Supplement to:

Holocene hydro-climatic variability and multi-frequency analyses at Lake Sidi Ali (Morocco)

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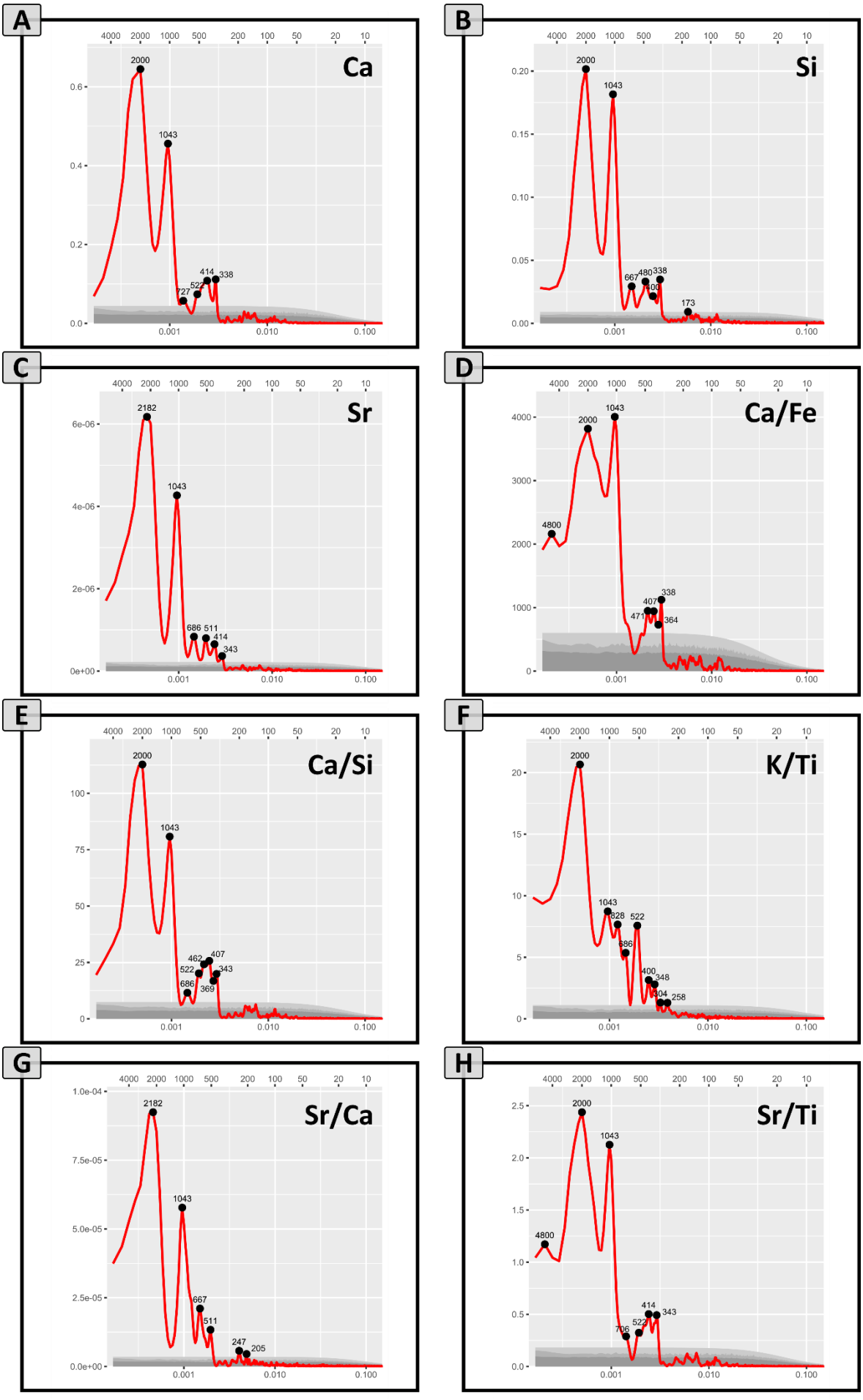
