Statistical modeling of ionospheric foF2 over Wuhan

, W x W , B

, C A , B , C

11 2003; 16 2004; 2 2004; 8 A 2004.

[1] - W F , 2, (114.4° , 30.6° ; 45.2°), C , 1957 1991 2, - x -B . , W , , 2. , W , 2 . 107 . x x x . , W 0.26 0.58 . , 2 0.5 1 .

INDEX TERMS: 2447 : ; 2479 : ; 6929 : (2409); *KEYWORDS:* 2, 107, ,

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1. Introduction

[2] . , , - , , . - - . A x - *Bilitza* 2002 . A ( ) , C - (C A) ( ).

[3] A , F , 2, . A ,

x ( ) F . , - . . - - , , x x . 10.7 x 107 . x 107 - x 107 *Tobiska*, 2001 . x

2 W .

5 B *Holt et al.*, 2002 , - - *Pancheva and Mukhtarov*, 1998 . - W 2 C . A W - 2 W 2 . - 2 , . 2 - - .

2. Data

6 1957, W (- 114.4° E, 30.6° ; 45.2°), , C , E A . . 2 1957 1991. - , 1991 - .

7 2 , x . , - 2 1957 1991 W . , , x 13. 107 1957 1991 1 11- .

3. Statistical Relationship Between foF2 and Solar Proxies

8 W 2 E x - . *F* . ., *Balan et al.*, 1994; *Kouris et al.*, 1998; *Richards*, 2001; *Sethi et al.*, 2002; *Liu et al.*, 2003 ,

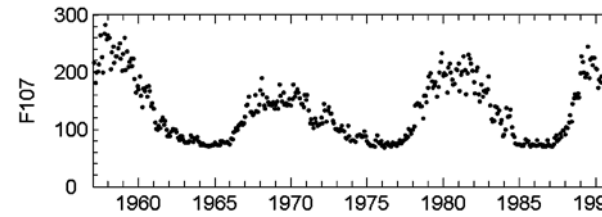

Figure 1. M 107 x 1957 1991.

2 *Kouris et al.*, 1998; *Richards*, 2001 . M - - 2 *Bilitza*, 2000 . M 2 - , 2 x . ., *Liu et al.*, 2003 . 2 *Sethi et al.*, 2002 *Rao and Rao*, 1969; *Triskova and Chum*, 1996 .

9 E . , 2, 107 107 W . 2 W . 10 x - 107 2:

$$2( ) = A ( ) + B ( ) \cdot 107 . \quad (1)$$

A ( ) B ( ) . . ., *Chen et al.*, 2002; *Gulyaeva*, 1999; *Holt et al.*, 2002; *Zolesi et al.*, 1996 . 2 ( ) ( ) 107, (00 , 120° E) (12) 2 3.

11 x - , 107 2:

