

Supplementary Material

1 SUPPLEMENTARY DATA

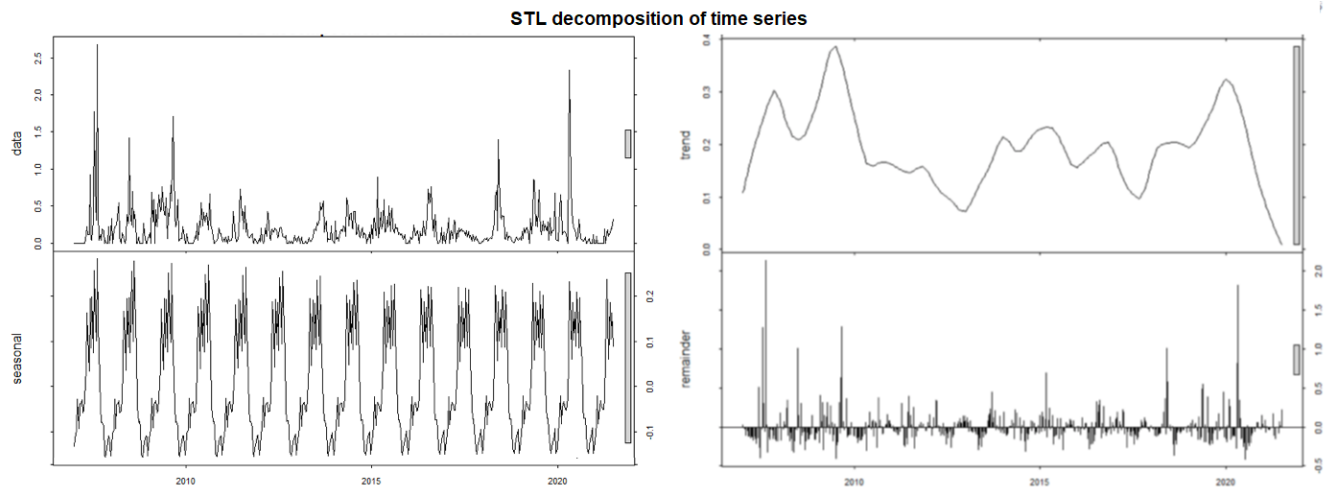


Figure S1. STL decomposition of 10-day turtle sightings time series. The figure shows the extracted raw data, seasonal component, population trend and remaining noise (TpH = turtles per hour).

