Solar Influences
on the Magnetosphere, Ionosphere and Atmosphere
Primorsko, Bulgaria, from 13 to 17 September 2021

Long-Term Atlantic Multidecadal Oscillation Driven by Solar Harmonics

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OBJECTIVES

- Determination of common solar and AMO cycles

USED DATA

- Total Solar Irradiance (TSI)
- Atlantic Multidecadal Oscillation

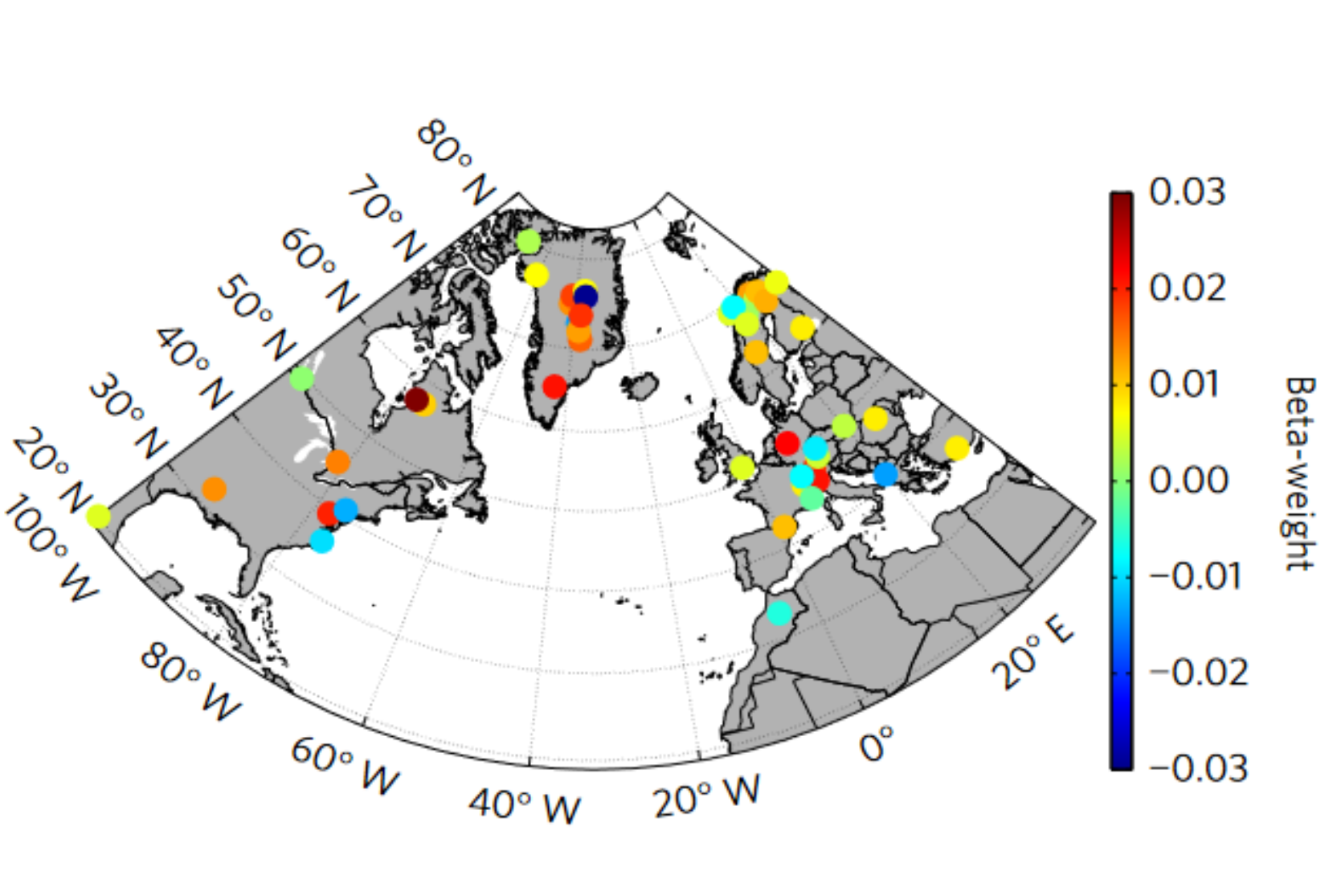
METHODS

- Partial Fourier approximation + Method of Least Squares; FFT

RESULTS

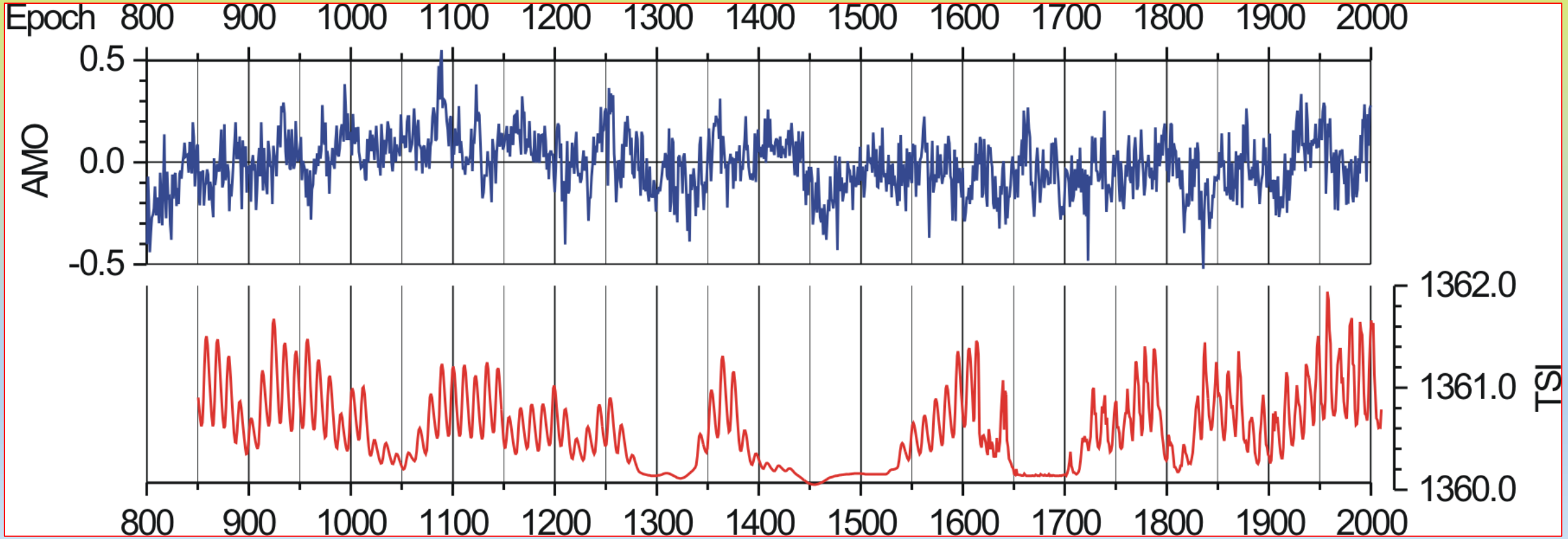
- Decadal and centennial common cycles of AMO and TSI variations.

