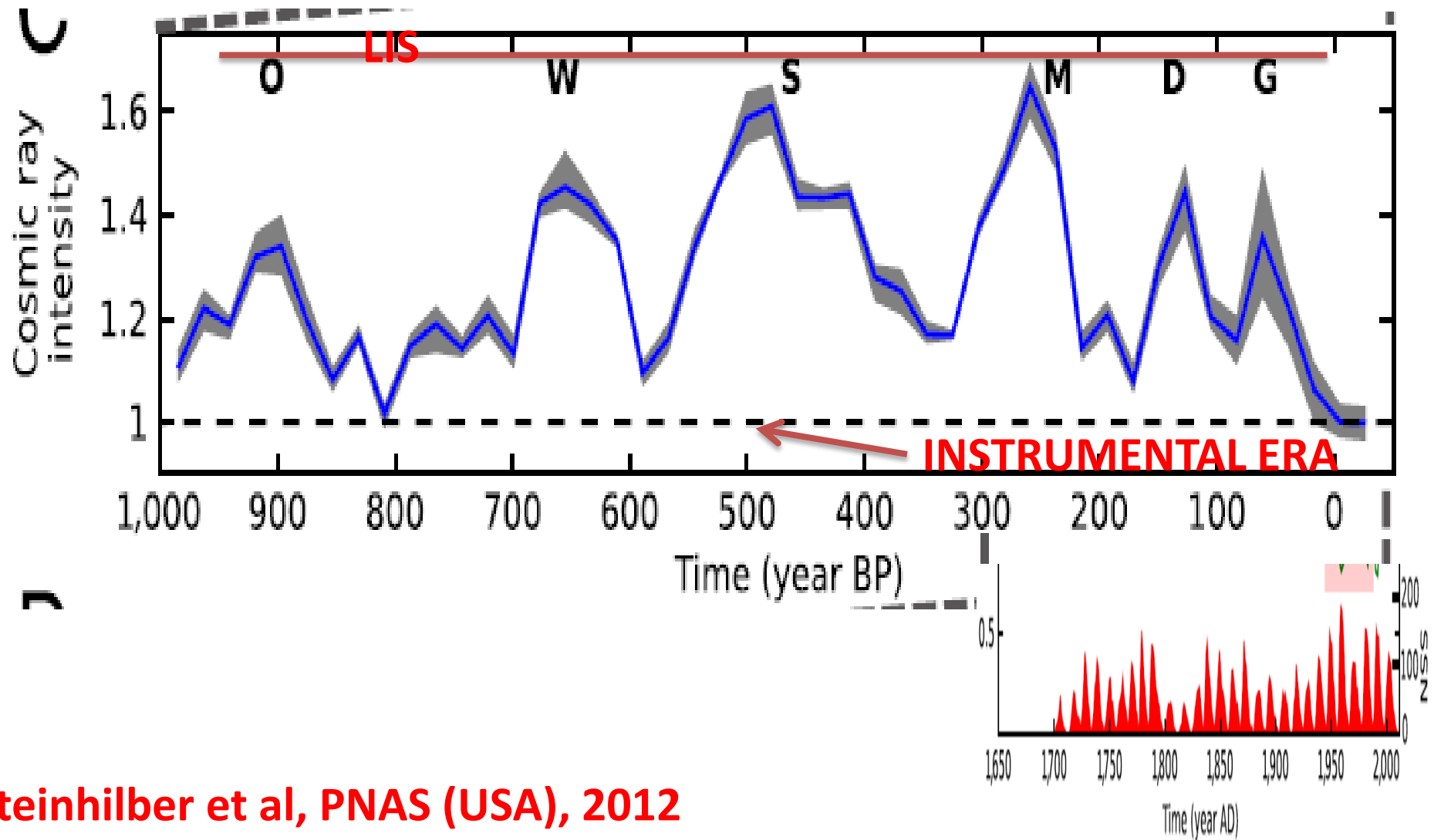


The Hallstatt, Eddy, and de Vries Cycles in Solar Activity in the Recent and Distant Past.

