

The paper analyzes variations in the M(3000)F2 parameter at the Ouagadougou station based on 21 years of measurements.

My comments

Line 66: *'that differs from that in other longitudinal sectors'*. This statement is unsubstantiated, as it is not referenced against other publications. The title focuses specifically on African longitudes; therefore, no analysis of other longitudes is provided.

Lines 111–113: The author calculates an annual mean (A) from monthly means (M). What is its physical significance, given that the author intends to demonstrate the existence of monthly variations? Does the author not consider variability around this mean, such as standard deviation or quartiles?

Line 114: The author adopts Lloyd's seasonal classification. While this is possible, are the seasons—and thus this classification—appropriate for a station located near the geographic equator (latitude 12.4°N)?

Line 129: On one hand, the selection criterion for disturbed conditions is weak ($K_p \geq 4$ and $A_p \geq 16$), on the other hand, although the author has 21 years of measurements (1976–1997) available, the study on magnetic storms is limited to just three years (1991, 1993, and 1995). Consequently, only seven events are analyzed. Question: Is this sufficient to generalize the conclusions?

Line 141: Some storms (out of the seven selected) are excluded due to insufficient measurements. This is too vague: How many?

Figure 1: The number of contours is high (30), making the figure nearly illegible. The pattern differs between 1991 and the other two years (1993 and 1995); furthermore, the extreme color contrast (blue/red) does not facilitate comparison.

Figure 2a, year 1993. Two bubbles representing extreme values appear in October (01 TL, high) and May (12 LT, low). The data were measured manually and verified. Was the daily sample size insufficient, thereby skewing the monthly average?

Paragraph 3.1. The paragraph is titled "*Diurnal variation*." The text introduces seasonal variation (line 174) and annual variation (lines 182, 192), which are subsequently addressed in paragraphs 3.2 and 3.3.

Line 221: "This pattern indicates an inverse dependence of M(3000)F2 on solar activity"—this comment remains unrelated to the paragraph title, which deals with seasonal activity.

Line 230. The author concludes that seasonal variation is linked to the dynamics of the equatorial ionosphere (?). This is an unsubstantiated claim that has not been justified by in-depth analysis.

Figure 3: If another month from the four seasons were selected, would the same result be observed?

Paragraph 3.3: Is the conclusion regarding "an inverse relationship between the two parameters over the study period" original? I believe not, given existing modeling (see IRI). What is the contribution of this analysis?

Paragraph 3.3. Modeling the parameters of the vertical ionization profile during magnetic storms is difficult when relying on a limited number of measured external parameters. The M(3000)F2 factor is subject to this limitation. The limited number of cases (7) allows for a specific analysis of each case.

Paragraph 3.5. The statistical study focuses on long-term variations, given that the parameters consist of monthly values. The results for the interplanetary magnetic field (B) and its vertical component (Bz) show opposite trends. Why were the other two components (Bx and By)—available in the OMNIWeb database—excluded?

Lines 521–524: "*a more comprehensive assessment*." What is unique about the African longitude sector regarding solar wind parameters and magnetic indices, which relate to the magnetosphere encompassing the entire Earth?

Line 559. The phenomena of PPEF, DDEF, and thermospheric circulation modification do not occur simultaneously. The latter two are rarely present during the main phase (line 557) and are more active during the recovery phase

Paragraph 4.4: "*The demonstrated inverse dependence of $M(3000)F_2$ on solar activity.*" This result has already been modeled and cannot be considered a highlight of the study. Empirical models like IRI and NeQuick (among others) are based on monthly data, whereas the analysis in Paragraph 3.5 relies on monthly averages and thus offers no improvement over existing work.

Line 615: "*long-term variability in $M(3000)F_2$ over the African equatorial sector.*" Care should be taken not to generalize the results to the entire equatorial African region, as the analysis is based on data from a single station located at a specific point within the equatorial anomaly.

Data availability: measurements are available on the GIRGEA website

(<https://www.girgea.org/en/searches/software/>).

Ionospheric sounding measurements are scarce in Africa. This submission analyzes the $M(3000)F_2$ parameter using a long time series (21 years) from Ouagadougou. Unfortunately, the results fall short compared to two previously cited publications and offer little insight into improving HF propagation conditions, contrary to the author's claims. I reject the submission for publication.