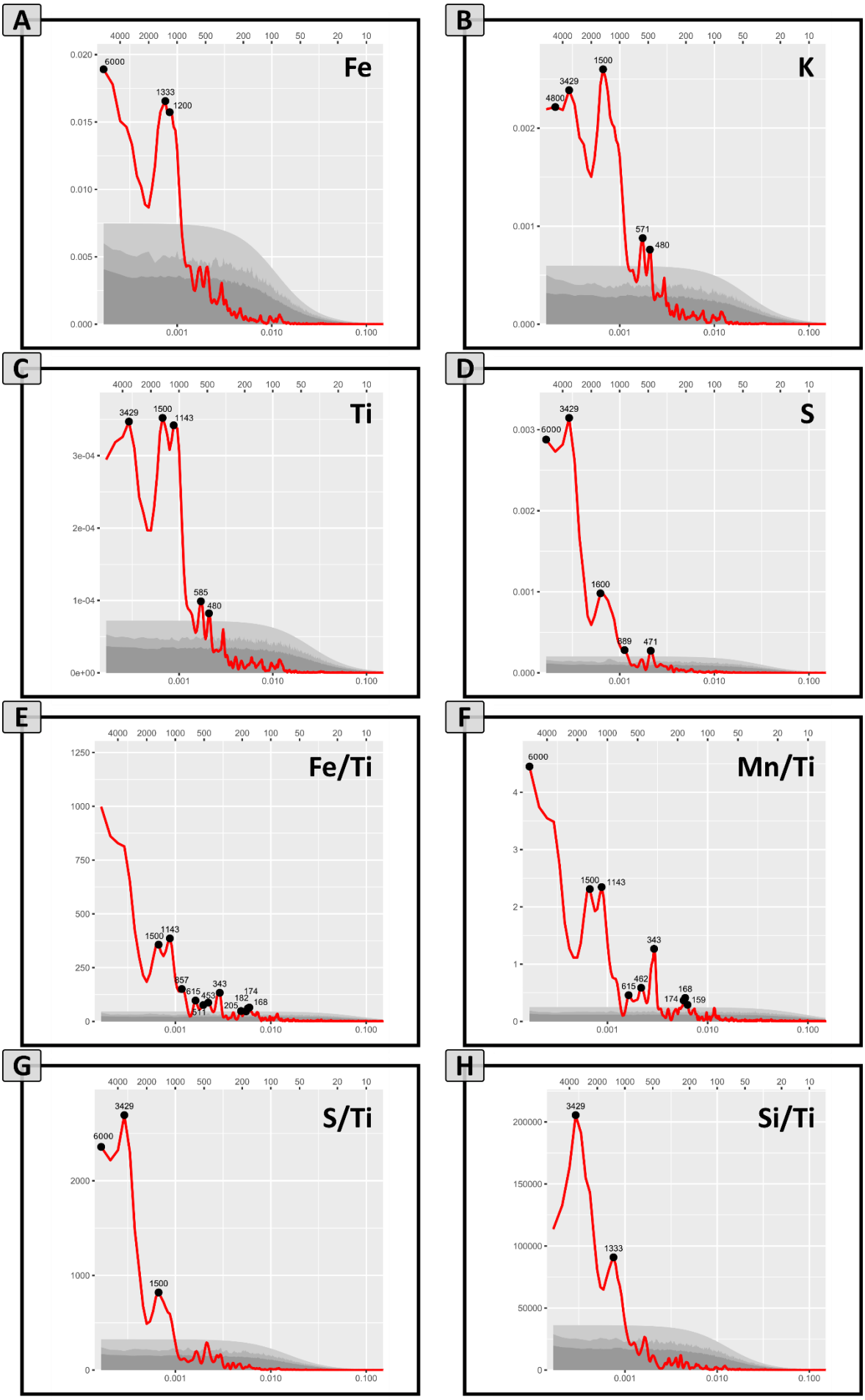
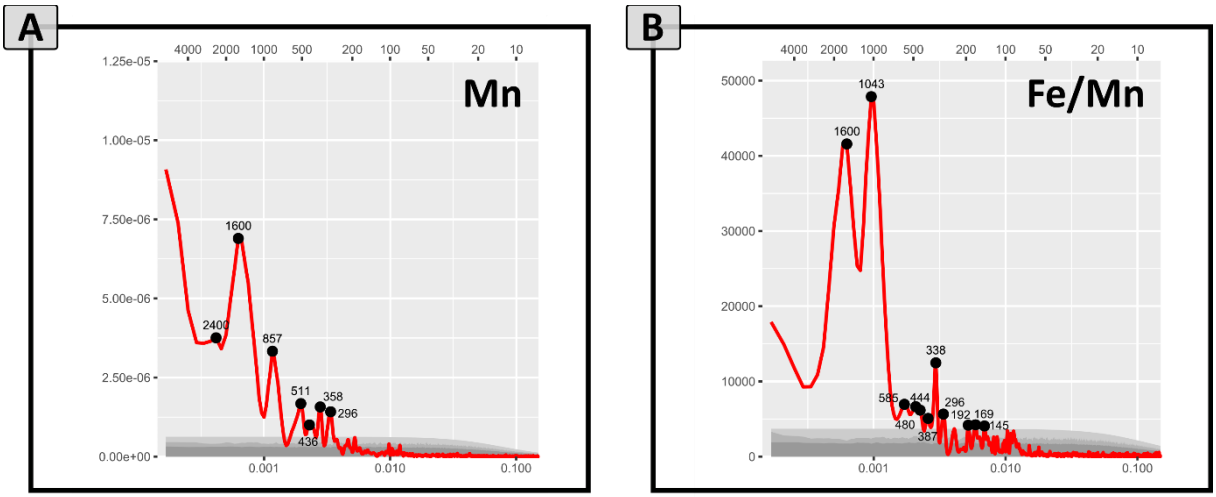

