Solar Influences
on the Magnetosphere, Ionosphere and Atmosphere
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Solar and Cosmic Rays Influence on Winter Temperature Variations in North Siberia

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OBJECTIVES

- Determination of temperature rise in North Siberia

USED DATA

- Total Solar Irradiance (TSI)
- Cosmic Rays (CR)
- Winter temperature in North Siberia

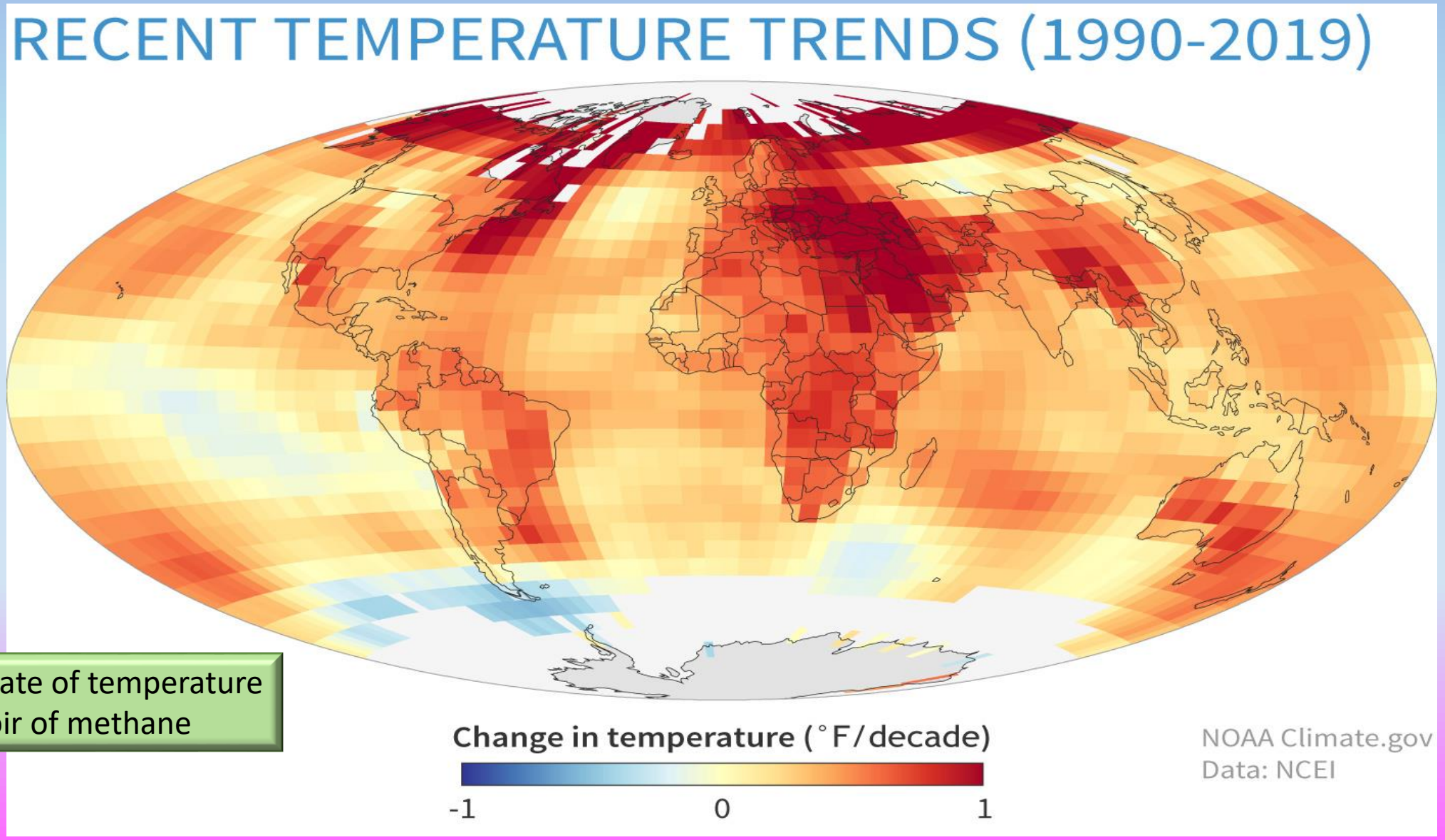
METHODS

- Partial Fourier approximation + Method of Least Squares; FFT

RESULTS

- Some common cycles of TSI, CR and Winter Siberia temperature.

Why winter temperature in North Siberia?