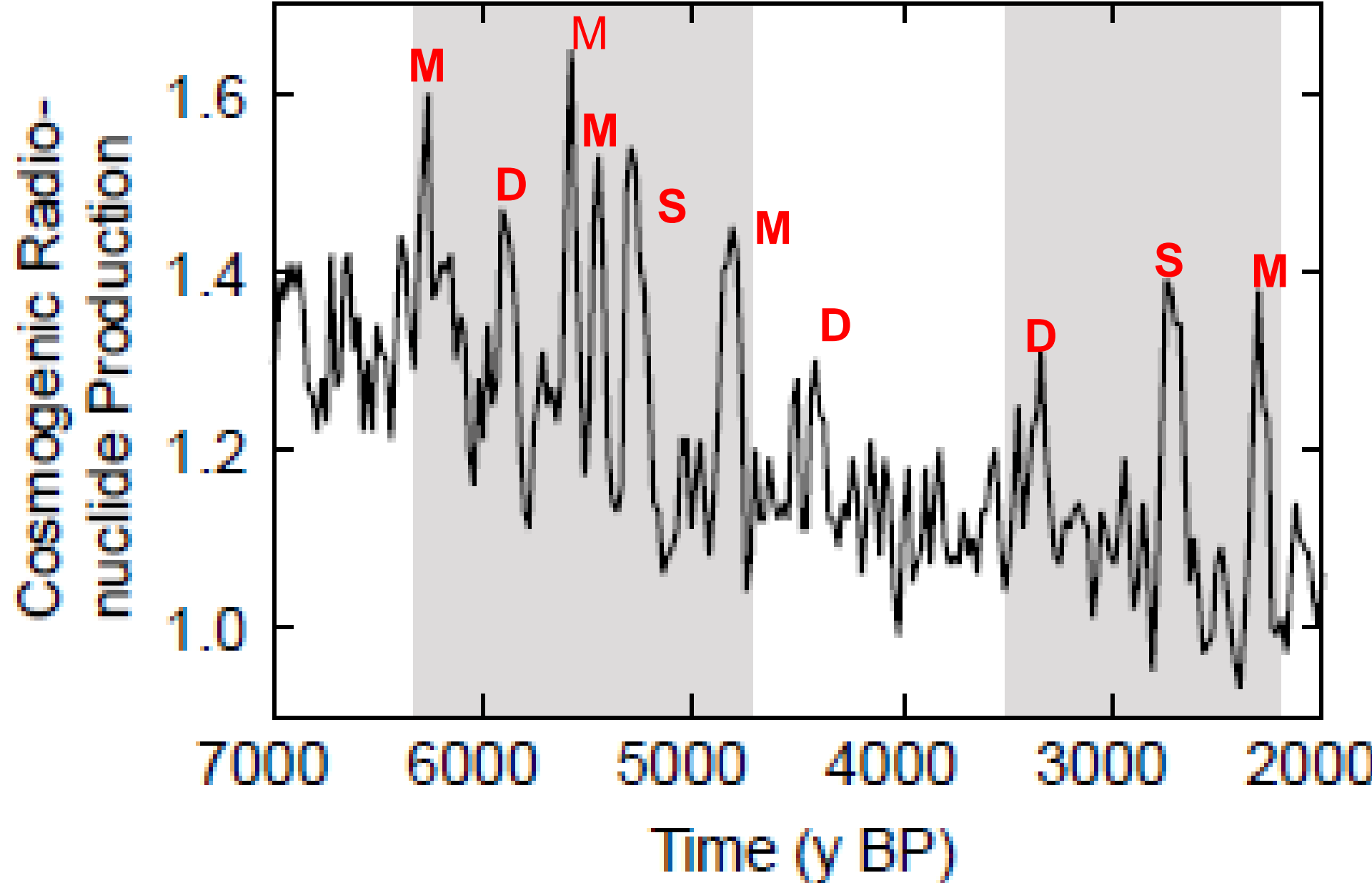
K.G.McCracken and J. Beer
jellore@hinet.net.au