AMO data location

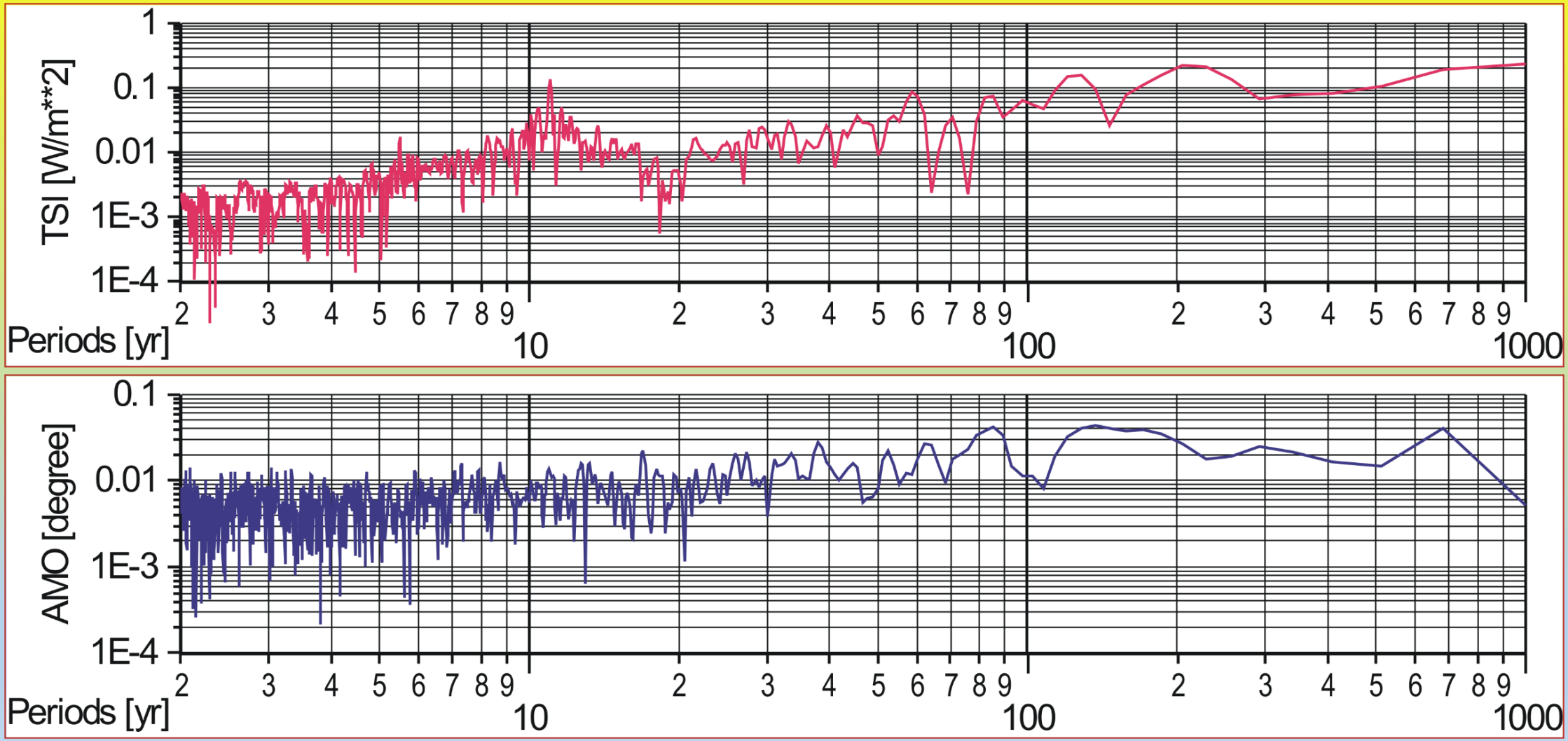


TSI and AMO Data

- 1200-year long time series.
- Reconstructed by principal component regression method of 46 annually-resolved terrestrial proxy records. Region 30N-80N, 100W-35E.
- Irradiance from 850 to 1609 is extension of NOAA CDR v02r02 using Roth & Joos (2013) TSI from cosmogenic 14C with added 11.0 year cycle