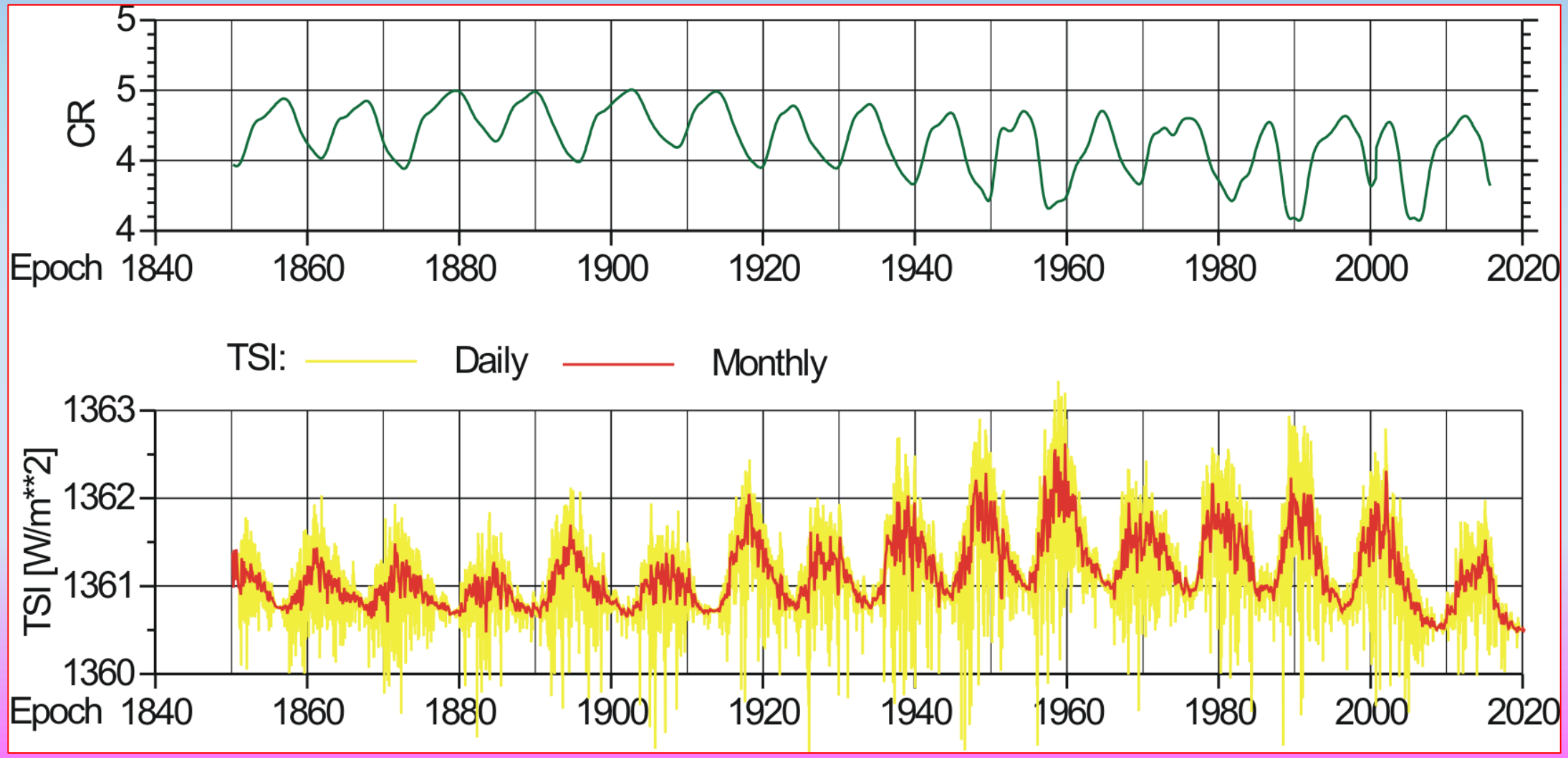


- High decadal rate of temperature
- Global reservoir of methane

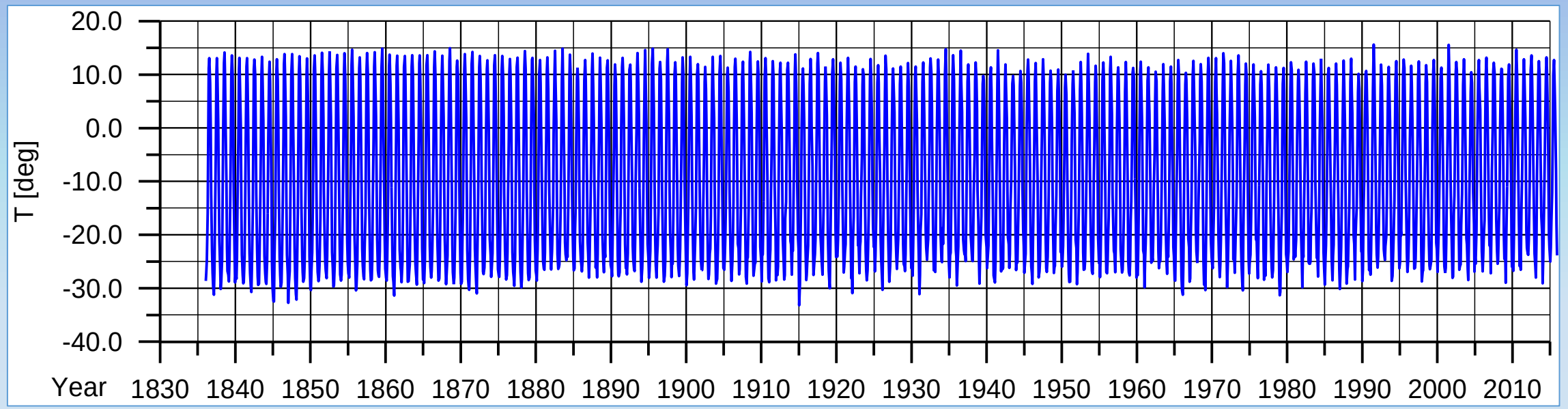
Why winter temperature in North Siberia?

