

Estimation of rangeland production in the arid Oriental region (Morocco) combining remote sensing vegetation and rainfall indices: challenges and lessons learned

Marie Lang ^{1*}, Hamid Mahyou ² and Bernard Tychon ¹

1 University of Liege, Department of Environmental Sciences and Management, 185 Avenue de Longwy, 6700 Arlon, Belgium

2 Centre Régional de la Recherche Agronomique d'Oujda, Institut National de la Recherche Agronomique Maroc, Oujda, Morocco

* Correspondence: marie.lang@uliege.be

Supplementary material

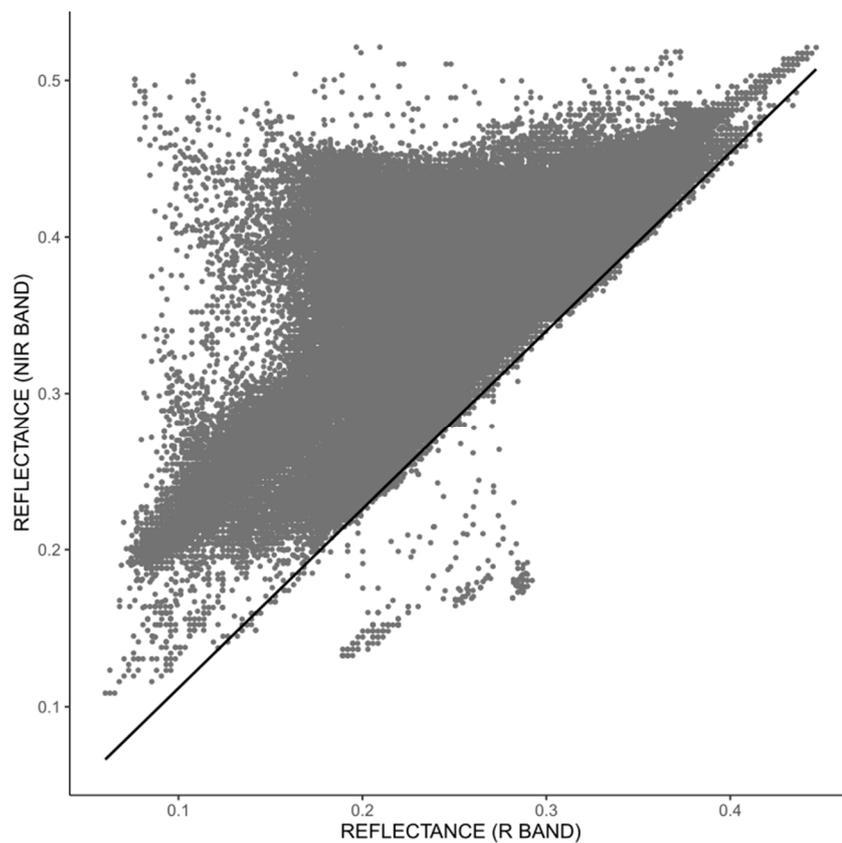


Figure S1. Soil line in the NIR vs R space (line = quantile regression with $\tau = 2 \times 10^{-03}$).

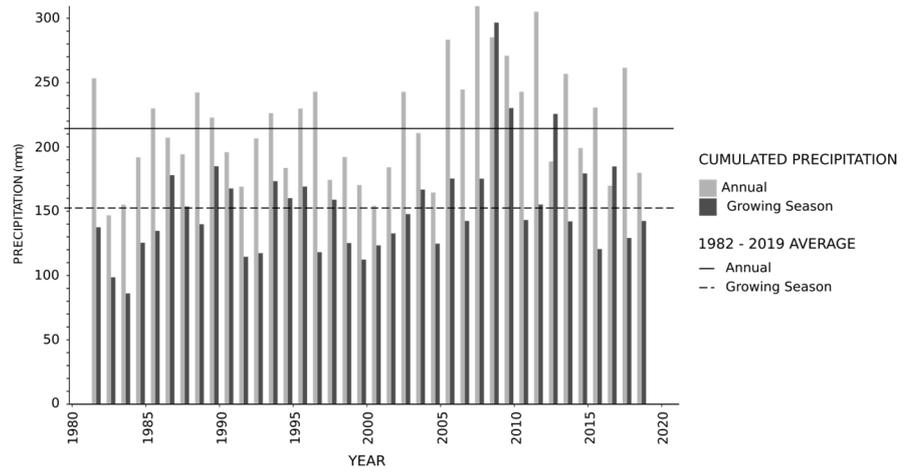


Figure S2. Evolution of precipitation (mm) from 1982 to 2019 over the Oriental. Bars = cumulated precipitation over the year and the growing season (growing season i = September of year $i-1$ to March of year i). Lines = 1982 – 2019 average for annual and growing season precipitation. Data: CHIRPS v2.0 ([81]).

