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

Periods 193.2-232.8 yr

Periods 144.9-165.6.
Solar influence on centennial cycles of AMO variations
Solar influence on decadal cycles of AMO variations
Solar influence on decadal cycles of AMO variations

Periods 58.0-61.0 years

Epoch 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000

AMO

Periods 48.3-50.4 years

Epoch 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000

AMO
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/m².

• 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
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Thank you for your attention!

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