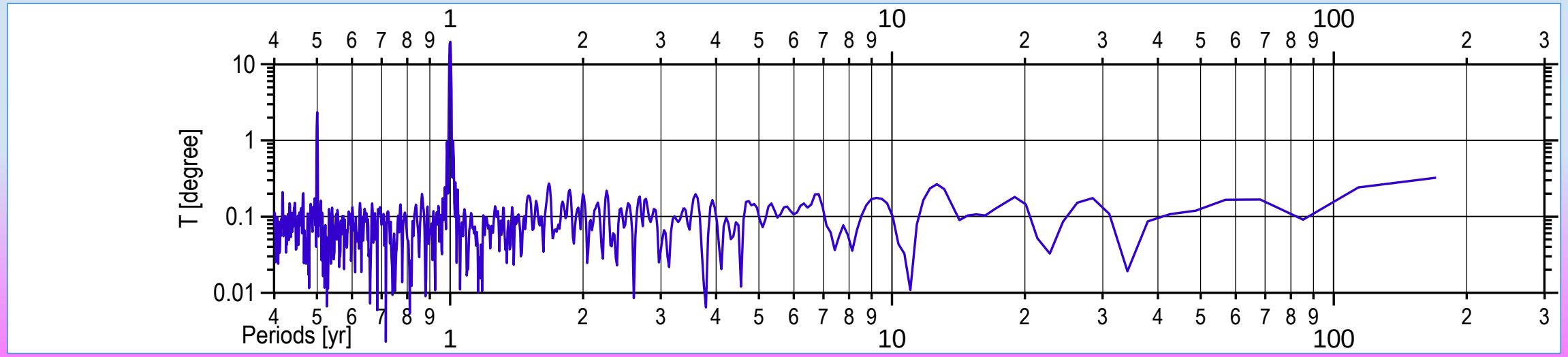
- (65N-75N; 90E-170E)