A
Ca
B
Si
C
Sr
D
Ca/Fe
E
Ca/Si
F
K/Ti
G
Sr/Ca
H
Sr/Ti

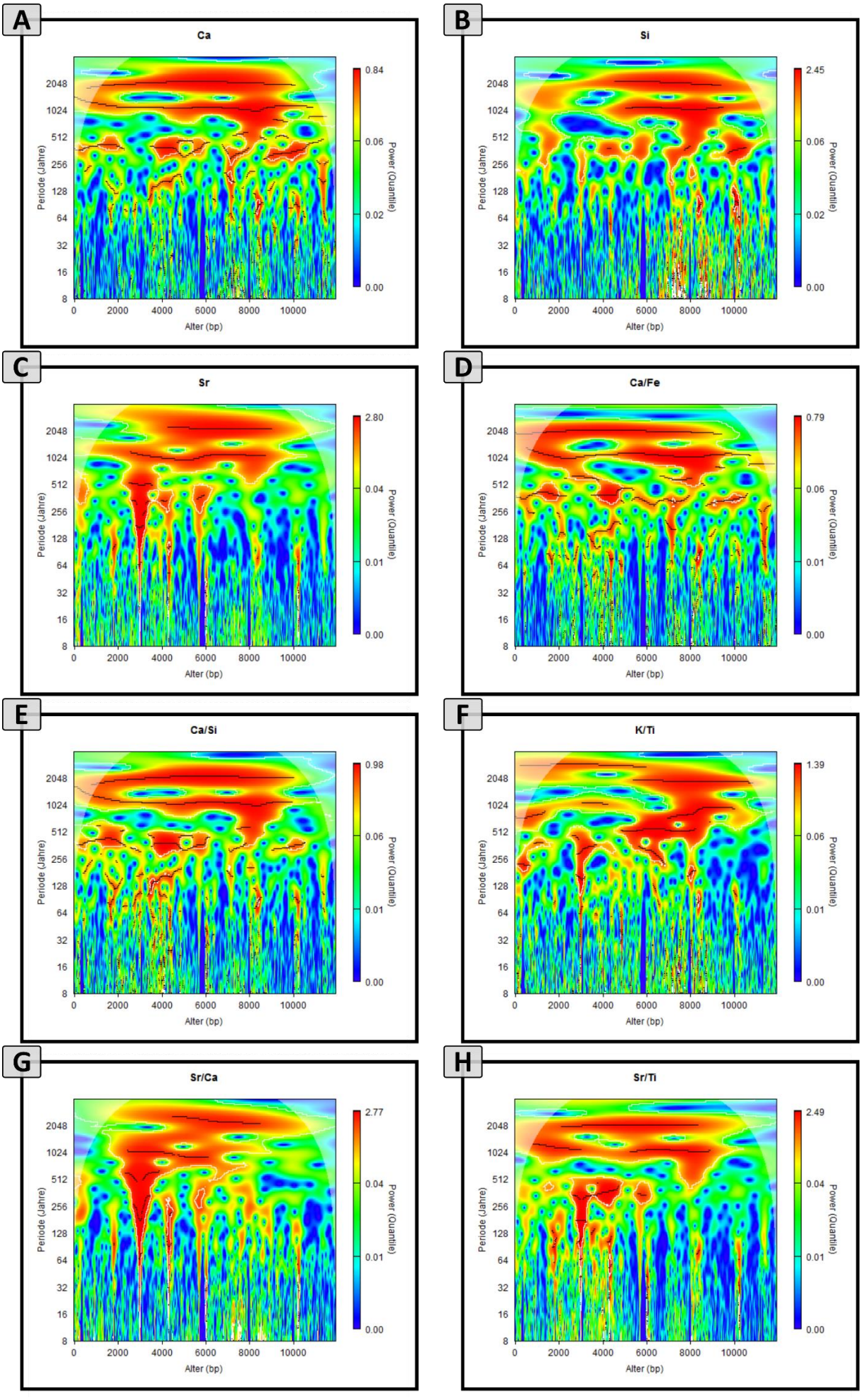
Supplement Figure 1: Redfit power spectra of XRF-scan-based proxies from Redfit Proxy Group 1; A) Calcium, B) Silicon, C) Strontium, D) Calcium/Iron ratio, E) Calcium/Silicon ratio, F) Potassium/Titanium ratio, G) Strontium/Calcium ratio, H) Strontium/Titanium ratio. Each Y-axis represents the power value of respective proxy. Each x-axis represents the frequency (lower label) and period in years (upper label). Grey areas show the significance level (darkest grey – 95%, dark grey – 99%, light grey – crit. Level). Black dots with numbers show local peaks with periodicity in years that are significant at the highest crit. Level.


