Stilianos Louca and Michael Doebeli. 2015. Detecting cyclicity in ecological time series. *Ecology* 96:1724–1732.

D Theoretical comparison

Times series of the OUSS model were generated using correlated draws, i.e. by choosing

$$\begin{aligned} \widetilde{x}_{i+1} &= \rho_i \widetilde{x}_i + \sqrt{1-\rho_i^2} \cdot \sigma \; w_i, \\ z_i &= f(t_i) + \widetilde{x}_i + \varepsilon y_i, \end{aligned} \tag{D.1}$$

where w_i and y_i are independent standard-normal variables, $\rho_i = e^{-\lambda|t_{i+1}-t_i|}$ is the correlation between two consecutive time points and $f(t)$ is the deterministic asymptotic solution to the ordinary differential equation $df/dt = \lambda(\mu(t) - f(t))$. The first value $\widetilde{x}_1$ was drawn from a normal distribution with zero mean and variance σ^2. The obtained time series $z_1, z_2, ..$ follows the correct distribution of the stationary OUSS model.

For the comparison of the OUSS and WN tests we generated 50000 low quality and 50000 high quality time series of the OUSS model (40 points across 15 time units and 200 points across 25 time units, respectively). The standard deviation σ and the resilience λ were normalized to 1. The oscillation period T was randomly and uniformly chosen within the interval $[0.5, 4]$. The ratios α/σ and ε/σ were sampled uniformly on a regular grid of size 20×20 spanning the values $[0, 3]$ and $[0, 2]$, respectively. The oscillation amplitude A, defined in the main article, is connected to the parameters α and T through

$$\alpha = \frac{A\lambda}{\sqrt{\lambda^2 + (2\pi/T)^2}}. \tag{D.2}$$

Periodograms were analyzed as described in Band OUSS FAPs were corrected as described in C.