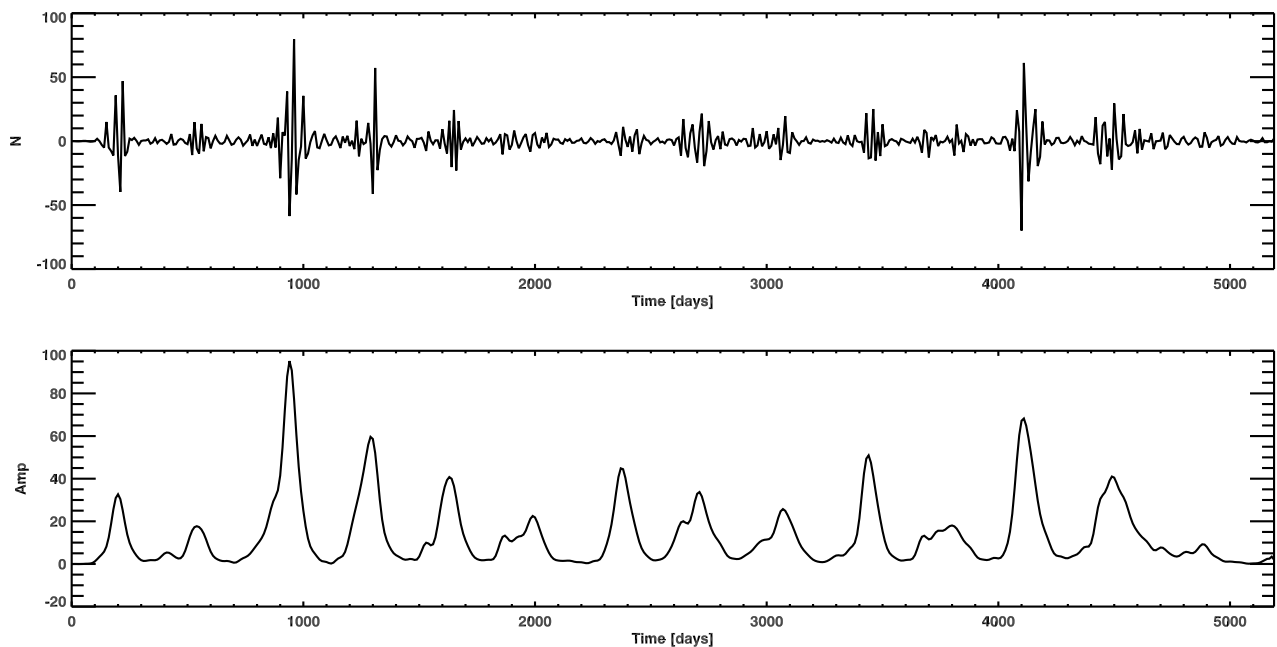


Figure S2. The detected seasonal $T_s = 365$ days (left) and monthly $T_m \sim 30$ days (right) components, isolated in the STS signal by applying BP filters. N is the number of turtle sightings per 10 days.

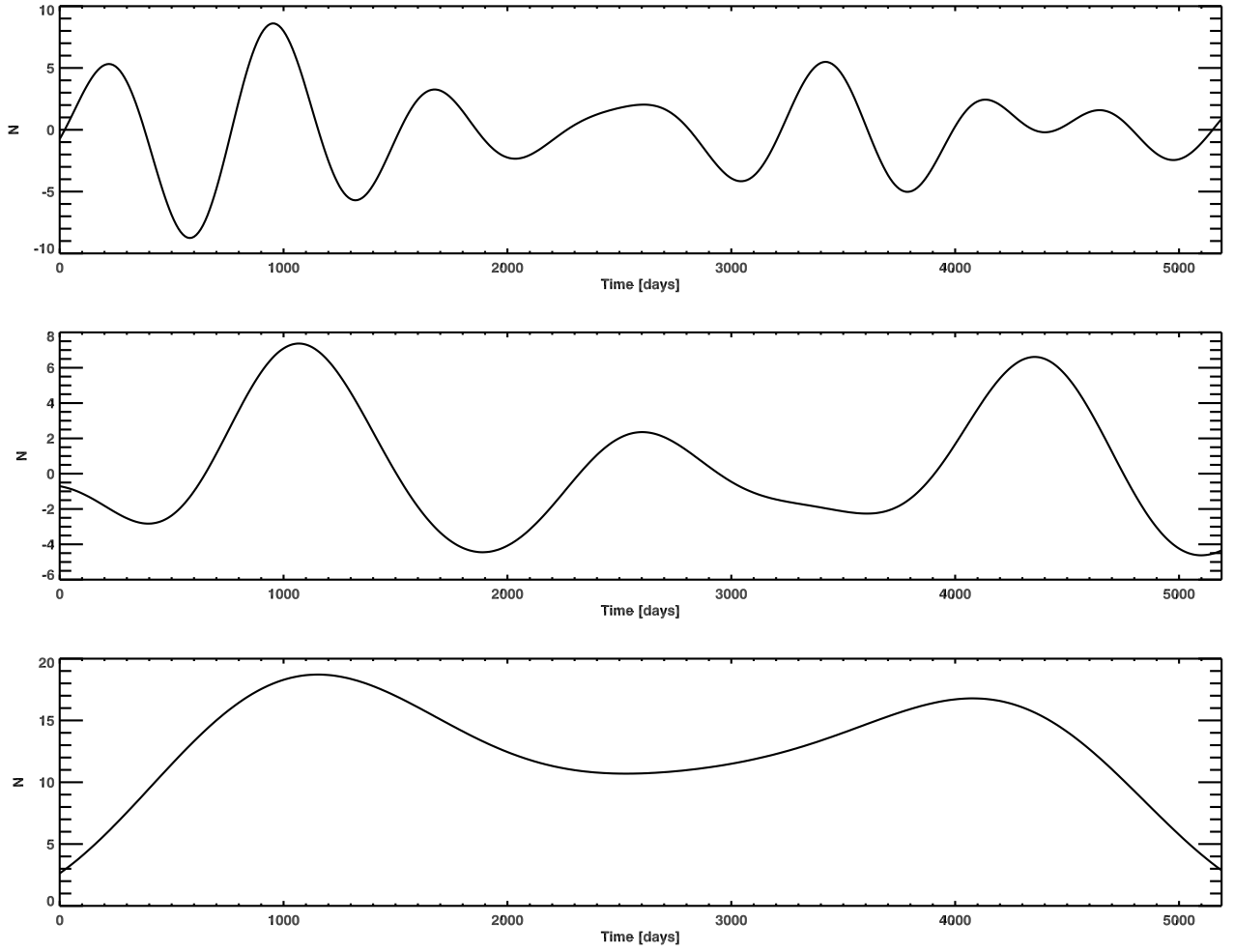


Figure S3. The trend decomposition to the individual components (isolated by BP filtering) given as $T_{mid} \sim 850$ days, $T_{nino} \sim 1700$ days, and $T_{long} \sim 2600$ days, from top to bottom respectively.