THE SEQUENCE OF GRAND MINIMA- 950-2000 AD



Steinhilber et al, PNAS (USA), 2012

ANOTHER SEQUENCE OF GRAND MINIMA- AND >1000 YR LONG INTERVALS BETWEEN

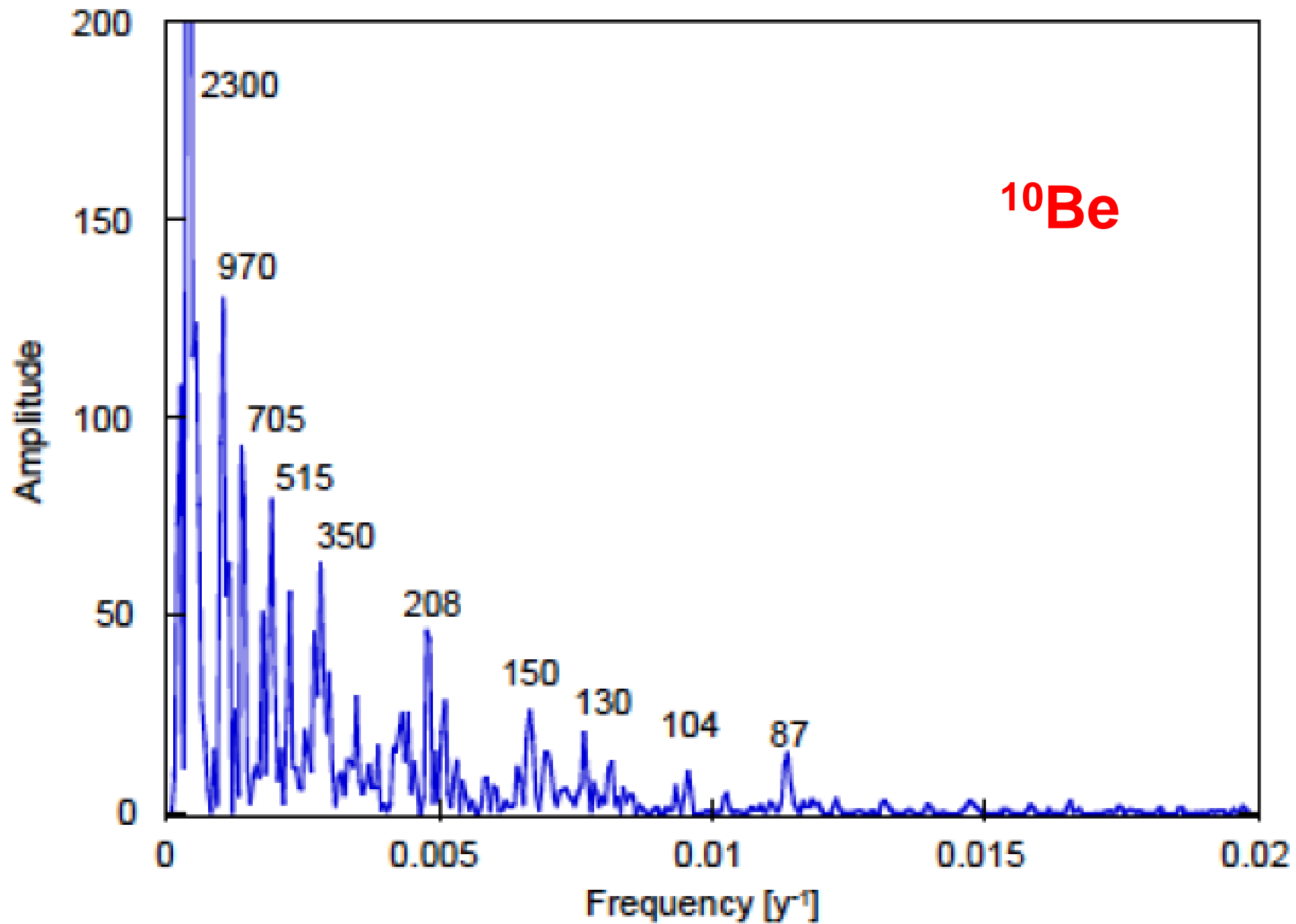