A
Fe
B
K
C
Ti
D
S
E
Fe/Ti
F
Mn/Ti
G
S/Ti
H
Si/Ti

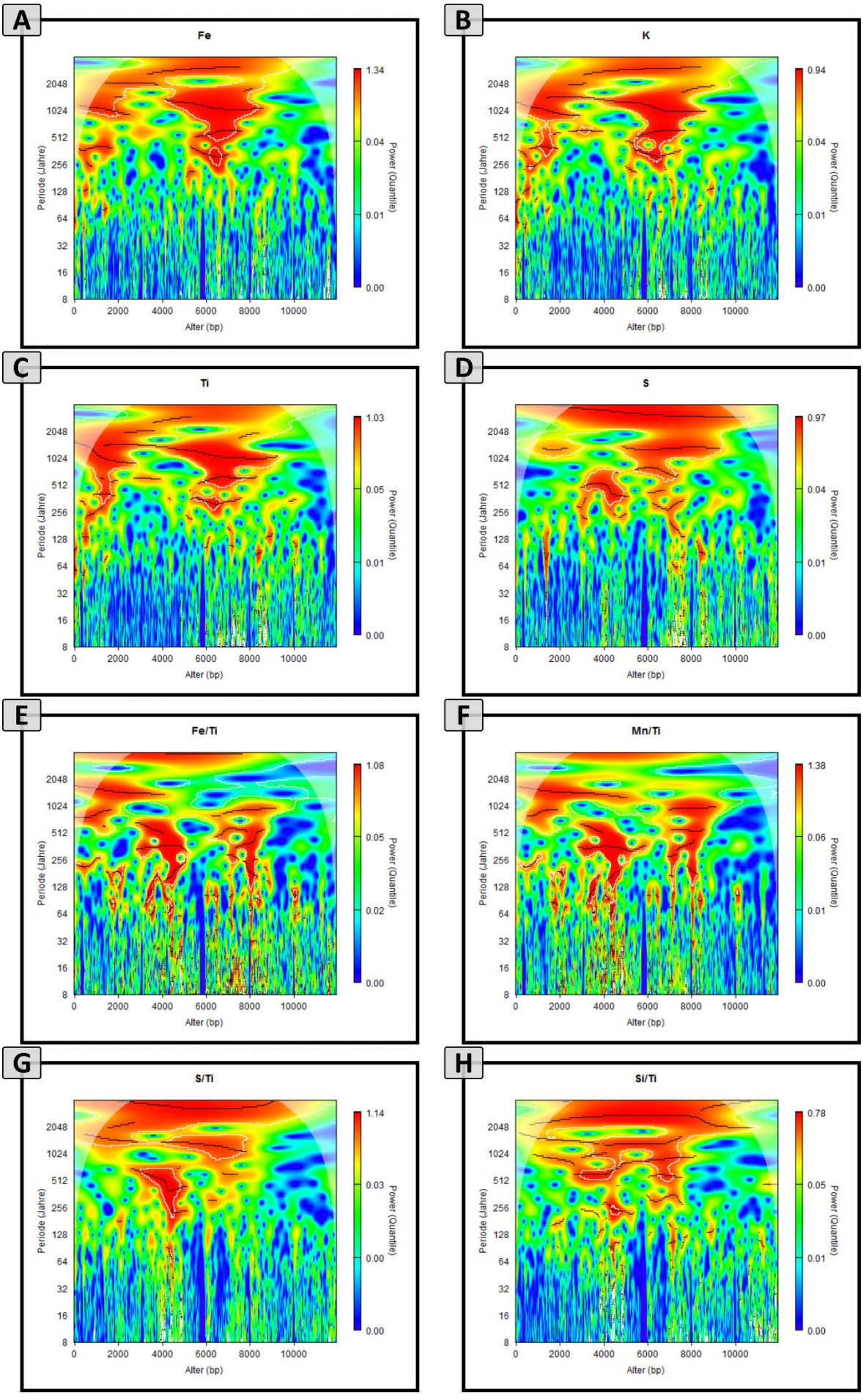
Supplement Figure 2: Redfit power spectra of XRF-scan-based proxies from Redfit Proxy Group 2; A) Iron, B) Potassium, C) Titanium, D) Sulfur, E) Iron/Titanium ratio, F) Manganese/Titanium ratio, G) Sulfur/Titanium ratio, H) Silicon/Titanium ratio. Each Y-axis represents the power value of respective proxy. Each x-axis represents the frequency (lower label) and period in years (upper label). Grey areas show the significance level (darkest grey – 95%, dark grey – 99%, light grey – crit. Level). Black dots with numbers show local peaks with periodicity in years that are significant at the highest crit. Level.