$$2( ) = A ( ) + B ( ) \cdot 107 + C ( ) \cdot 107^2 . \quad (2)$$

A ( ), B ( ) C ( ) . 2 3. *Sethi et al.* 2002

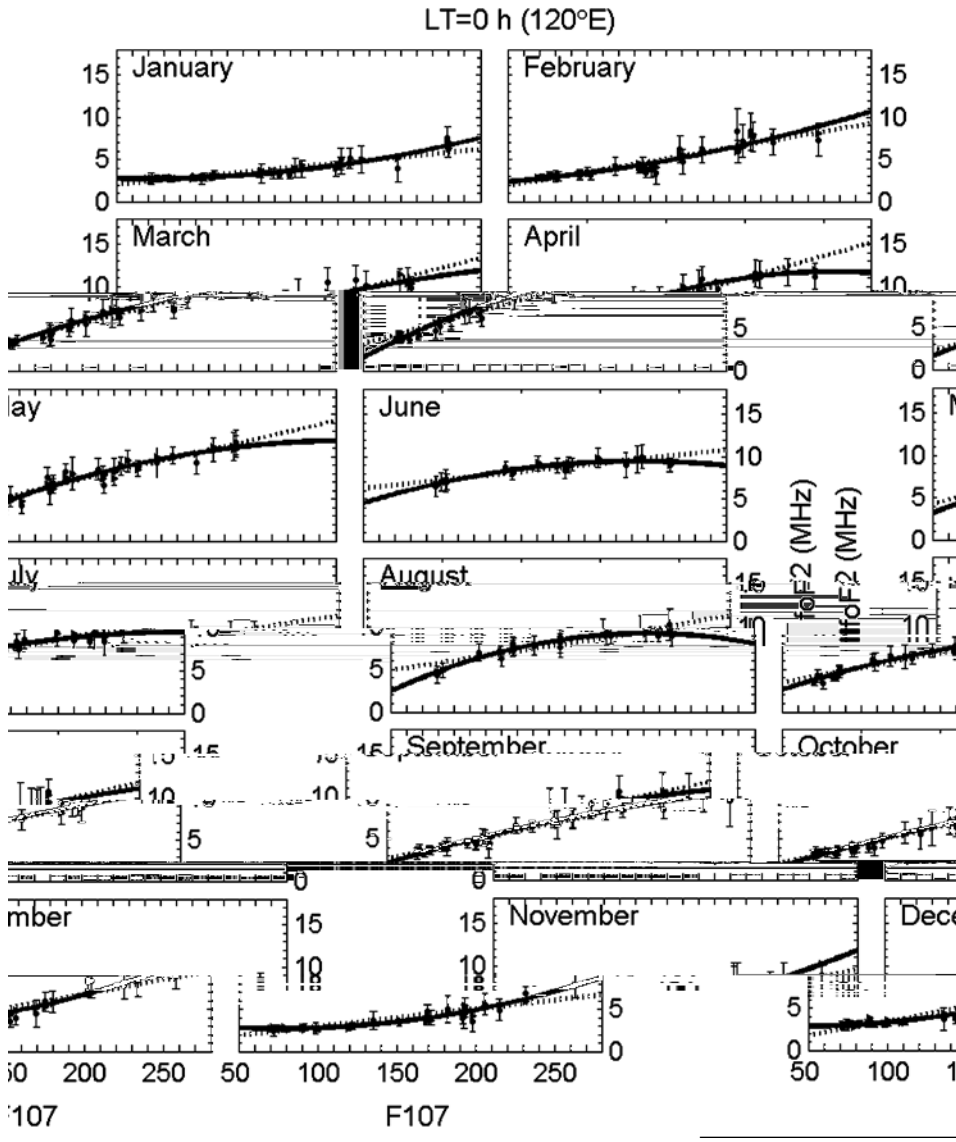

Figure 2. 2 107 0 (120° E) 1957 1991 W .

.

, . - : 2 = A + B · 107 + C · 107² + · 107 + E · 107².

2 - . A . W 2 , - , - . 107 , 107 . 12 x x

, *Pancheva and Mukhtarov* 1998 - 2( ) = A ( ) + B ( ) · 107 + C ( ) · 107² . , / - + ( ) · 107 + E ( ) · 107 ². (3)