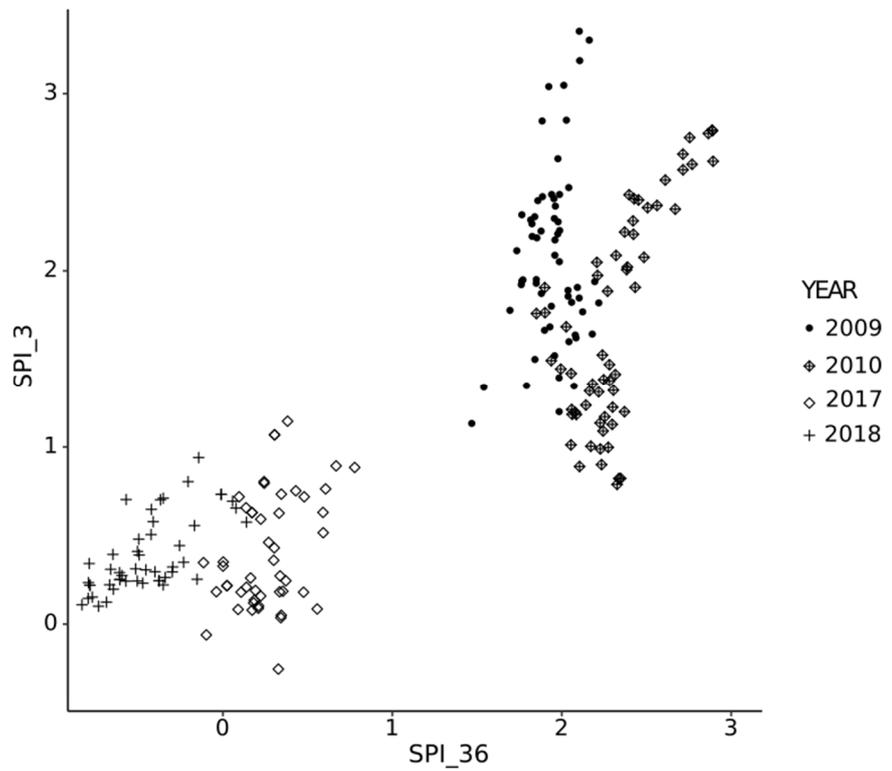


Figure S3. Short-term (SPI₃) and long-term (SPI₃₆) precipitation conditions over the study sites in 2009, 2010, 2017, and 2018.