Data: CR and TSI

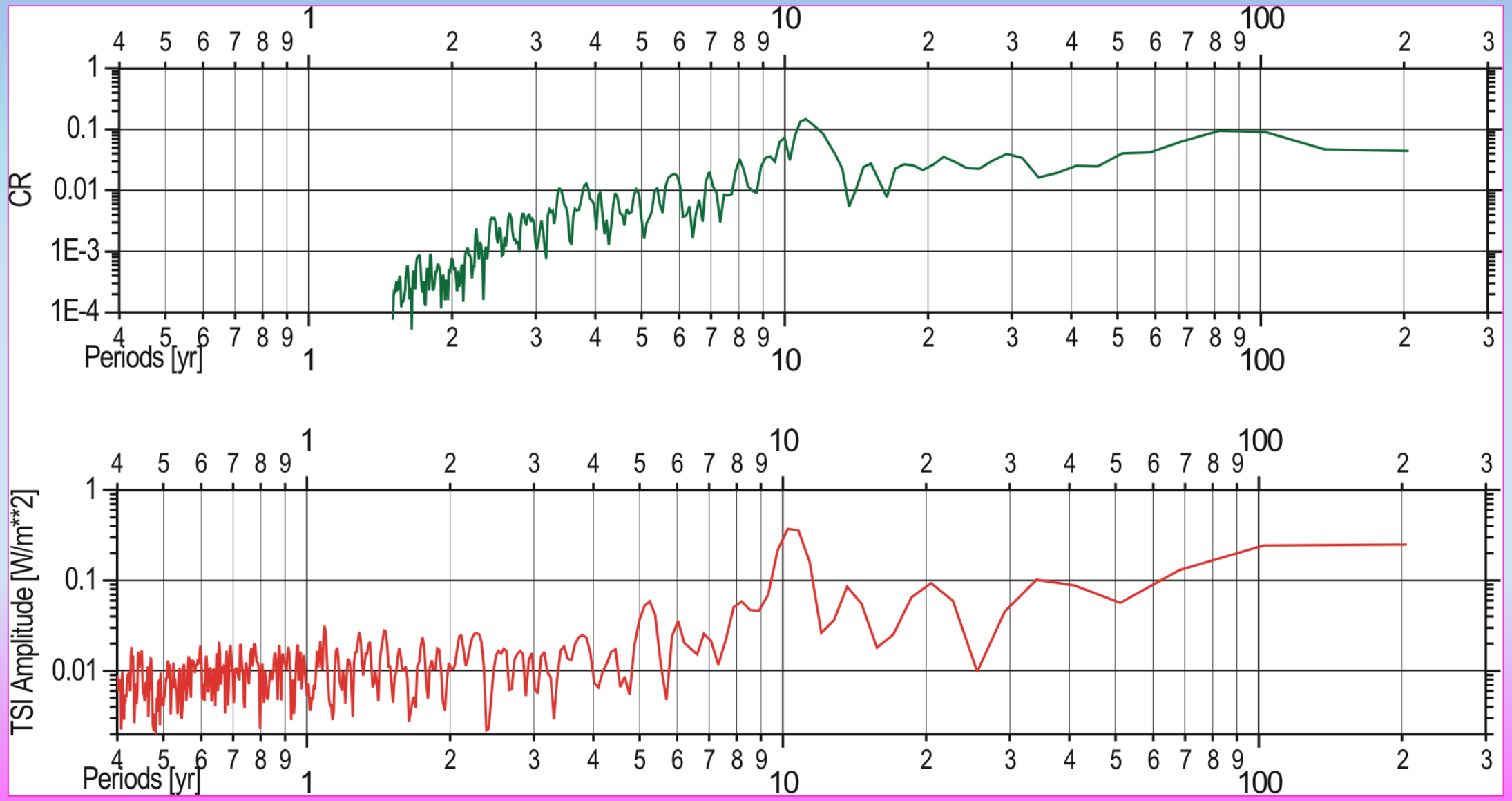


Temperature in North Siberia and spectrum

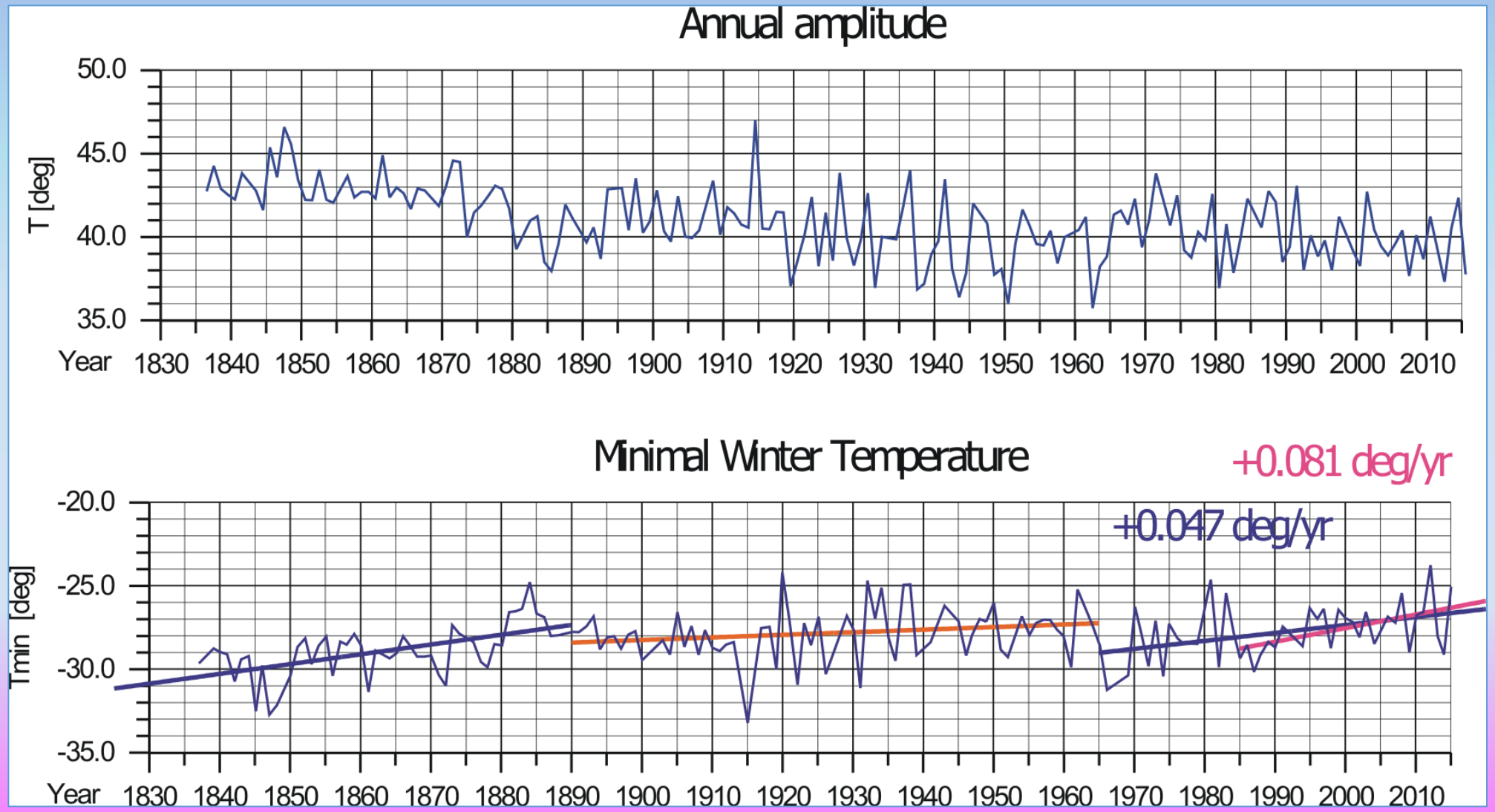




CR and TSI spectra

