IS THE "DISPARITION BRUSQUE" PHENOMENON ALWAYS AN EFFECTIVE DISAPPEARANCE ?

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1. Introduction

A "Disparition brusque" (DB) of a solar filament is announced several hours before its occurence by at least two forerunners events :

a) the optical density of the filament increases and, consequently, it becomes darker (Martres, 1956)

b) Hot arches ($T \sim 10^5$ to 10^{6}°K) span the cool filament (Schmahl et al., 1980).

These events are related and it is possible that the first is the result of the second.

There are two possible explanations for the DB process visible in H_α :

- DB 1 - Expansion of the prominence and, therefore, decrease of the density of the material on the line-of-sight.

- DB 2 - Ionization of prominence material by heating without any expansion.

Possibly the filament expands (DB1) and is heated simultaneously (DB2). In the case DB2 the organization of the photospheric magnetic field is probably not altered and, thus the filament can be reformed. EUV observations should provide a test of the heating hypothesis (DB2).

2. Observational data

Observations of the DB phenomenon and the formation of a filament were made between June 14 and June 18, 1973. The Harvard College Observatory spectroheliograms on Skylab (Reeves et al., 1977) in the first polychromic position and the H_α center and wings filtrograms from Meudon Observatory were used.

3. Results

Figure 1 presents two sets of scans, at left (A), a well-established filament and at right (B), the site where a filament is expected to appear. The H_α filament