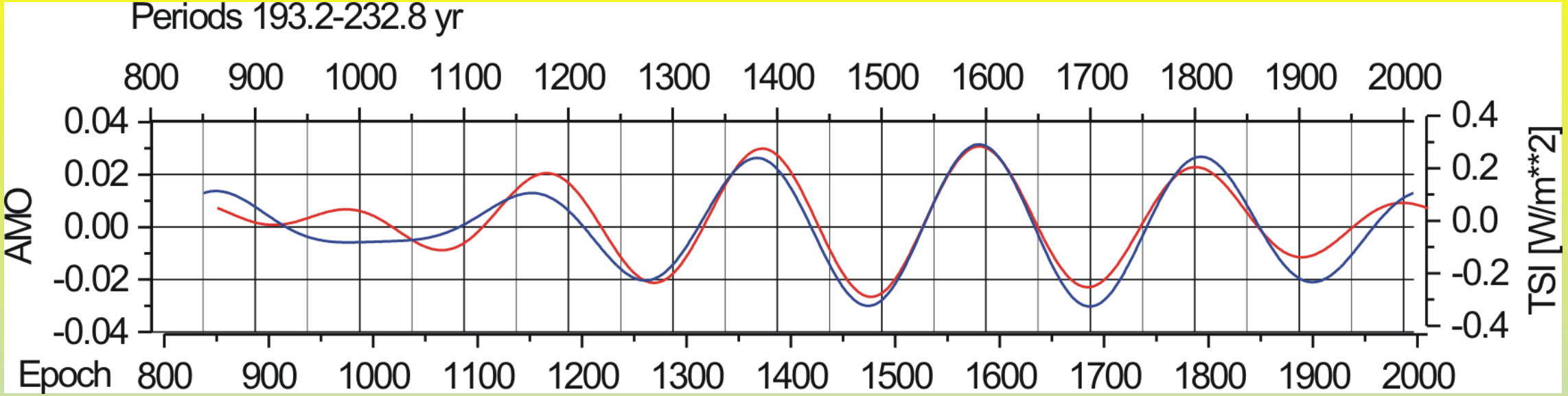


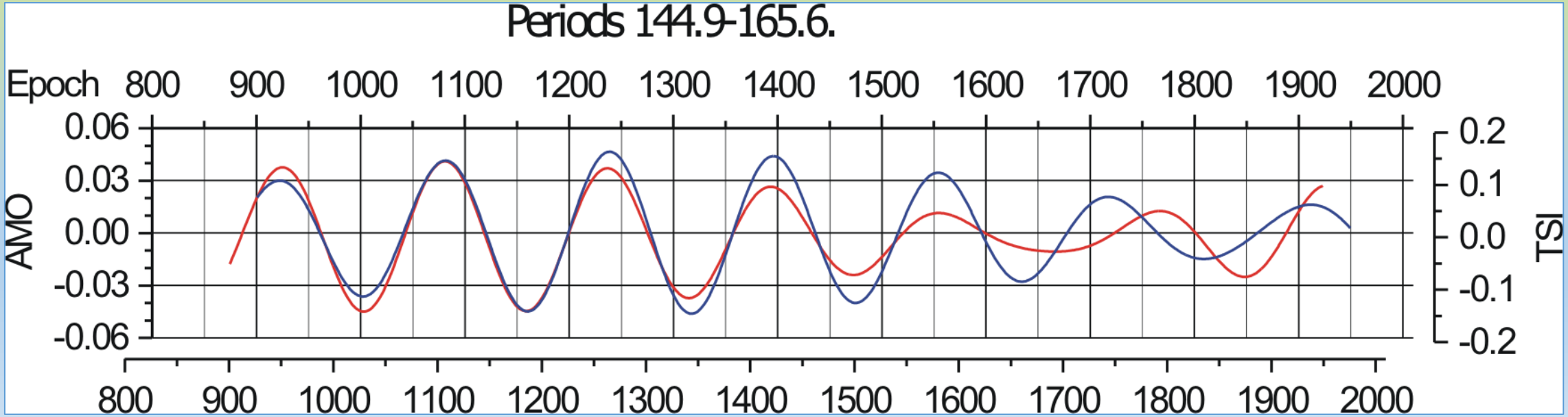
Time series spectra



- Common long-period parts