3 10

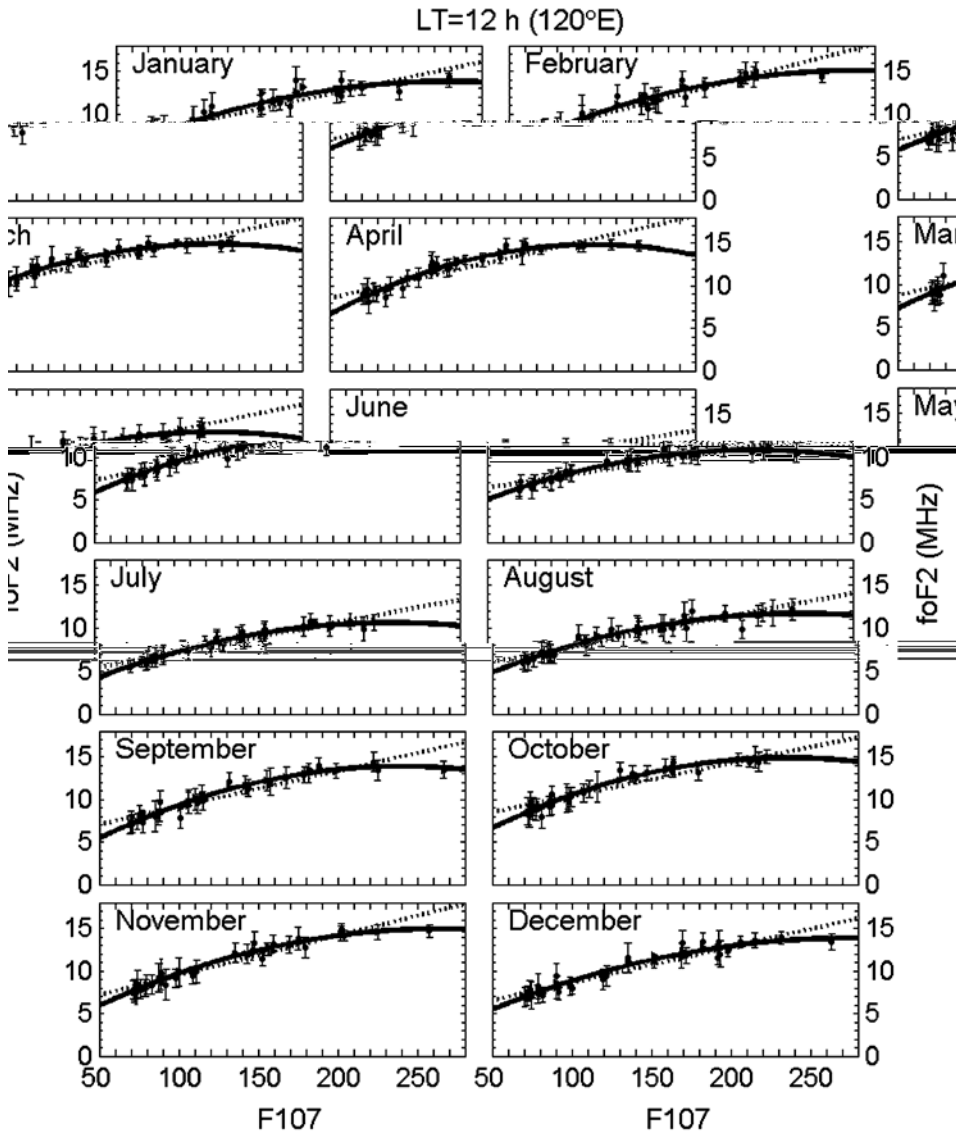

Figure 3. 2, 12 (120° E).

13 2 3 E .

. 1.35 M 0.5 M . W , 2
2
107 . , . B (
2) 2
2 W ,
(4).

14 4 - x . 107
2 1957 1991. W 2. 4 , W ,
2 , 2
2 4 , , M ,
.