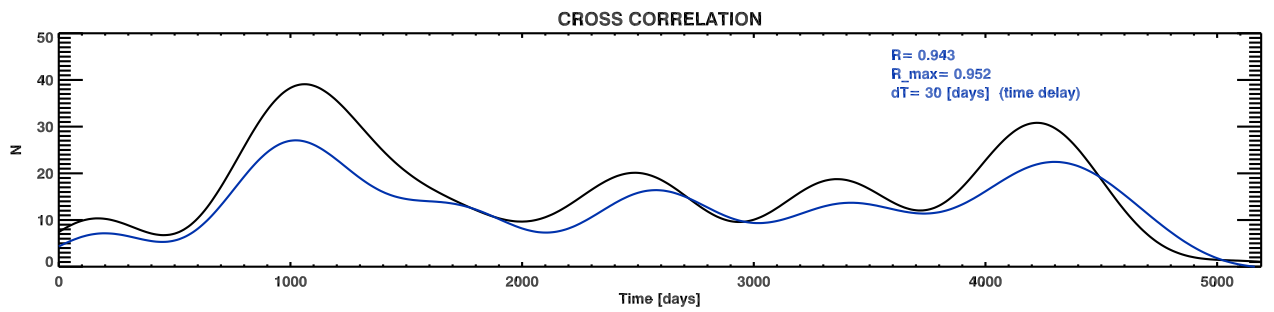


Figure S4. The cross-correlation of the envelope extracted from T_s mode by demodulation (black line) with all the other $T > 700$ days STS signal components (blue line).