Solar influence on centennial cycles of AMO variations





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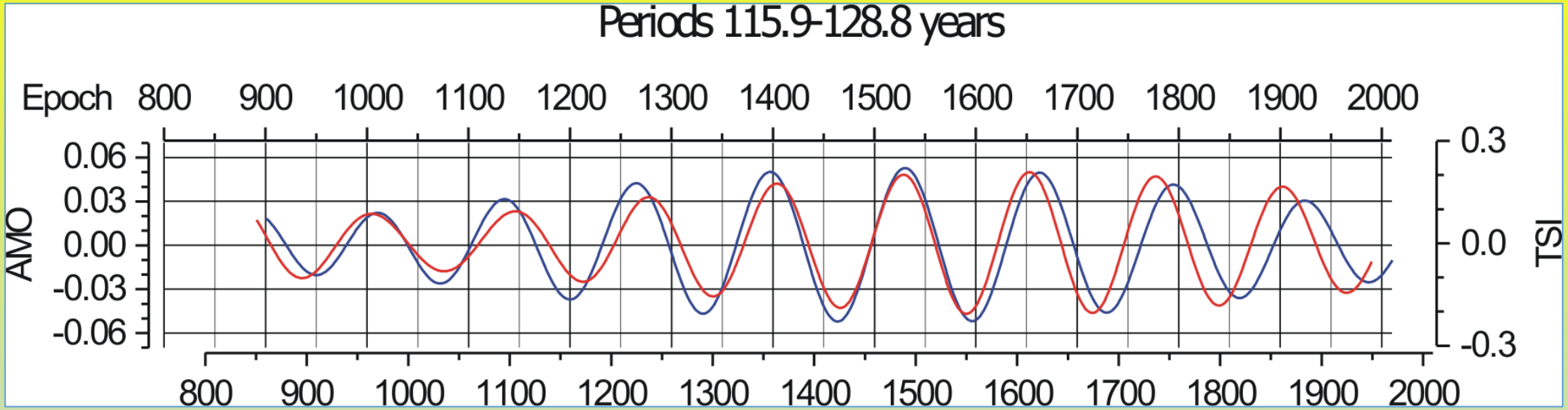