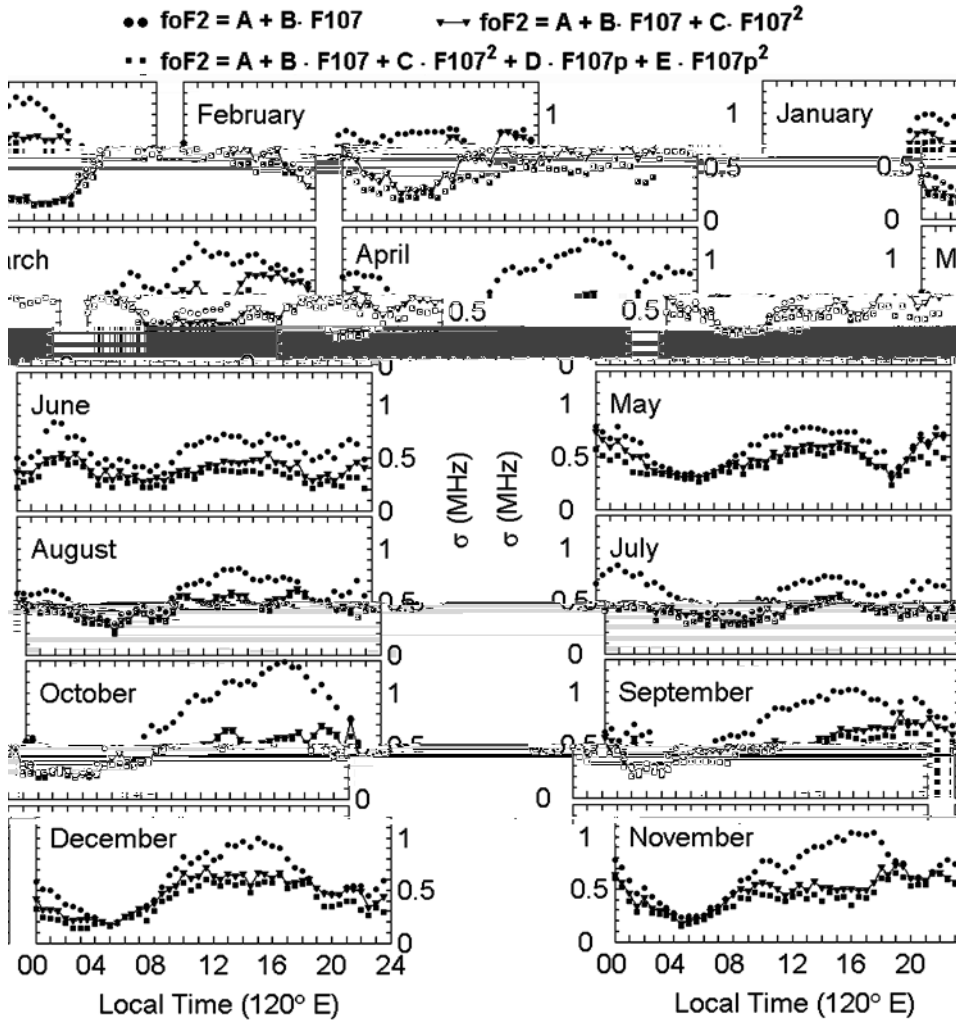

Figure 4.
2 1957 1991 W .

W 15 W 2 - . x
W E 107 ( ). 2 W x
107 x ((3)
E 107 E x , 3).
W E 107 - 2 17 B
W . ,
M, *Zhang* . W -
and Holt 2002 . , , - 2 W
107
, .
-B , . -
, , 107 107 ,
, - ,

4. Models

16 E 2. 120° E ,
, 107 107

107
, .

4.1. Fourier Model

18
, x
.
x
x
24
.
2 x

$$foF2(t)_m = c_{0,m} + \sum_{n=1}^{N} \left(c_{n,m} \quad \frac{2\pi nt}{T} + s_{n,m} \quad \frac{2\pi nt}{T} \right), \tag{4}$$

(= 0, 1, . . .,)
24 .
, , , , 107 107 . ,
x x
(3),
2
.
2
W
, , ,
5 .

4.2. Cubic-B Splines Model

19 -B
( ). -B
Scherliess and Fejer 1999
F , *Fejer and Scherliess* 1997
.
20 , 2
x -B
, ,4 ( ),

$$2( ) = \sum_{=1} \Gamma , \quad ,4( ). \tag{5}$$

,4 ( )
, ,
. , Γ ,
(5) x x
(3).
2 , .
24 .
21 5 ,4 ( )
.
, *Scherliess and Fejer* 1999 .
6 10

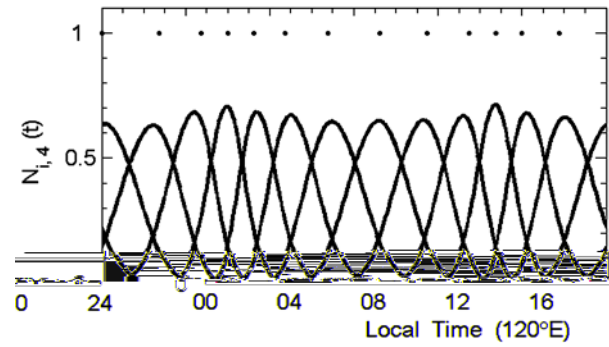

Figure 5. ( ) -B
.

Scherliess and Fejer 1999 -B
2
W .
, 13
0, 2.75, 4.75, 6, 7.25, 8.75, 10.75, 13.25, 15.5, 17.5, 18.75, 20, 21.75.
22 , 3
- 2
.

