Description of R codes for Comparing Time Series with Annual Cycles

This Github site contains the core algorithms of DelSole and Tippett (2022). Below is a brief description of each R code file.

test.nested.cycle.univariate.R
generates synthetic data and calls `diff.ar.cycle` to illustrate its application.

diff.ar.cycle.R
tests if two time series come from the same stochastic model, where the time series contains periodic and serially correlated components. The main relevant output is `dev.table` and AICm for the two models. There are other output variables which are used for checking purposes, but generally can be ignored. An example of the deviance table is given below:

```
1   > source('test.nested.cycle.univariate.R')
2                        deviance crit(chisq) pval(chisq)      alpha   crit(F)    pval(F)   F-value
3   D[0:1]; equal variance  0.4942722    5.701292  0.48202772 0.01695243  7.378021 0.23863299 1.2530663
4   D[1:2]; equal AR model  0.6347443   10.198449  0.88843440 0.01695243 12.701228 0.91675516 0.1693801
5   D[2:3]; equal cycle    14.3012447   15.461973  0.02644627 0.01695243 18.233146 0.05916021 2.1239644
6   D[0:3]; total          15.4302613   18.307038  0.11714489 0.05000000        NA         NA        NA
```

timeseries2ar.cycle.R
formats $\mathbf{y}$ and $\mathbf{X}$ appropriate for ARX(p, H) (called by `diff.ar.cycle.R`).

diff.regression.nested.R
performs the nested testing procedure (called `diff.ar.cycle.R`).

aicm.R
computes AICm for the ARX(p, H) model (called `diff.ar.cycle.R`).

References

DelSole, T. and M. K. Tippett, 2022: Comparing climate time series – part 4: Annual cycles. *Adv. Stat. Clim. Meteorol. Oceanogr.*, **in press**.