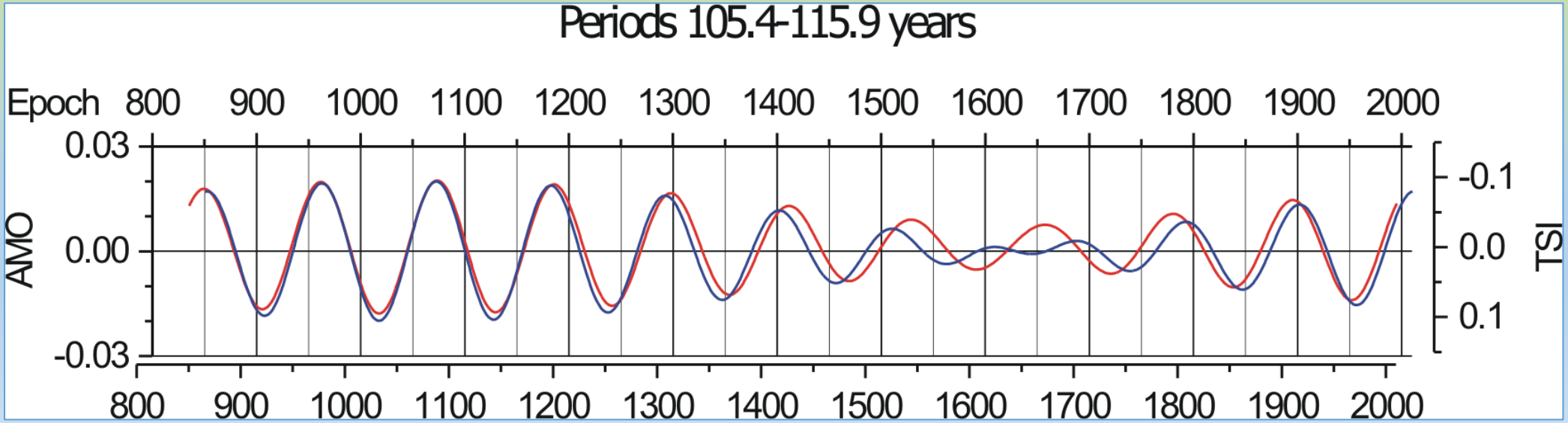
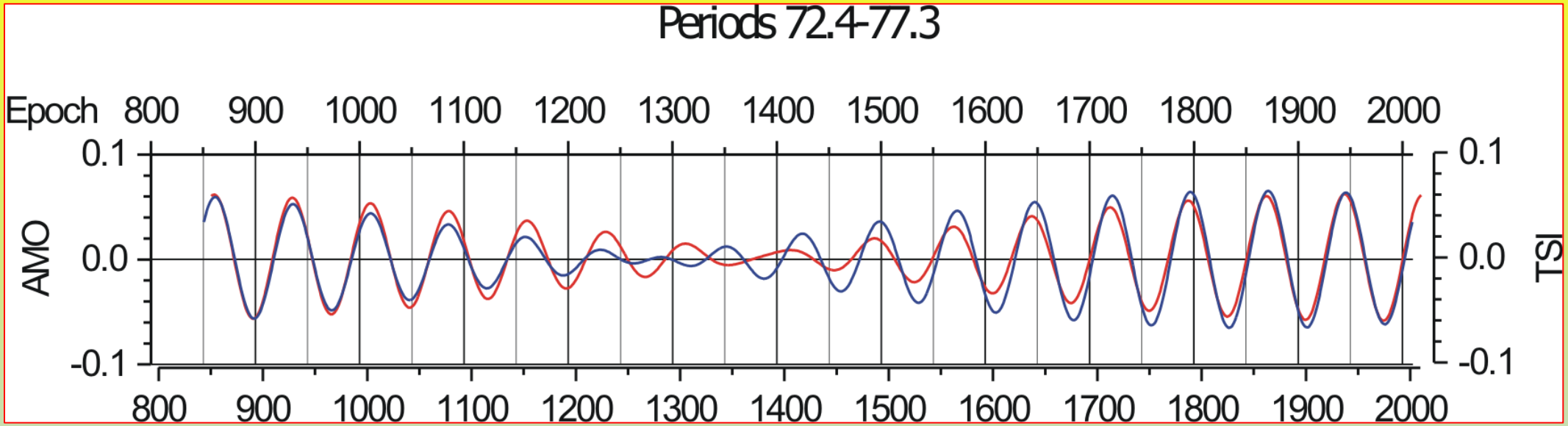
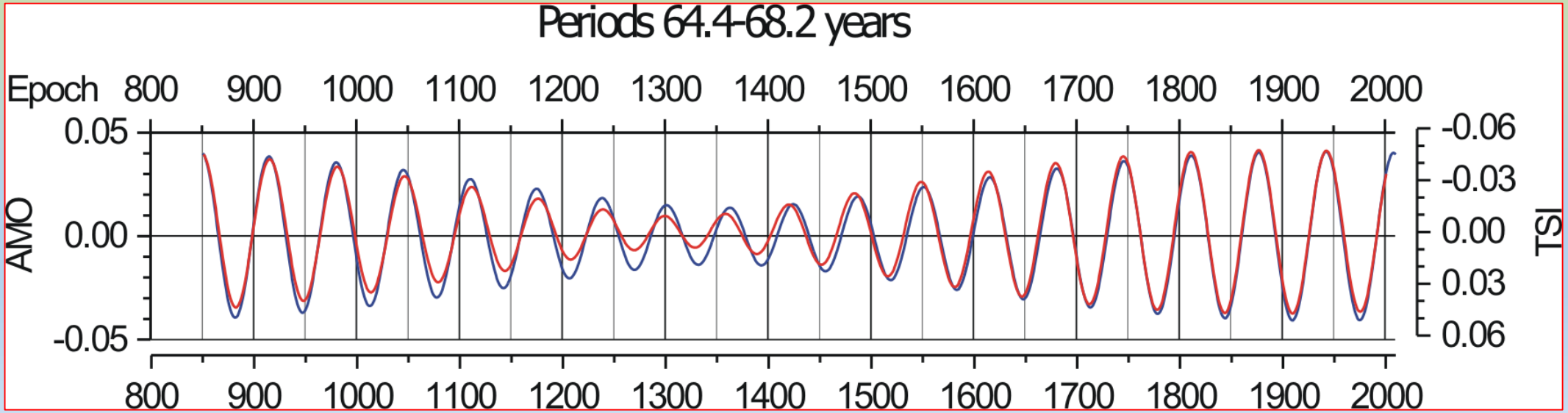