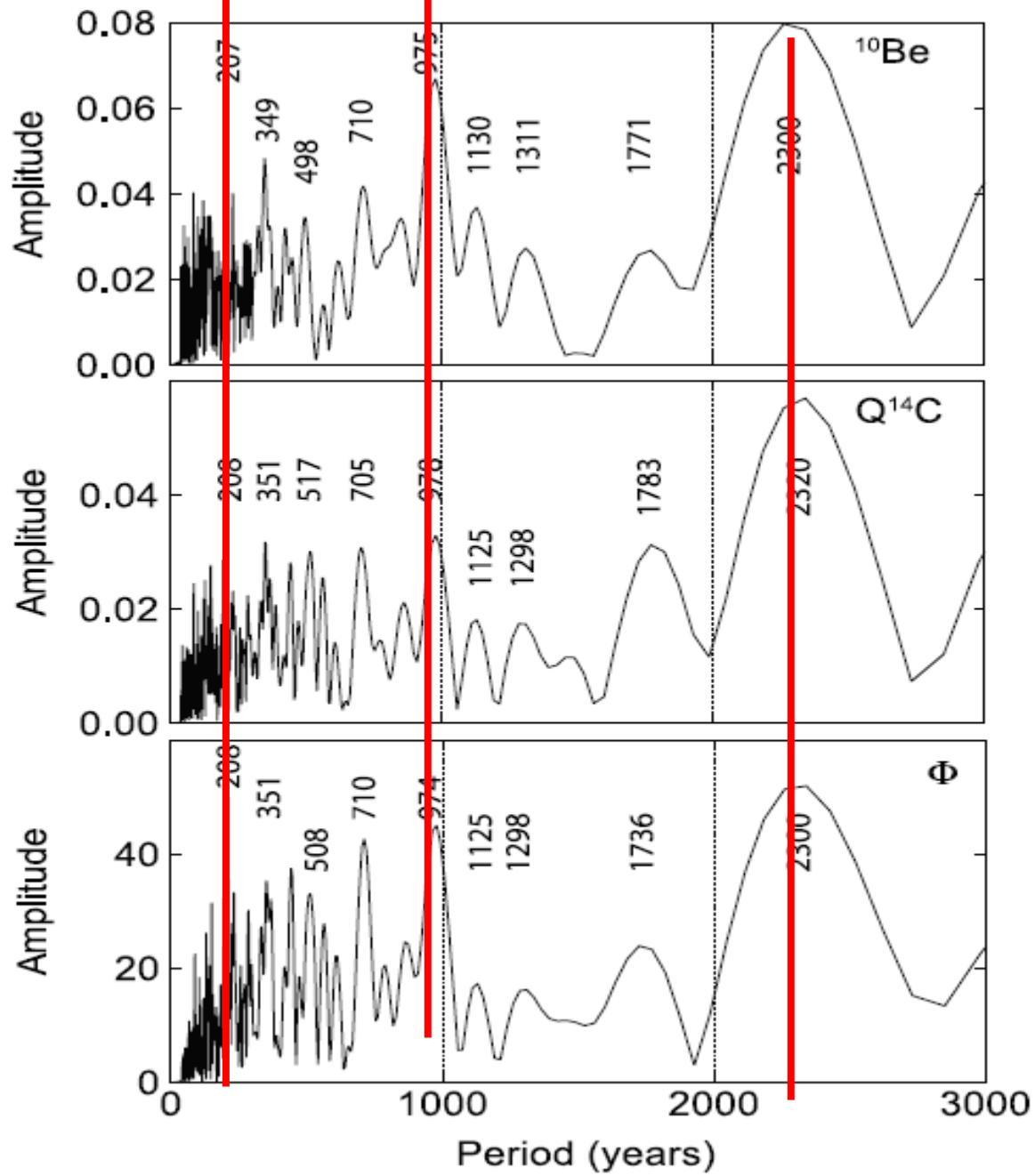
QUESTION

ARE THE GRAND MINIMA THAT WE SEE IN THE TIME DOMAIN OCCURRING AT RANDOM, OR IS THERE SOME UNDERLYING PERIODICITY ????

