Reply to Gonsamo et al.: Effect of the Eastern Atlantic-West Russia pattern on Amazon vegetation has not been demonstrated

Gonsamo et al. (1) use 8-km satellite data from advanced very high-resolution imaging spectroradiometer (AVHRR) global inventory modeling and mapping studies (GIMMS) to demonstrate the role of climatic oscillations, specifically the East Atlantic-West Russia (EA-WR) pattern, on interannual dynamics of Amazon greenness. Hilker et al. (2) do not investigate EA-WR but focus on the El Niño southern oscillation (ENSO), a pattern that is well known to affect climate throughout South America and the Pacific region (3). Gonsamo et al. (1) do not challenge these results but claim that EA-WR, more than ENSO, may "explain the entire ensuing year Amazon vegetation greenness dynamics." We are unable to judge this claim based on our findings (2), but argue that the authors do not present a convincing case. EA-WR is a teleconnection pattern whose anomalies result in above-average temperatures over eastern Asia and below-average temperatures over large portions of western Russia and northeastern Africa. A connection between North Atlantic sea surface temperature (SST) and the likelihood of an El Niño onset has been demonstrated (4). A direct approach to prove the superior explanatory power of EA-WR compared with ENSO would have been to use the same normalized difference vegetation index (NDVI) dataset shown in figure 1 of Hilker et al. (2) and demonstrate a better correlation between NDVI and EA-WR. Figure 1 A–D in Gonsamo et al. actually confirms a stronger connection between annual precipitation and ENSO than with annual precipitation and EA-WR (1). The lack of correlation in figure 1 E–G of Gonsamo et al. is not surprising given the high noise level in AVHRR GIMMS that largely prevents detection of trends over tropical vegetation (5). Proof of statistical significance of changes in GIMMS NDVI is missing. The spatial patterns in figure 1H seem unconnected to those in figure 1 C and D, which begs the question of what climate factor, if not precipitation, drives those changes in NDVI. The connections between EA-WR and ensuing year precipitation and EA-WR and ensuing year NDVI (figure 1 I and J) seem to contradict the findings in figure 1 D and H; at the very least, the distinction between those figures is not clear. The Pearson *R* values presented in figure 1 I and J are extremely low. Parts J and K in figure 1 are not comparable because figure 1K shows monthly mean values (2), whereas figure 1J shows interannual variation. The intent of the analysis shown in figure 1K was to demonstrate that Amazon forests initially respond positively to seasonal reductions in rainfall, whereas grasslands respond negatively. Why the authors included this figure in the presented context is unclear. On a side note, Gonsamo et al. wrongly claim that Hilker et al. (2) demonstrate that a lack of correlation between moderate resolution imaging spectroradiometer (MODIS) NDVI and ENSO can be attributed to normalizing MODIS reflectance to a common view and sensor geometry (1). Hilker et al. demonstrate that directionally normalized NDVI observations show seasonal variation, contrary to previous findings (6).

In summary, a connection between Amazon vegetation greenness and EA-WR has not been convincingly demonstrated. The existence of such a connection would require much more comprehensive analysis, as, like the authors correctly state, the mechanism between these connections is unknown.

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The authors declare no conflict of interest.

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