CSI DEBLY Augustin 2nd year

Augustin Debly

State of the art

NDVI-Biomass relationship in microphytobenthic studies : a review

Standardized framework choosen

The non-linear function choosen here has to be asymptotic

$$B_{a,b,c}(NDVI) = \frac{1}{c} ln\left(\frac{b}{a+b-NDVI}\right) \tag{1}$$

From linear assumptions to the non-linear framework

It's often made the assumption that the relationship between NDVI and biomass is linear such as :

$$B_{\alpha,\beta}(NDVI) = \alpha NDVI + \beta$$

Which is the linearization of the non-linear function around a point, if the NDVI range is small enough.

$$
\begin{aligned}
B_{a,b,c}(NDVI) &= \frac{1}{c} ln\left(\frac{b}{a+b-(x+NDVI_{mean})}\right) \\
&= \frac{1}{c}\left[ln\left(\frac{b}{a+b-NDVI_{mean}}\right) - ln\left(1-\frac{x}{a+b-NDVI_{mean}}\right)\right] \\
&= \frac{1}{c}\left[ln\left(\frac{b}{a+b-NDVI_{mean}}\right) + \frac{x}{a+b-NDVI_{mean}}\right] \\
&= \frac{1}{c}\left[ln\left(\frac{b}{a+b-NDVI_{mean}}\right) + \frac{NDVI-NDVI_{mean}}{a+b-NDVI_{mean}}\right] \\
&= \left[\frac{1}{c(a+b-NDVI_{mean})}\right] NDVI \\
&+ \left[\frac{1}{c} ln\left(\frac{b}{a+b-NDVI_{mean}}\right) - \frac{NDVI_{mean}}{c(a+b-NDVI_{mean})}\right]
\end{aligned}
\tag{2}
$$

So we have

$$
\alpha = \frac{1}{c(a+b-NDVI_{mean})} \tag{3}
$$

and

$$
\beta = \frac{1}{c} ln\left(\frac{b}{a+b-NDVI_{mean}}\right) - \frac{NDVI_{mean}}{c(a+b-NDVI_{mean})} \tag{4}
$$

To find a,b and c we have 3 unknowns and 2 equations. We must add another constraint :

$$
\beta = \frac{1}{c} ln\left(\frac{b}{a+b}\right) \tag{5}
$$

Scaling Bias