TO INVESTIGATE THIS, CONVERT TO THE FREQUENCY DOMAIN.

Gleissberg (1958, 1965), Sonett (1984), Stuiver (Many), Peristykh and Damon (2003); Snowball et al (2007), Knudsen et al (2009), and many others.





De Vries **208**
+/- 2.4y

Eddy **976**
+/- 53 y

Hallstatt **2310**
+/- 300 y

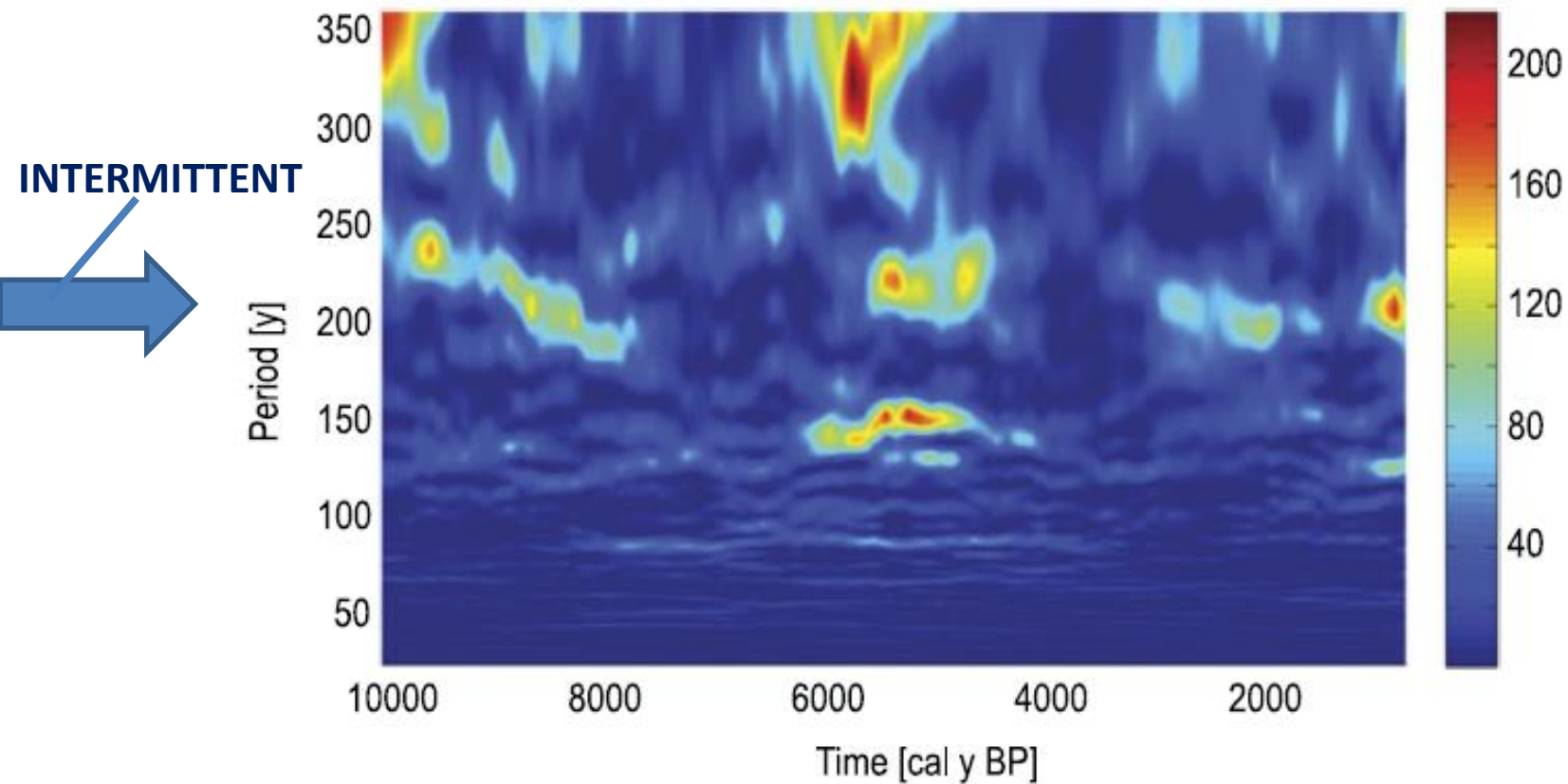


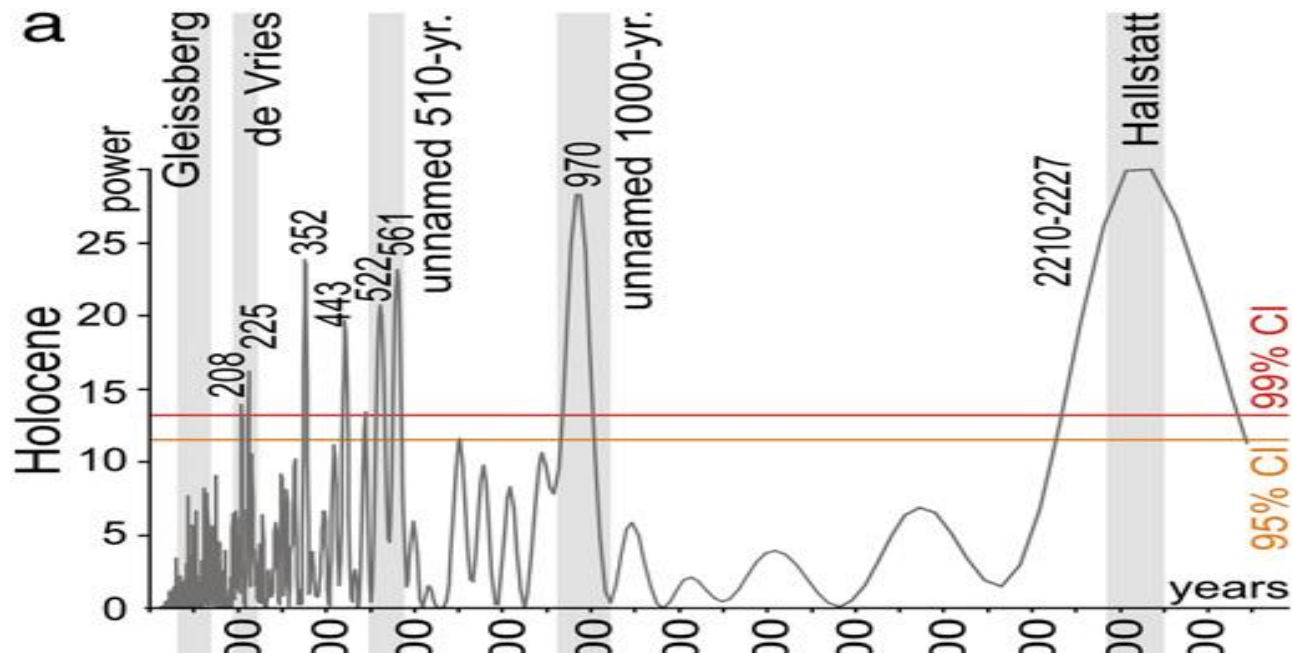
Figure 7 The Fourier scan for the interval 10 000–700 BP for periods from 50–350 years. This scan was generated using a 1500-year time window with a 100-year step from one Fourier spectrum to the next. The periods (y -axis) are given in years. Time (x -axis) is BP. See note in text regarding the Spörer, Maunder, and Dalton Minima.