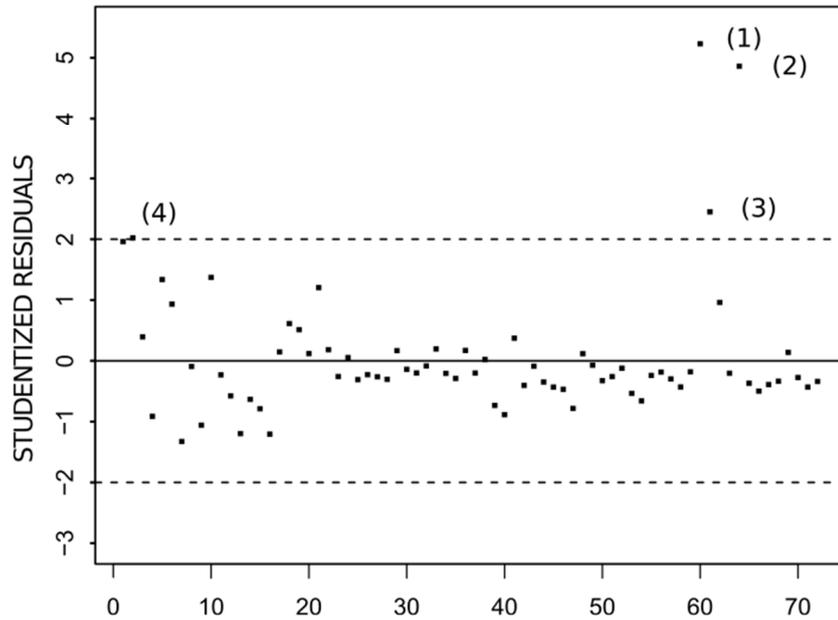
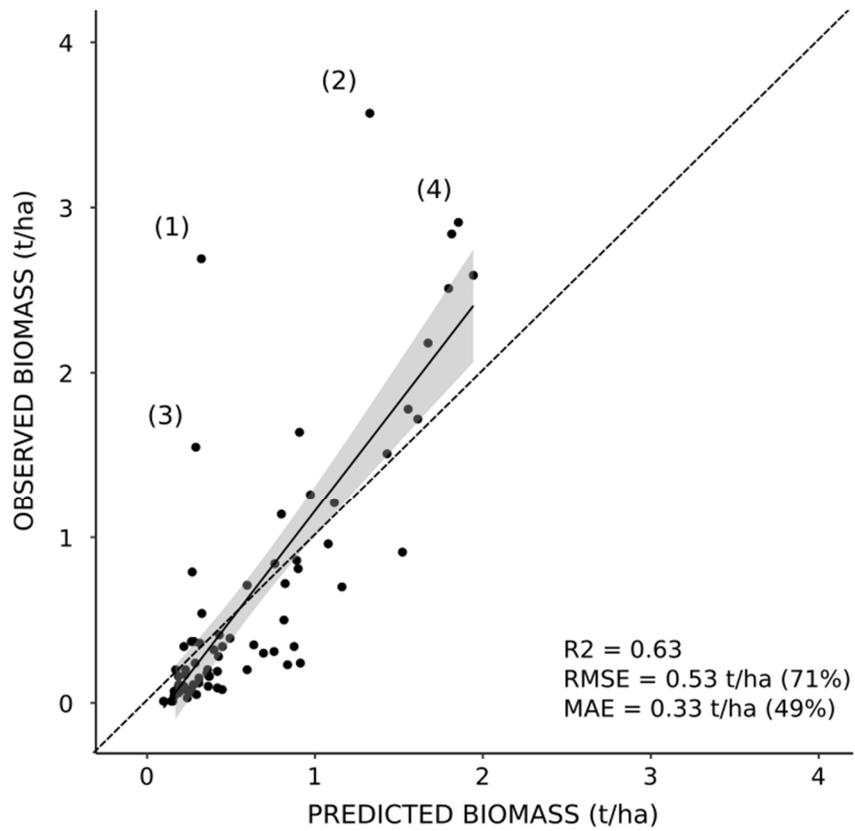


Figure S4. Relationship between observed and predicted biomass values (top), and studentized residuals (bottom) for the validation sample. 1 to 4: observations characterized by a value of studentized residuals outside the $[-2,2]$ interval (identification of observations in Table 5). Top panel: solid line = linear fit, grey area = 95% confidence interval on regression line, dashed line = $Y = X$.