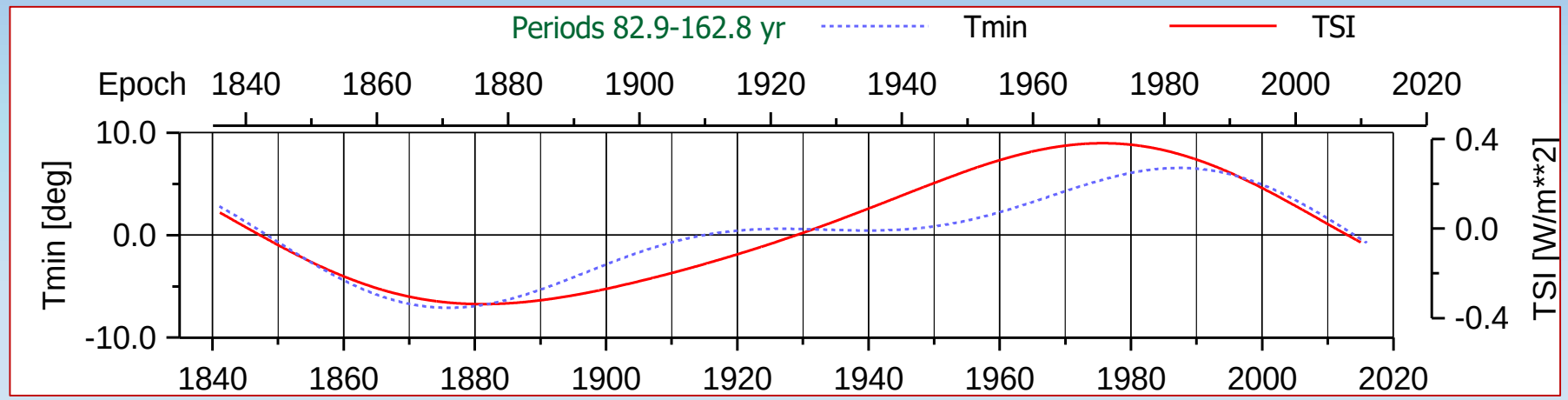


Annual amplitude and winter temperature

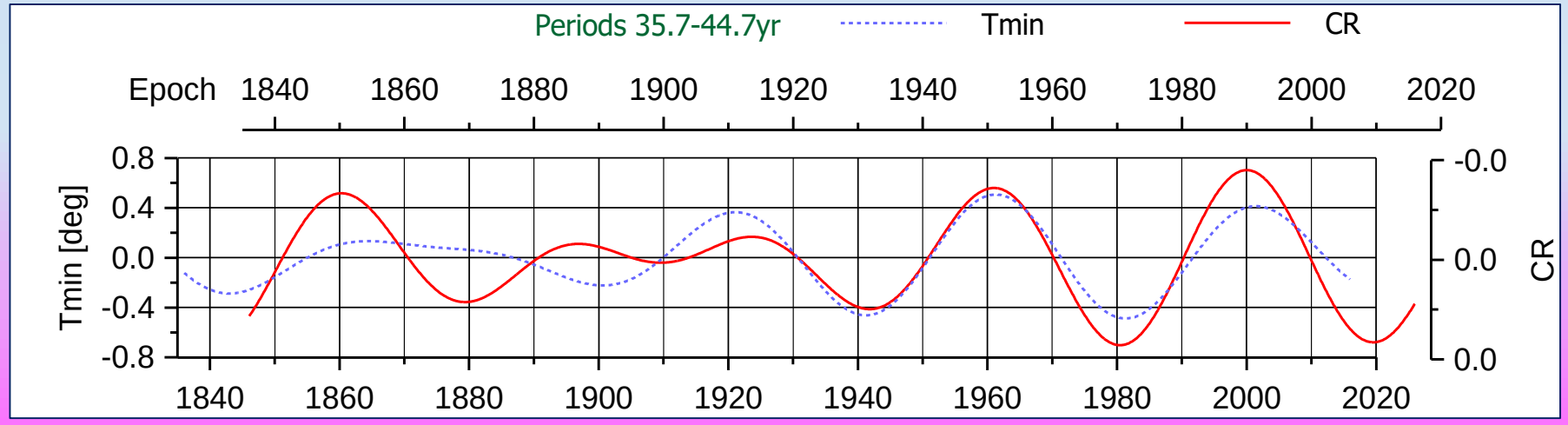


Solar influence on winter temperature of North Siberia (1)