5. Verification of the Models

23 ( ) -
( ) 2 6,
, .
(1958), (1965), (1973) (1978) .
6
. ,
2 ,
. W
. 2 2001 W
6 -
.
24 ,
- 2 ,
W
1957 1991. 7

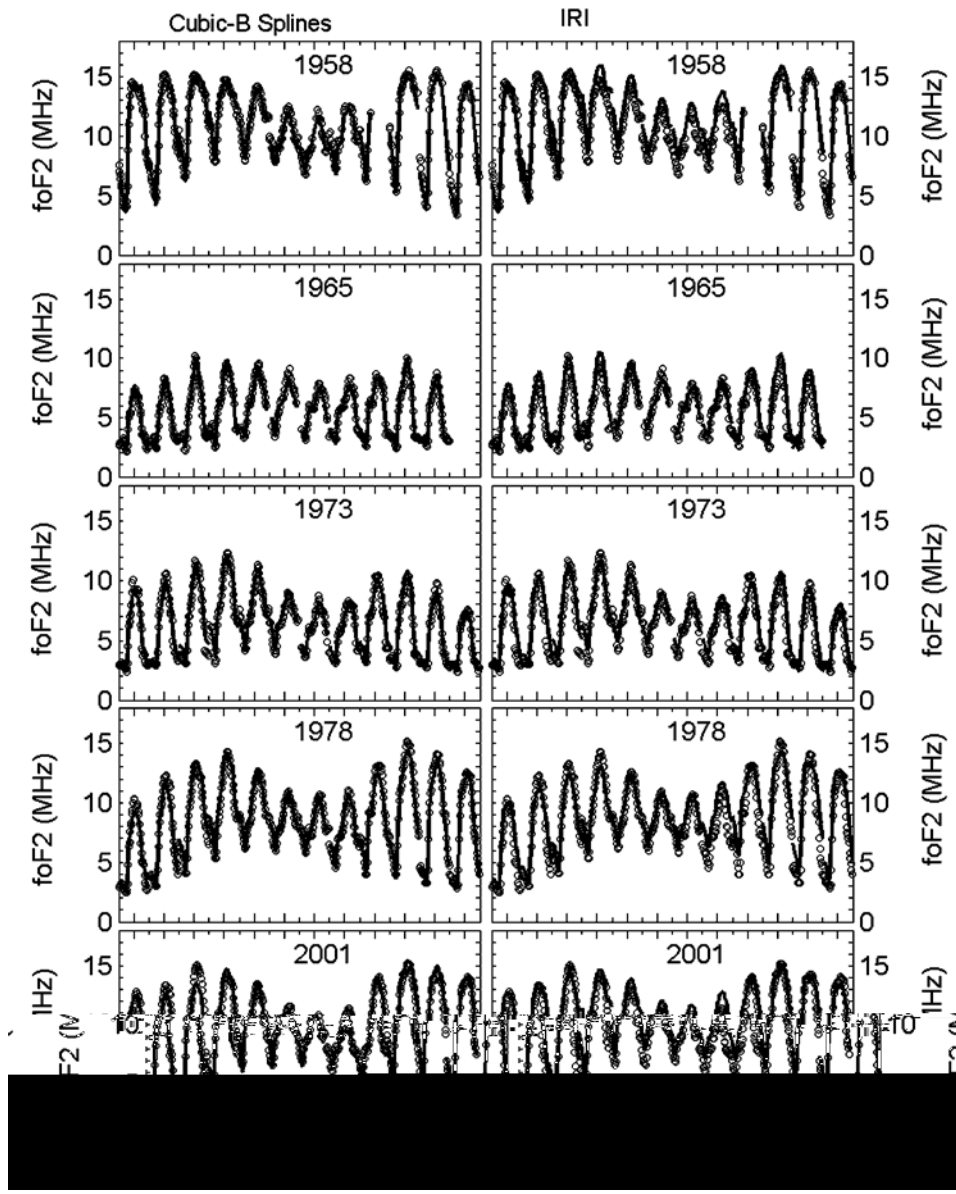

Figure 6. M - ( ) ( )
2 (1958, 2001), (1965),
(1973), (1978).