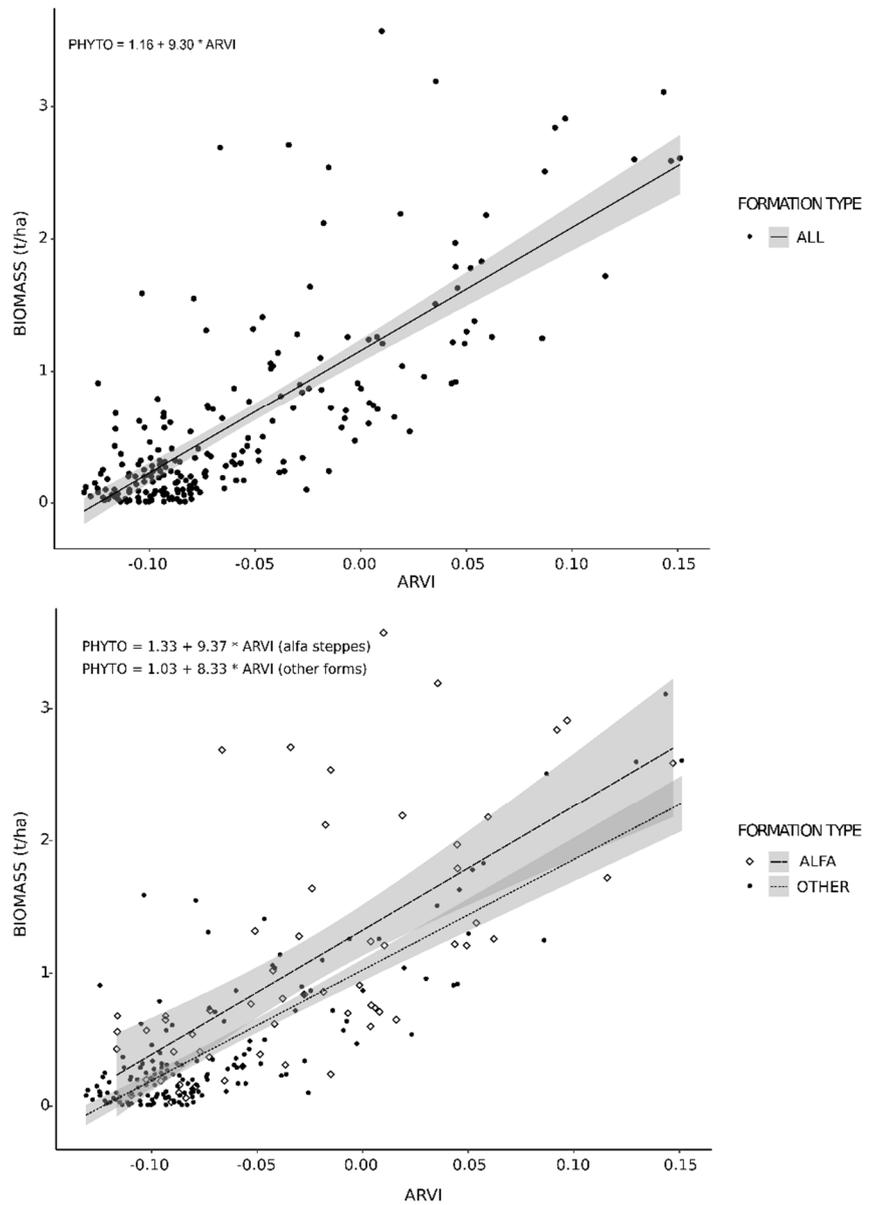


Figure S5. Comparison of the linear relation between biomass and ARVI for the overall case (top) and alfa steppes vs other types of vegetation formation (bottom). Solid and dashed lines = linear regression, grey area = 95% confidence interval on the regression line.

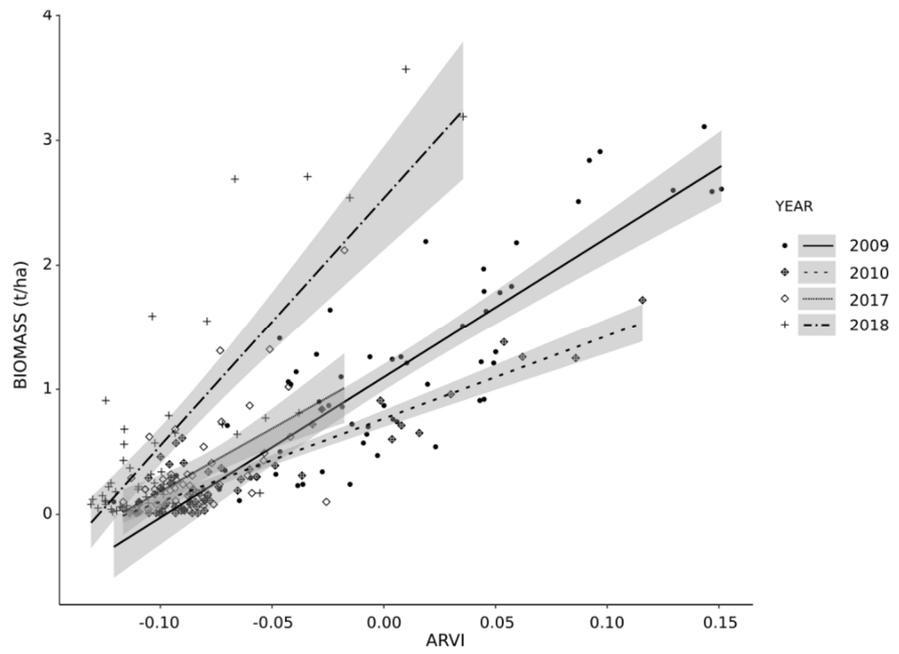


Figure S6. Comparison of the linear relation between alfa steppes biomass and ARVI for the years 2009, 2010, 2017, and 2018. Solid and dashed lines = linear regression, grey area = 95% confidence interval on the regression line.