- Long-terms driven by TSI

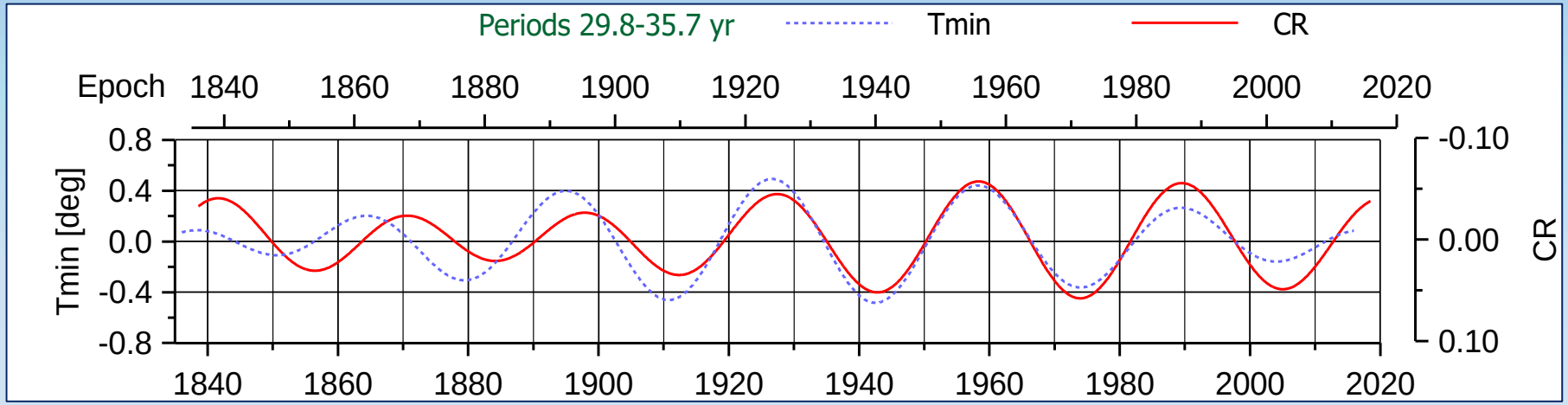


- Partial correlation with decadal CR cycles after1920

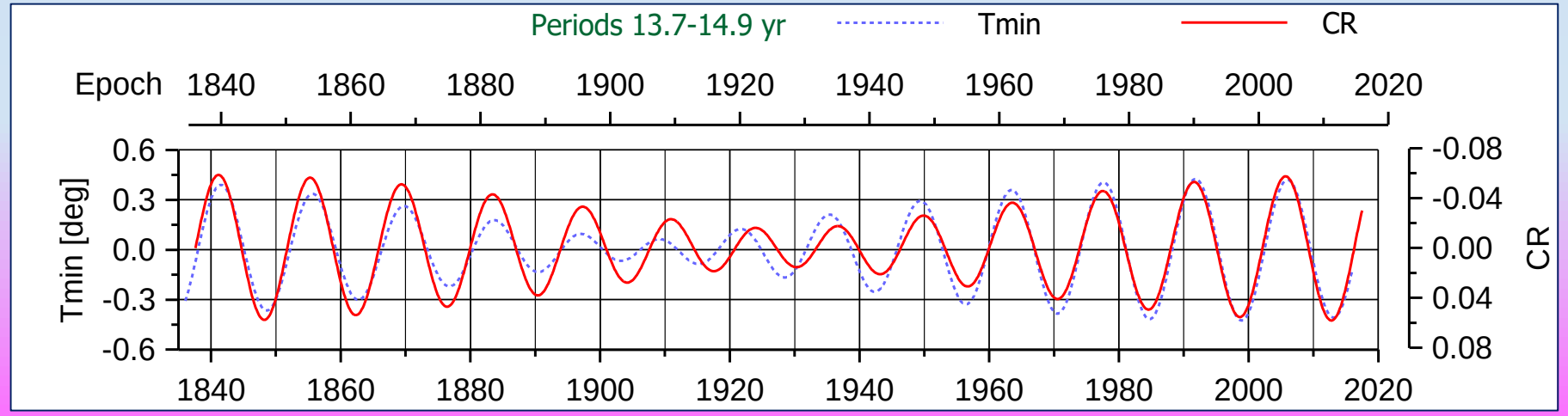


Solar influence on winter temperature of North Siberia (2)