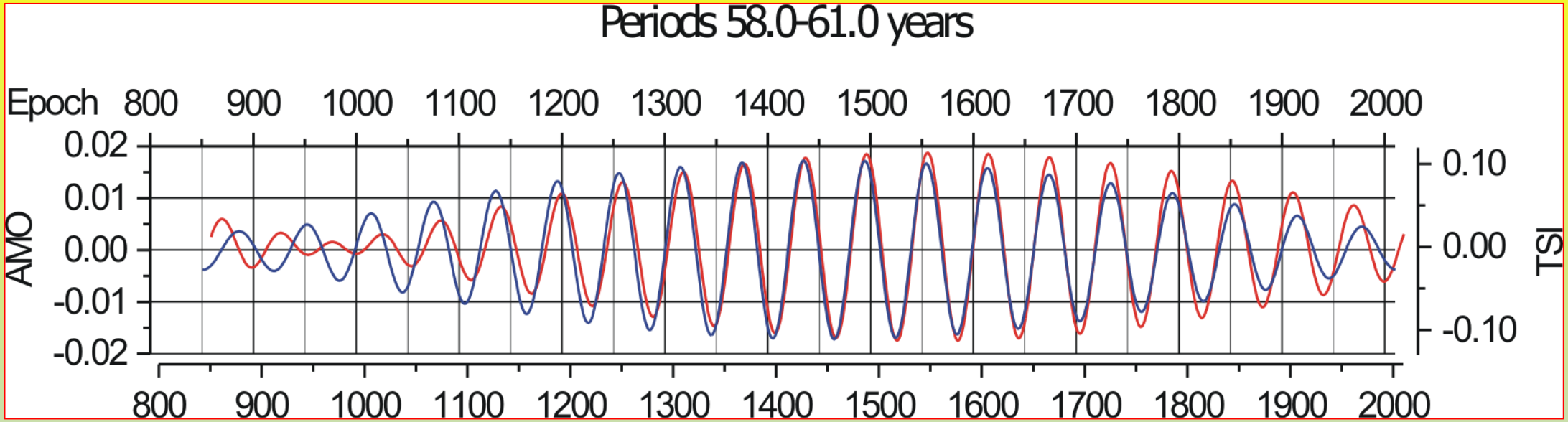


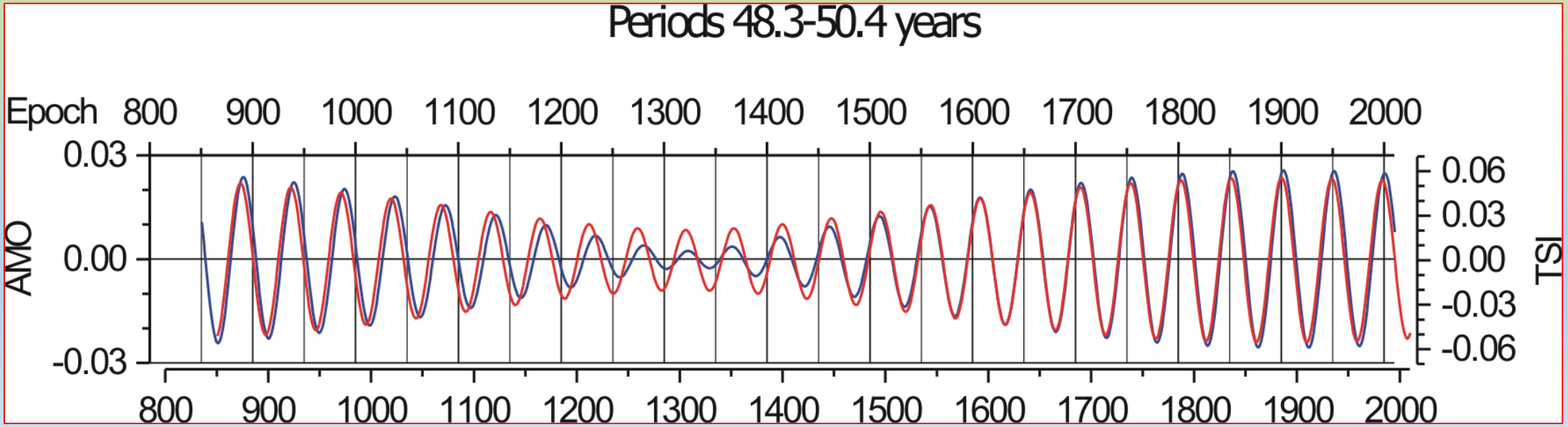
Solar influence on decadal cycles of AMO variations





Solar influence on decadal cycles of AMO variations





CONCLUSIONS

- The centennial and decadal cycles of Atlantic Multidecadal Oscillation are derived from 1200-year time series by the method of Partial Fourier Approximation with accuracy better than 0.008°C. These cycles are compared with the corresponding TSI cycles, derived by the PFA Method with accuracy better than 5mW/m^2.
- Good agreement exist between the TSI and AMO cycles in 8 narrow frequency bands with periods 48.3-50.4; 58-61; 64.4-68.2; 72.4-77.3; 105-116; 116-129; 145-166; 193 -232 years

Project “PRIANTROPO”

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ФОНД НАУЧНИ ИЗСЛЕДВАНИЯ
МИНИСТЕРСТВО НА ОБРАЗОВАНИЕТО И НАУКАТА

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Thank you for your attention!

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