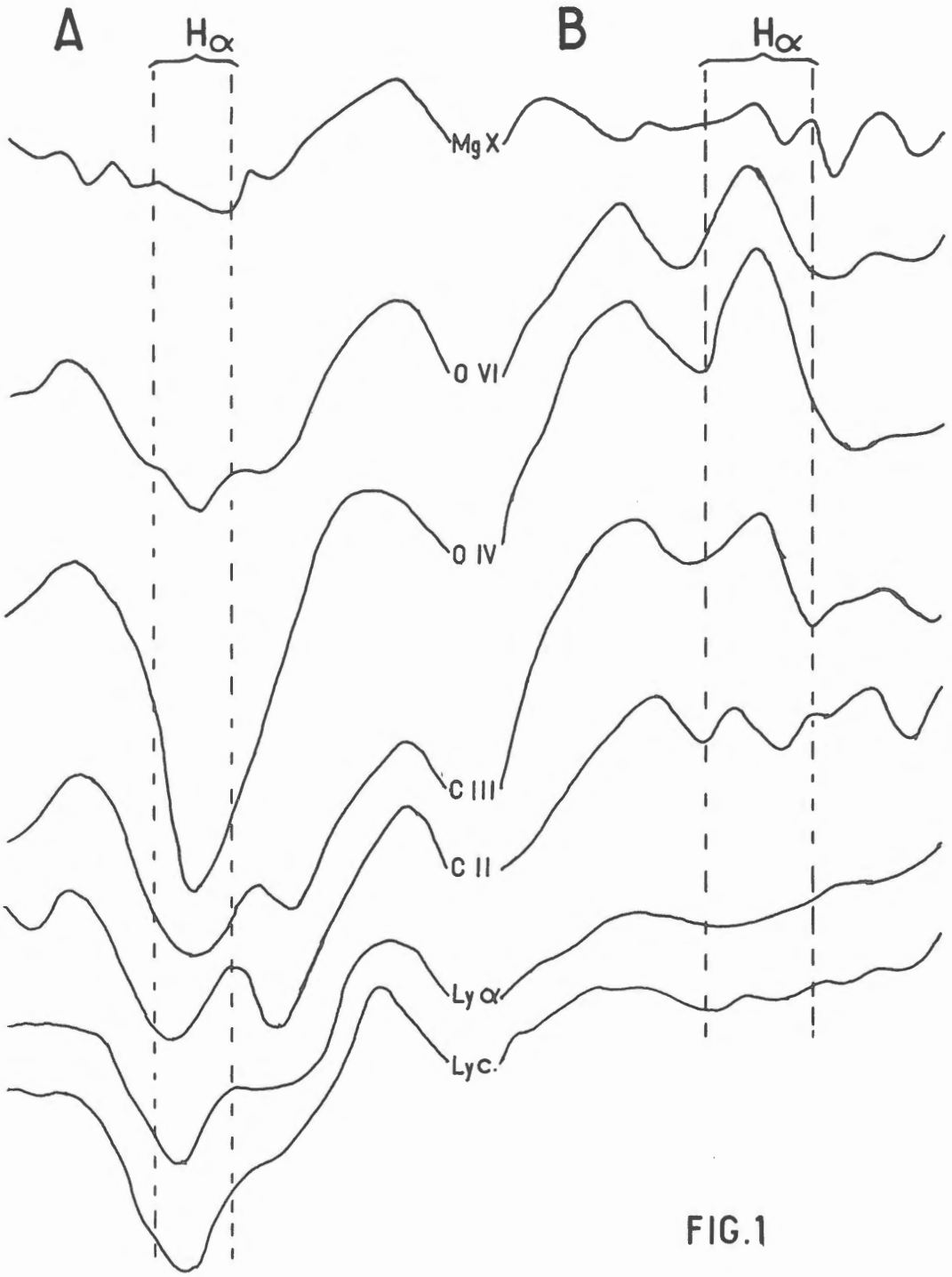

FIG.1

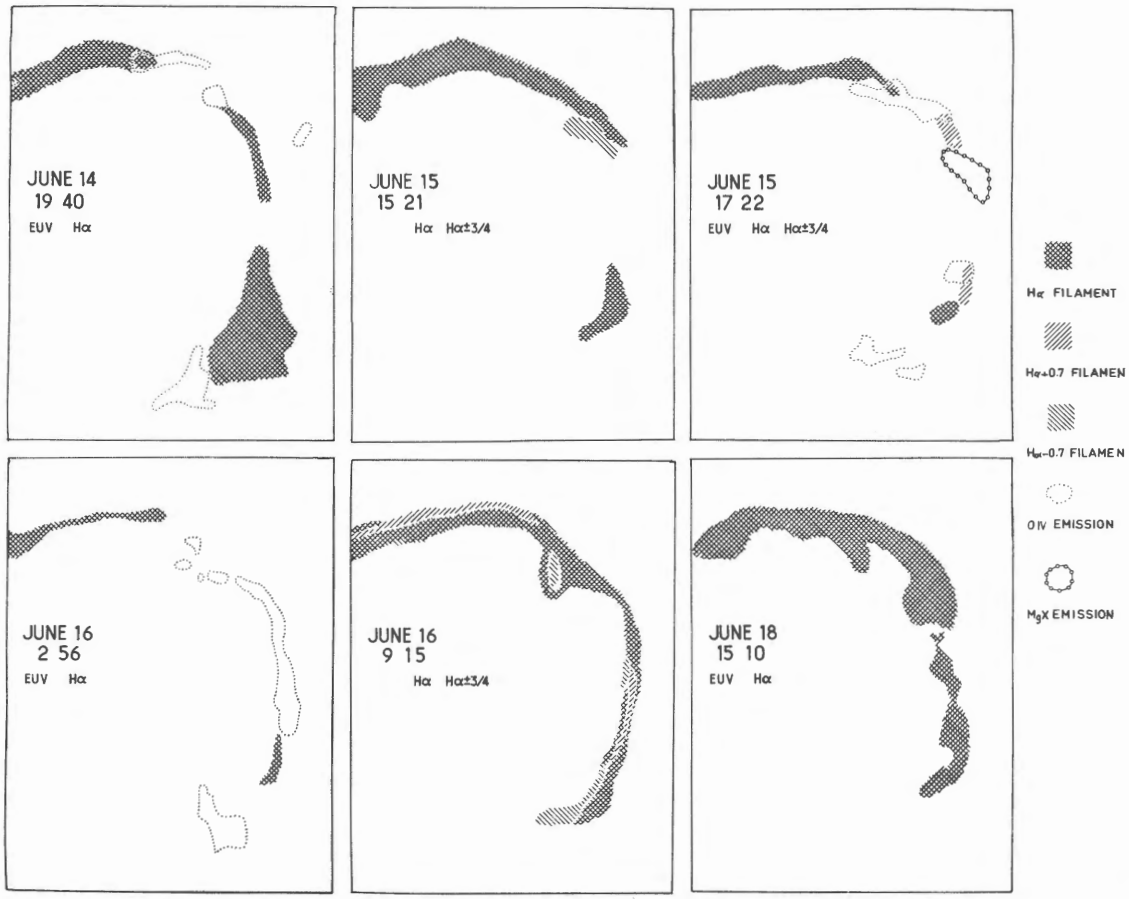
JUNE 14
19 40
EUV Hα
JUNE 15
15 21
Hα Hα±3/4
JUNE 15
17 22
EUV Hα Hα±3/4
JUNE 16
2 56
EUV Hα
JUNE 16
9 15
Hα Hα±3/4
JUNE 18
15 10
EUV Hα
Hα FILAMENT
Hα+0.7 FILAMEN
Hα-0.7 FILAMEN
OIV EMISSION
MgX EMISSION

FIG. 2

position is indicated. The temperature of the maximum abundance of the observed lines are :
Ly cont. : 7.10^3 °K ; Ly_α: 10^4 ; CII : 2.10^4 ; CIII : 6.10^4 ; OIV : 10^5 ; OVI : 3.10^5 and MgX : 10^6.

Note that in case A an absorbing feature is visible in all lines. In B, the cool lines (Ly c.,Ly_α) are not structured ; whereas in hot lines, an emission appears. The greatest contrast can be seen in the OIV line. Consequently hot filaments were identified and their locations were compared with those of the cool filaments which were expected to appear.

Figure 2 presents six composite images of H_α line, OIV and MgX, observed from June 14 at 19:40 to June 18 at 15:10 . During this period the DB phenomenon and the reapparance of a filament was observed. On June 15 at 17:22 the DB is performed but the hot filament is partially visible in the hottest line (MgX). Nine hours later (june 16, 02:56 UT) the hot filament is clearly visible with its OIV emission and MgX disappears. The filament material continues its cooling and is visible in H_α six hours later. Afterwards its stabilizes and no emission in EUV lines is observed .

4. Conclusion

This observation of a DB phenomenon is a good example of the hypothesis DB2 (ionization of the prominence material).

Therefore, at last in some cases the DB phenomenon is more a modification in the ionization temperature rather than a dramatic restructuration of the magnetic field, even if important material movements are observed in H_α.

REFERENCES

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Schmahl E.J., Mouradian Z., Martres M.J., Soru-Escaut I., 1980, Bull. Amer. Astr. Society. 12, 526.