- Phase deviation of common decadal T and CR cycles before 1920

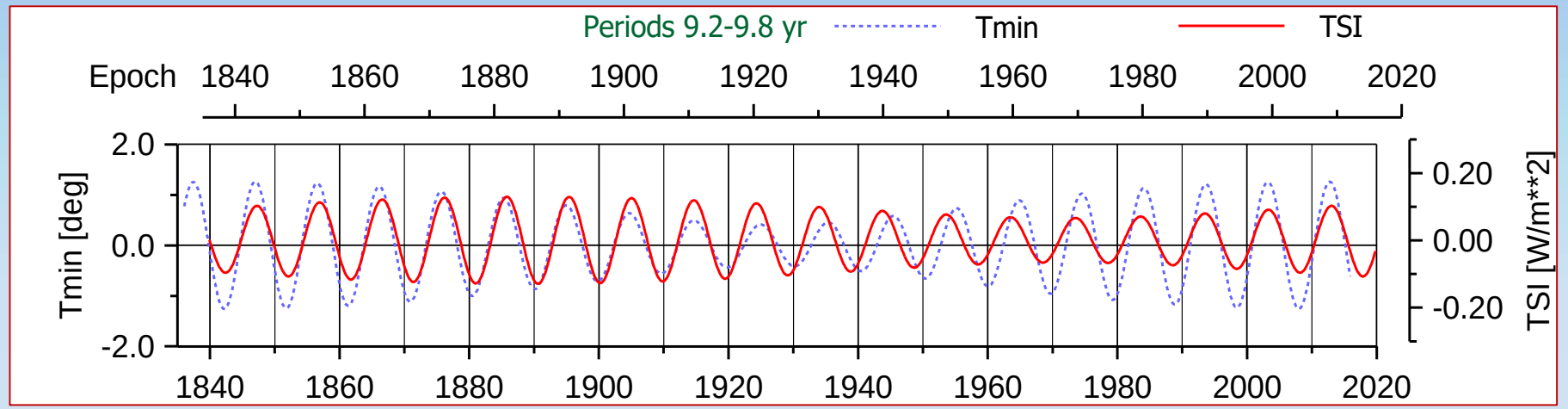


- Common decadal T and CR cycles, periods 13.7-14.9 years

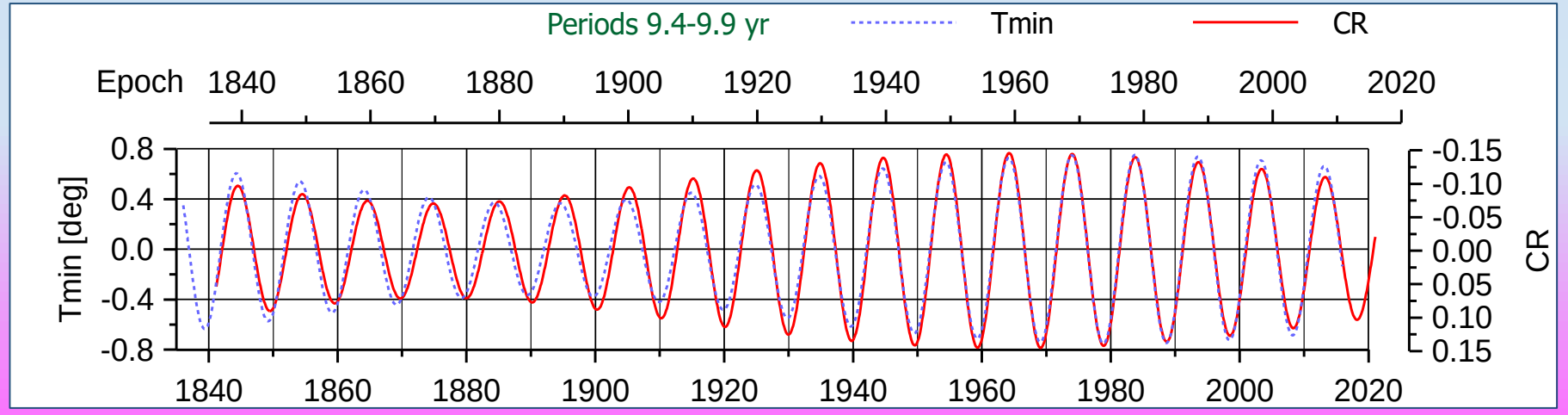


Solar influence on winter temperature of North Siberia (3)

- Common subdecadal T and TSI cycles

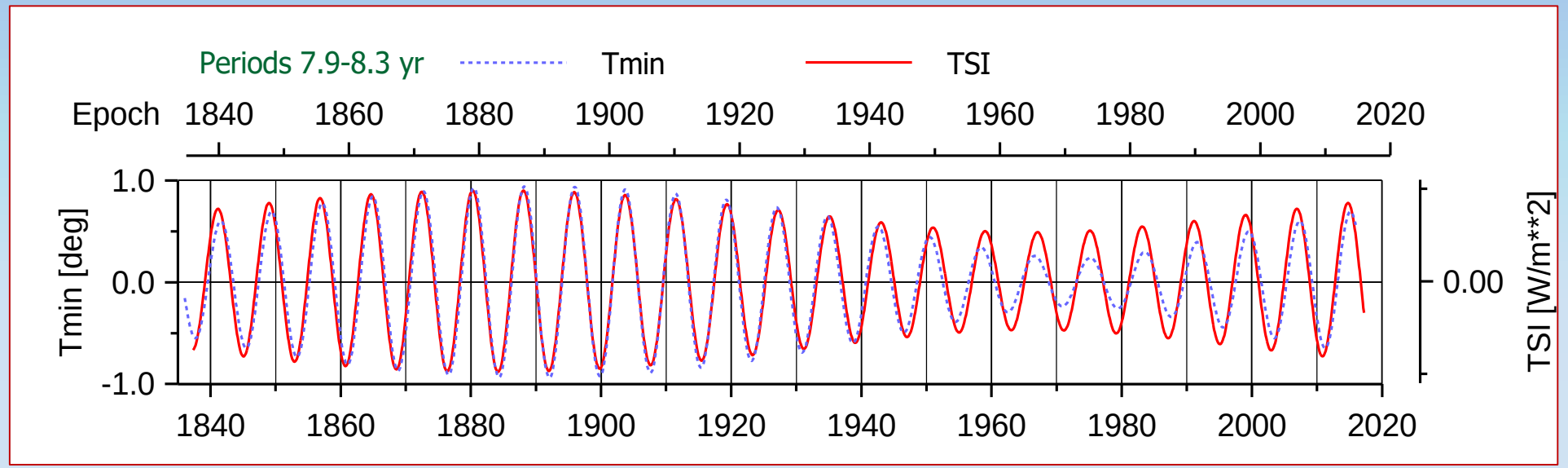


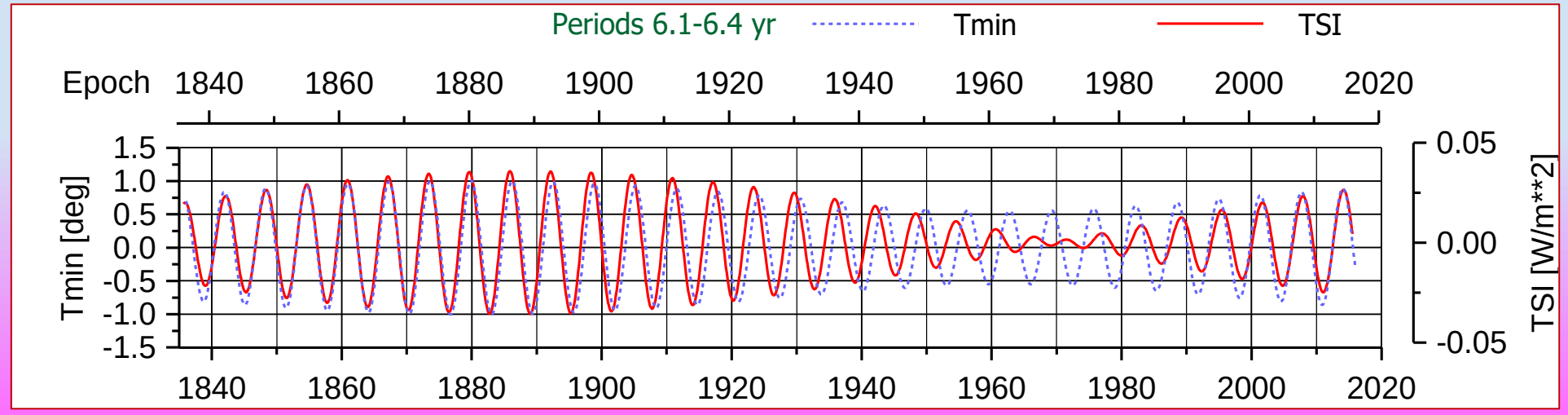
- Common subdecadal T and CR cycles with better agreement



