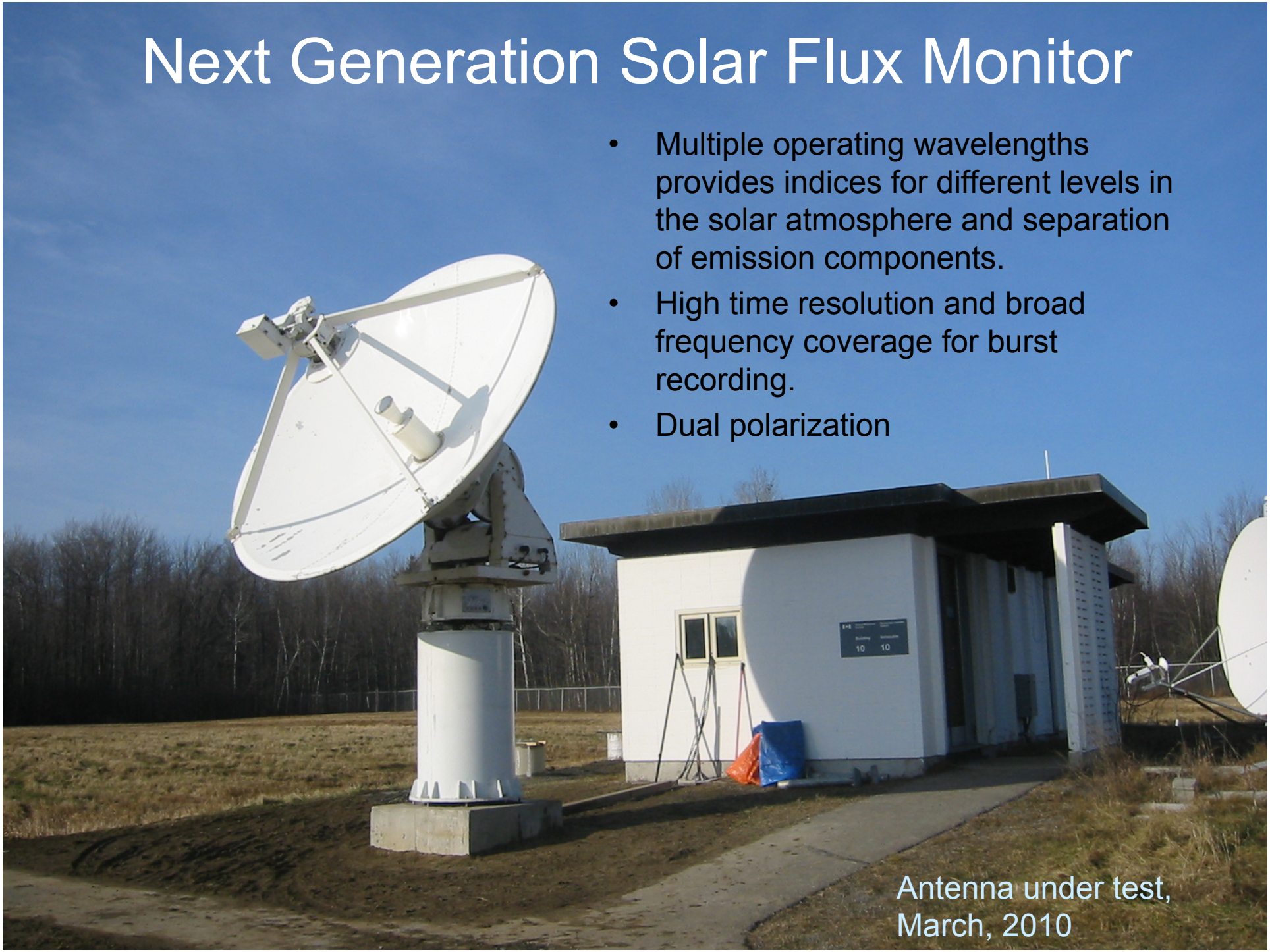


Conclusions

- In Cycle 23 the relationship between coronal/chromospheric activity and photospheric activity changed.
- Indications are that in Cycle 24 so far the deviation from "standard behaviour" is continuing or perhaps increasing.
- The next cycle is probably going to be a weak one. Could this be a precursor to a series of weak cycles?
- There are indications in earlier cycles of a changing behaviour.
- Use of one index as a proxy for another index or some other solar parameter, may not always be reliable, because the relationships between different indices can change.
- On the other hand, changing relationships between proxies may provide a very high resolution detector of deviations from "standard behaviour".
- Weird solar behaviour should be good for solar and space weather funding.

Next Generation Solar Flux Monitor

- Multiple operating wavelengths provides indices for different levels in the solar atmosphere and separation of emission components.
- High time resolution and broad frequency coverage for burst recording.
- Dual polarization



Antenna under test, March, 2010