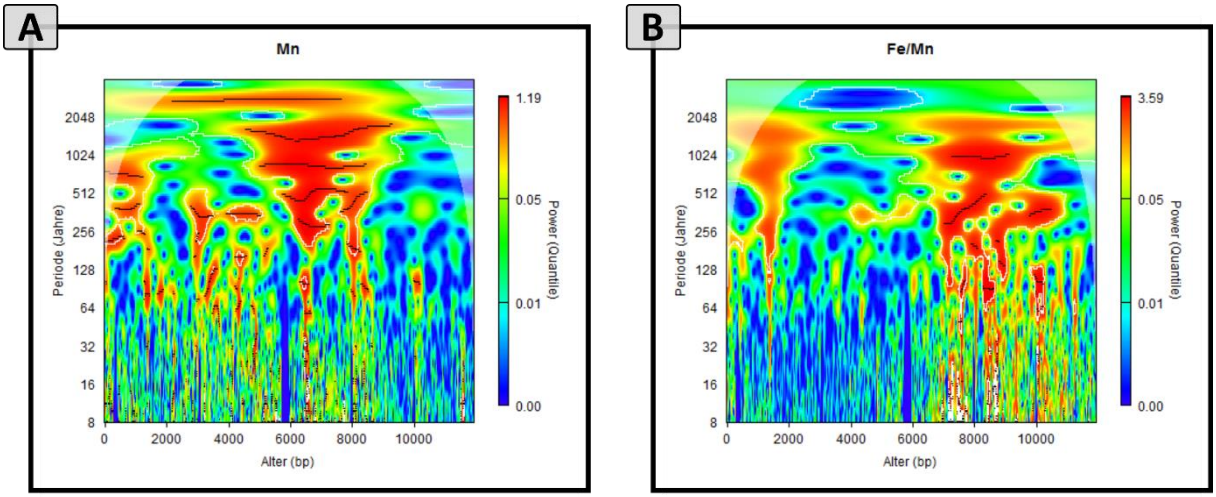
Supplement Figure 3: Redfit power spectra of XRF-scan-based proxies from Redfit Proxy Group 3; A) Manganese, B) Iron/Manganese ratio. Each Y-axis represents the power value of respective proxy. Each x-axis represents the frequency (lower label) and period in years (upper label). Grey areas show the significance level (darkest grey – 95%, dark grey – 99%, light grey – crit. Level). Black dots with numbers show local peaks with periodicity in years that are significant at the highest crit. Level.


A
Ca
B
Si
C
Sr
D
Ca/Fe
E
Ca/Si
F
K/Ti
G
Sr/Ca
H
Sr/Ti
Periode (Jahre)
Alter (bp)
Power (Quantile)

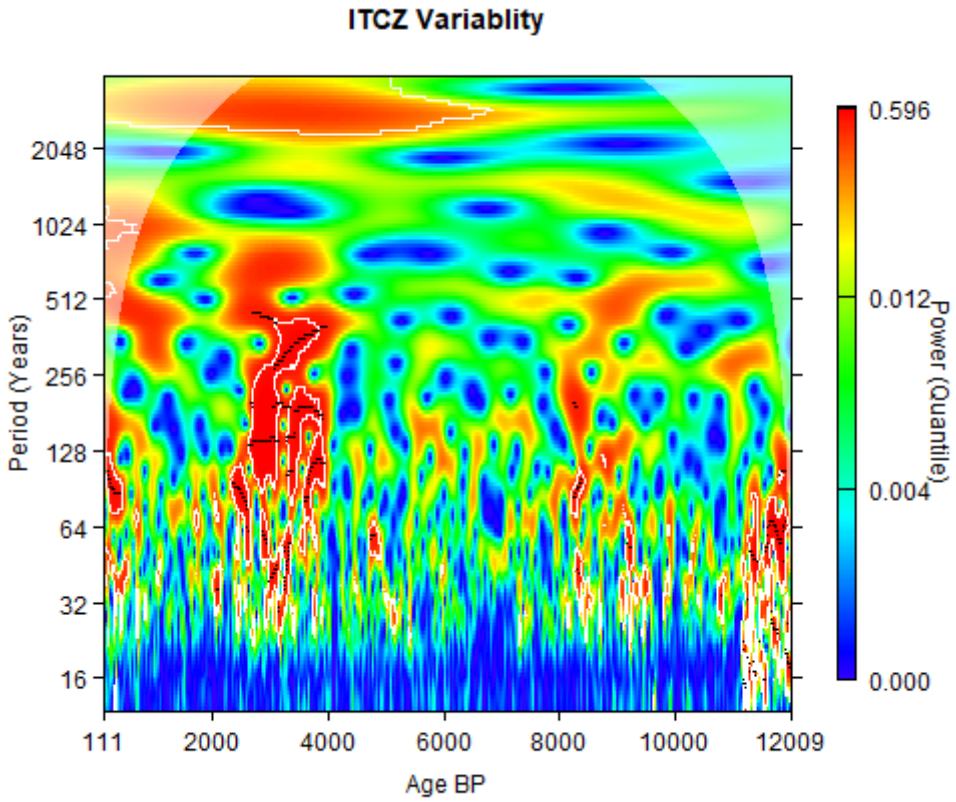
Supplement Figure 4: Wavelet power spectra of XRF-scan-based proxies from Redfit Proxy Group 1; A) Calcium, B) Silicon, C) Strontium, D) Calcium/Iron ratio, E) Calcium/Silicon ratio, F) Potassium/Titanium ratio, G) Strontium/Calcium ratio, H) Strontium/Titanium ratio. Colours show the specific power values. White lines enclose the significant areas and black lines local maxima. Grey facet shows the cone of influence.