THE PAST 50,000 YEARS

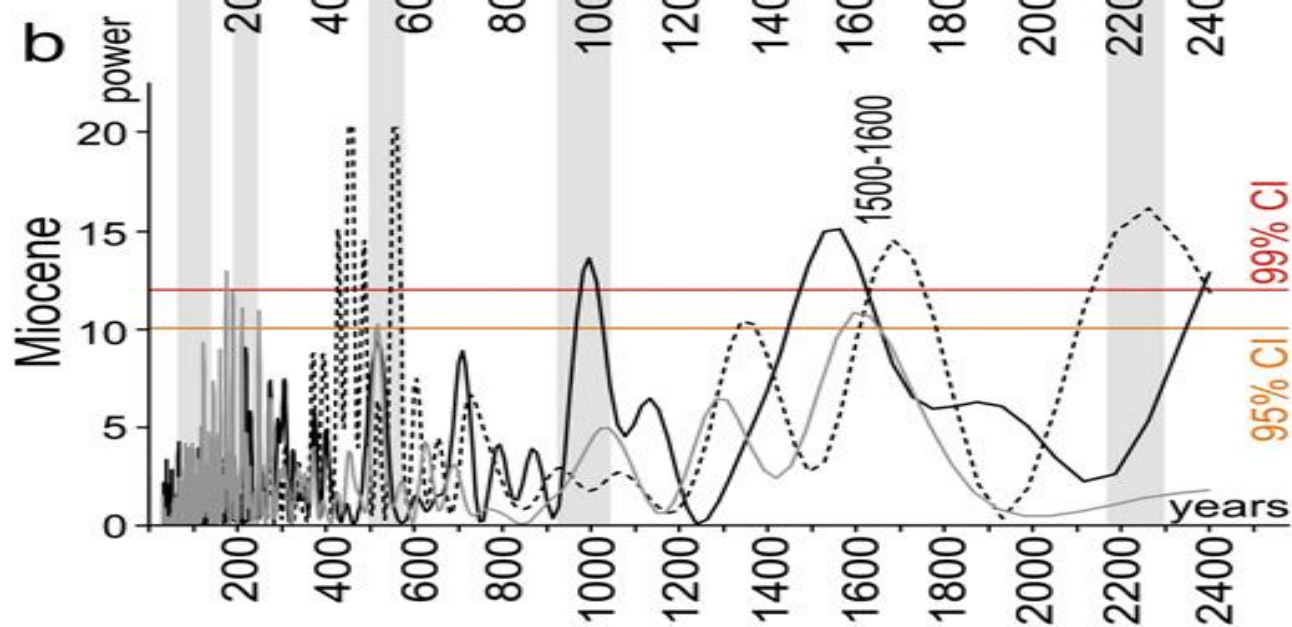
McCracken et al (2014)	9.4kBP standard deviation	^{10}Be & ^{14}C	208 (2.4)	976 (53)	2310 (300)
Castagnoli et al(1998)	2.6-0kBP	Thermo- luminescence.	207	not measured	
Usoskin et al (2006)	0.2-0 kBP	^{44}Ti			
Wagner et al (2001)	25kBP-50kBP	^{10}Be	205	~980	~2000
Deep Sea Temperatures		Biological	208	~800	~2300

>150 kBP

Horiuchi et al (2015)	170-200kBP	^{10}Be ice/sed.			~ 1700
Conquoin et al (2014)	325-336kBP	^{10}Be	208 not significant	980 and 2300 not investigated	
Kern et al (2012)	11.6 MBP	various	209***	~950	~1700
Shell Oil			208		



**HOLOCENE
10,000-0BP**



**MIOCENE
11.6 Million
years ago.**

CONCLUSIONS

- (1) The thermo-luminescence and meteoritic data indicate that the variations in the cosmic radiation at Earth are not due to terrestrial factors. They are of solar origin.**
- (2) The de Vries, Eddy, and Hallstatt periodicities appear to have extended back at least 50,000 y into the most recent glacial epoch.**
- (3) Furthermore, it appears possible that the de Vries, Eddy, and Hallstatt (and other) periodicities were present 11 Million years ago.**
- (4) This would imply a quite remarkable long-term periodic influence on the solar dynamo.**
- (5) It is worth looking at the geological and deep sea data.**



THANK YOU

2001/03/29 09:36 UT