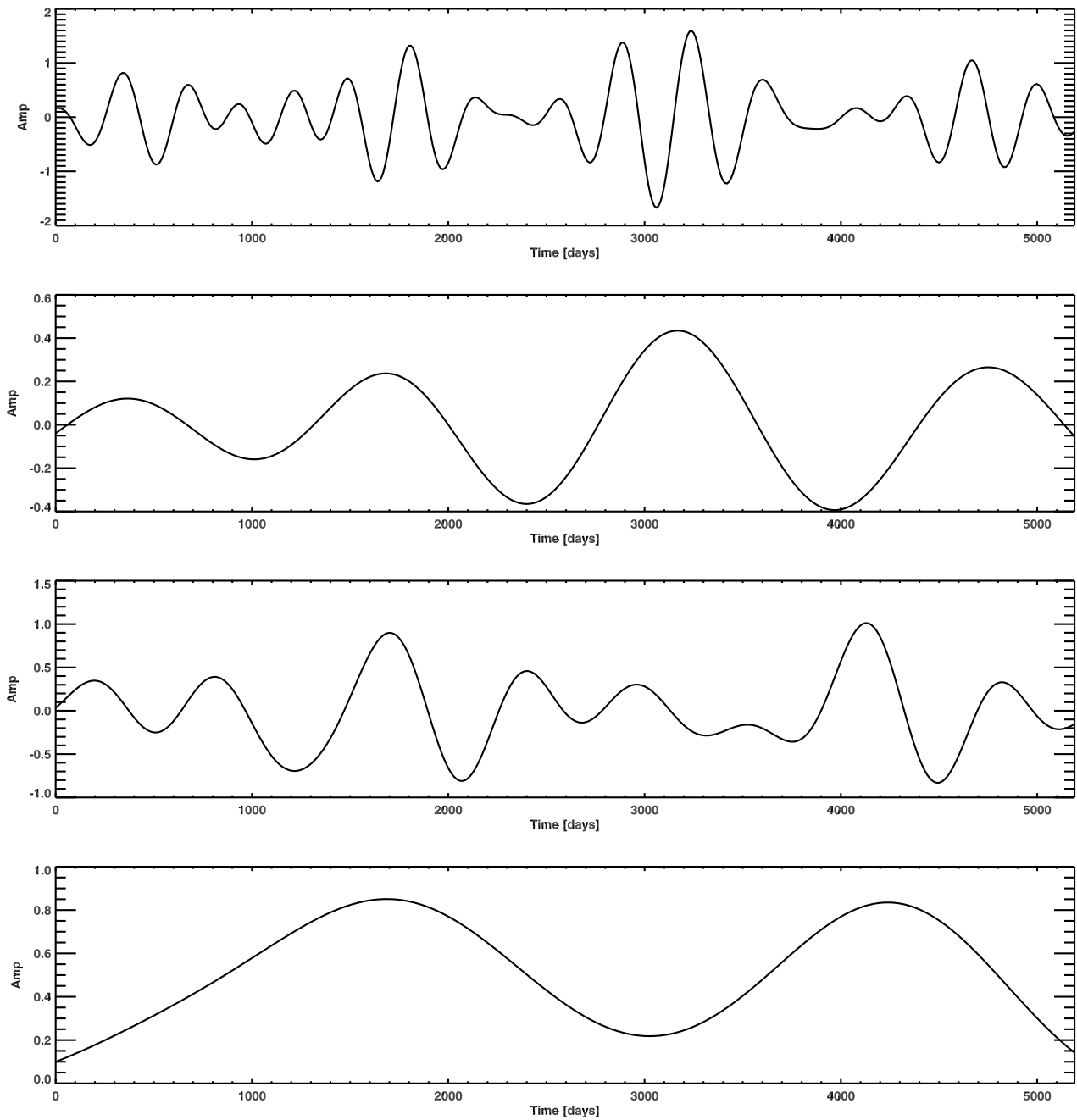


Figure S5. The isolated seasonal $T_s \sim 365$ days component, its envelope $T_{nino} \sim 1700$ days, the mid-period $T_{mid} \sim 850$ days component, and its envelope $T_{long} \sim 2600$ days of the NAO time series, from top to bottom respectively.