A
Fe
B
K
C
Ti
D
S
E
Fe/Ti
F
Mn/Ti
G
S/Ti
H
Si/Ti
Periode (Jahre)
Alter (bp)
Power (Quantile)

Supplement Figure 5: Wavelet power spectra of XRF-scan-based proxies from Redfit Proxy Group 2; A) Iron, B) Potassium, C) Titanium, D) Sulfur, E) Iron/Titanium ratio, F) Manganese/Titanium ratio, G) Sulfur/Titanium ratio, H) Silicon/Titanium ratio. Colours show the specific power values. White lines enclose the significant areas and black lines local maxima. Grey facet shows the cone of influence.



Supplement Figure 6: Wavelet power spectra of XRF-scan-based proxies from Redfit Proxy Group 3; A) Manganese, B) Iron/Manganese ratio. Colours show the specific power values. White lines enclose the significant areas and black lines local maxima. Grey facet shows the cone of influence.



Supplement Figure 7: Wavelet power spectra of the Ti (%) values from Haug et al. (2001).

Supplement Table 1: Compilation of used XRF proxies related to the XRF proxy compilations in Cohen (2003) and Davies et al. (2015). appropriate to available elements, including extracted driving climatic signals and process levels

No.	Proxy	Climate signal	Process signal	Reference
1	Ca	Precipitation, Temperature	Evaporation, Bioproductivity, Erosion	Davies et al. 2015, Cohen 2003
2	Ca/Fe	other	Erosion	Davies et al. 2015
3	Ca/Si	Temperature	Other	Davies et al. 2015
4	Fe	Precipitation	Evaporation, Erosion, Redox	Davies et al. 2015, Cohen 2003
5	Fe/Mn	Precipitation	Redox	Davies et al. 2015, Cohen 2003
6	Fe/Ti	Precipitation	Evaporation, Erosion, Redox	Davies et al. 2015
7	K	Precipitation	Erosion	Davies et al. 2015, Cohen 2003

8	K/Ti	Precipitation, Temperature	Other	Davies et al. 2015
9	Mn	Precipitation	Evaporation, Erosion, Redox	Davies et al. 2015, Cohen 2003
10	Mn/Ti	Precipitation, Temperature	Redox	Davies et al. 2015
11	S	Temperature	Evaporation, Bioproductivity	Davies et al. 2015, Cohen 2003
12	S/Ti	Other	Evaporation, Bioproductivity	Davies et al. 2015
13	Si	Precipitation, Temperature	Erosion, Bioproductivity	Davies et al. 2015, Cohen 2003
14	Si/Ti	Temperature	Bioproductivity	Davies et al. 2015
15	Sr	Other	Evaporation, Bioproductivity, Erosion	Davies et al. 2015, Cohen 2003
16	Sr/Ca	Temperature	Bioproductivity	Davies et al. 2015, Cohen 2003
17	Sr/Ti	Temperature	Bioproductivity	Davies et al. 2015
18	Ti	Precipitation	Erosion	Davies et al. 2015, Cohen 2003

References

Cohen, A.S., 2003. Paleolimnology. The history and evolution of lake systems. New York; Oxford University Press, Oxford.

Davies, S.J., Lamb, H.F., Roberts, S.J., 2015. Micro-XRF Core Scanning in Palaeolimnology: Recent Developments. In: Croudace, I.W., Rothwell, R.G. (Eds.), Micro-XRF Studies of Sediment Cores. Springer Netherlands, Dordrecht, pp. 189-226.

Haug, G.H., Hughen, K.A., Sigman, D.M., Peterson, L.S., Röhl, U., 2001. Cariaco basin trace metal data (titanium) of ODP Hole 165-1002C.