Solar influence on winter temperature of North Siberia (4)

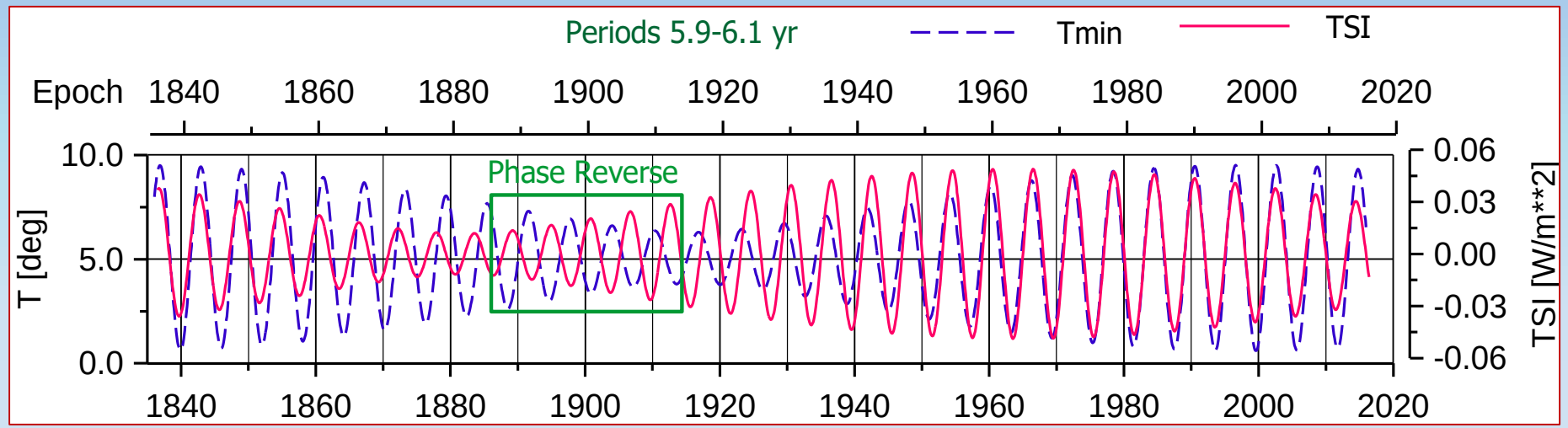
- Common subdecadal T and TSI cycles



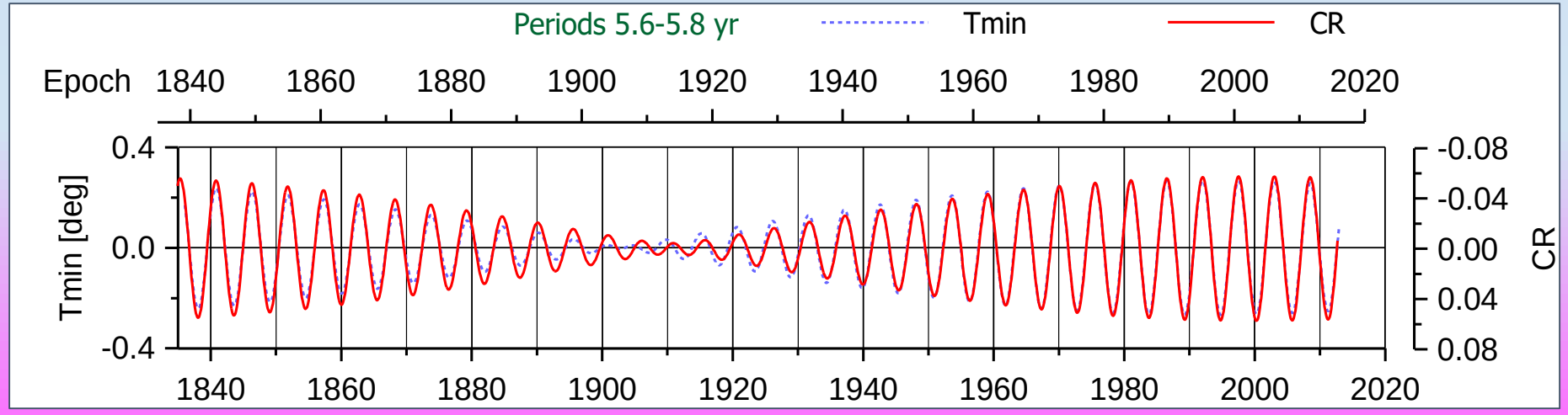


Solar influence on winter temperature of North Siberia (5)

❖ Common subdecadal T and TSI cycles



❖ Common subdecadal T and CR cycles with better agreement



Conclusions

- The solar activity cycles and their harmonics drive long-term and centennial variations of winter Siberia temperature with periods 83-163 years. They also affect decadal temperature variations with periods below 44 years and various interannual cycles.

- The solar influence on winter Siberia temperature is revealed by TSI and cosmic rays variations, where the cosmic ray harmonics have better agreement with temperature cycles.

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ФОНД НАУЧНИ ИЗСЛЕДВАНИЯ
МИНИСТЕРСТВО НА ОБРАЗОВАНИЕТО И НАУКАТА

CAWRI BAS

Thank you for your attention!

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