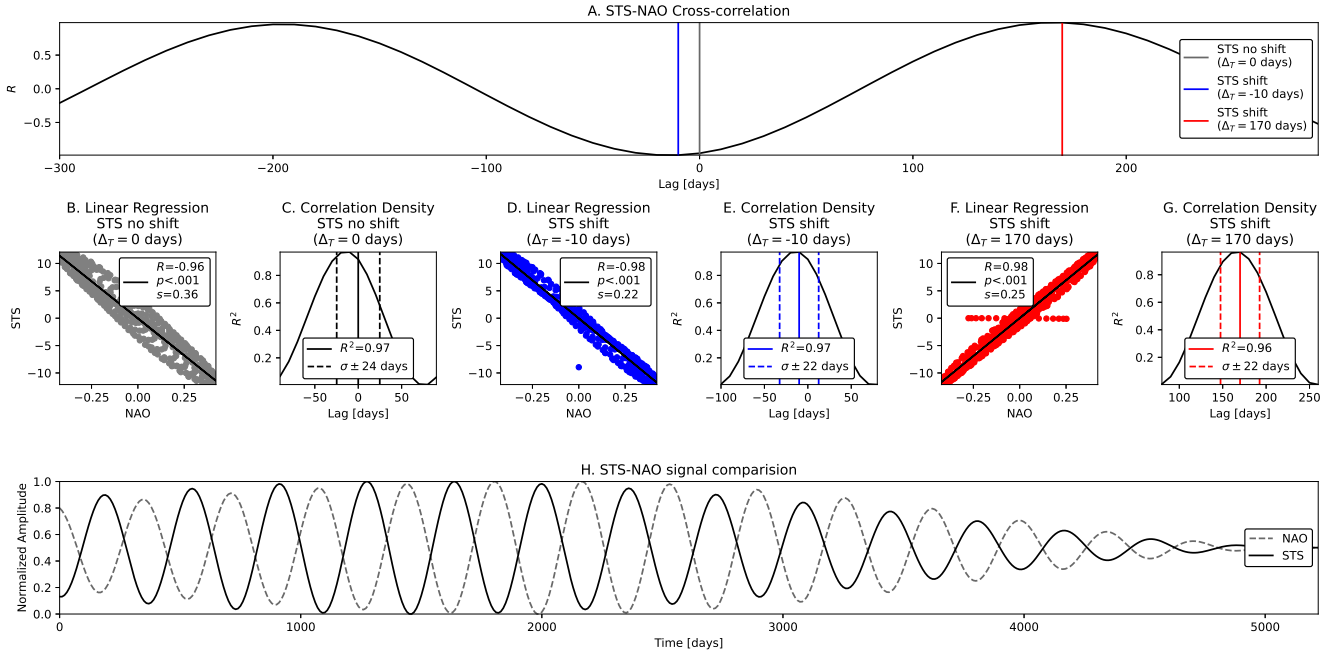


Figure S6. STS-NAO Cross-correlation and linear regression of seasonal components ($T_s = 365$ days). From top to bottom, left to right: (A) Time shift of Pearson's R cross-correlation coefficients between STS and NAO signals using lags ± 5230 days; (B-G) Linear regressions using no shift and time shift with regression coefficients (Pearson's R) and coefficients of determination R^2 ; and (H) STS-NAO overlapped signals with time delays between NAO troughs and STS peaks. Both seasonal modes are anticorrelated. Loggerhead sea turtles (STS) appear in Madeira, NE Atlantic when there is a decrease of NAO.

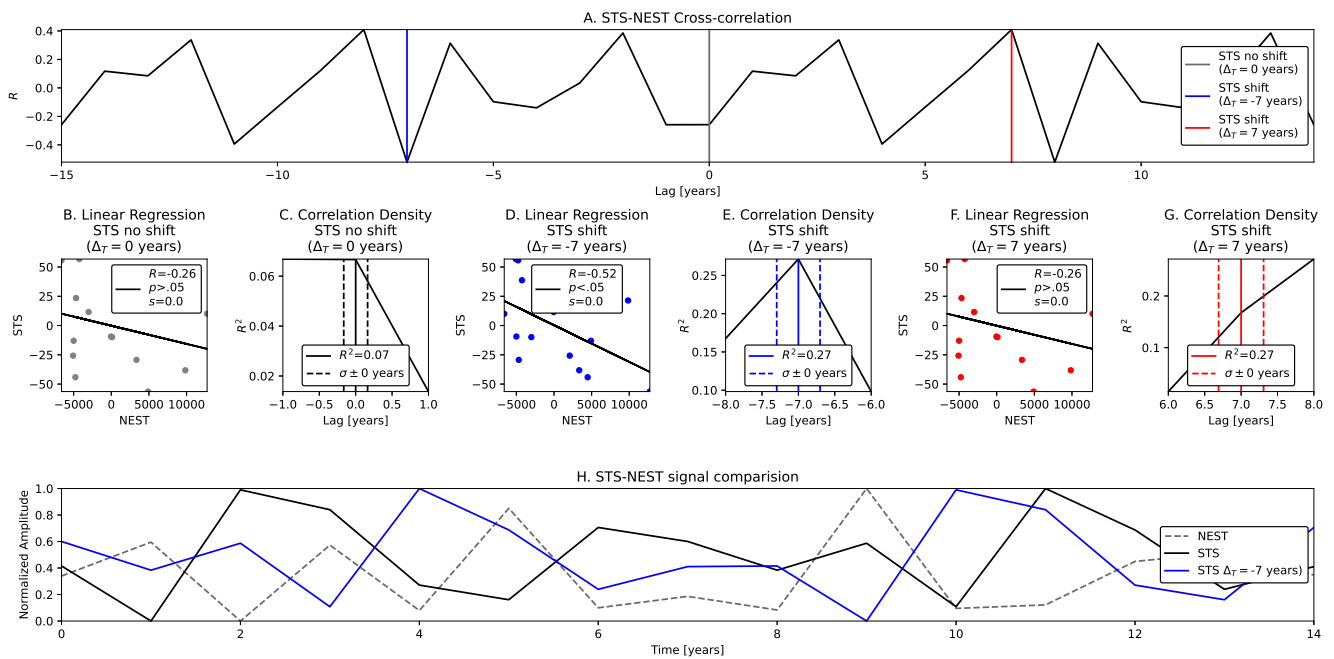


Figure S7. STS-NEST Cross-correlation and linear regression, using cumulative yearly STS points. From top to bottom, left to right: (A) Correlation coefficients R for the cumulative STS (with no shift) and shifted STS signals; (B-G) Linear regression results including coefficients of determination R^2 and error in days within 1σ ; and (H) Position of STS peaks and troughs against the NEST signal. Sea turtles are having the highest correlation with nesting with shift $\Delta_T \sim 7$ years.