(7),
1957 1991 . C
E .
8 –2 2 M ,
25 W , 0.26 0.58 M .
7 8, 26 , .
13 11 ,
. ,
(7) 2 W . A ,

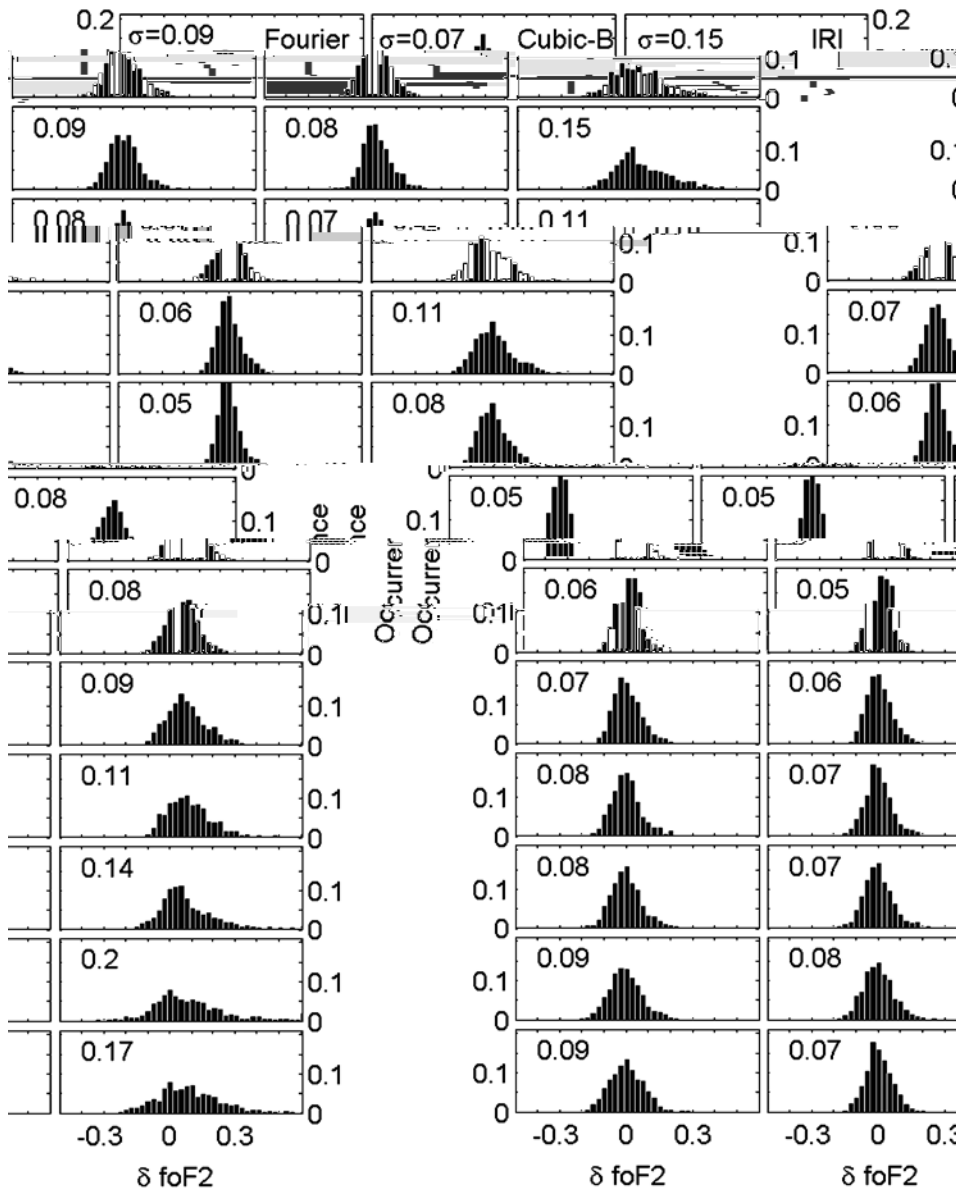

Figure 7.
2 W
, C -B , , , ,
. , .

, ,
0.5 1 M, E C W . 6 8
Chen et al., 2002 .
27 A , .
, C
, W[28] -
Wu et al., 1996 , 2
8 10

6. Summary

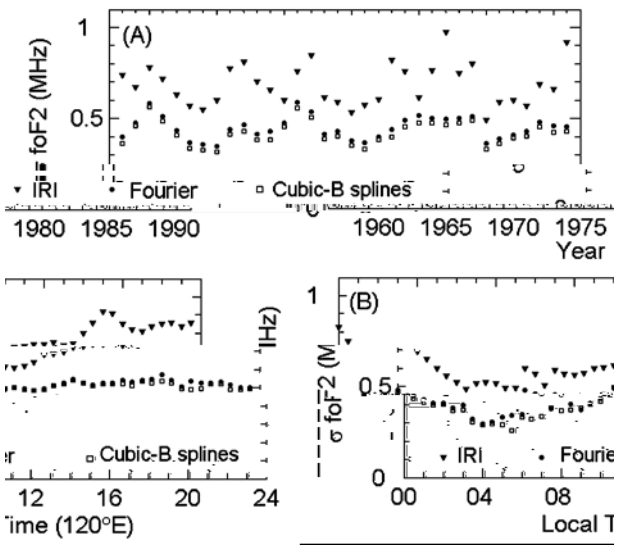

Figure 8. ( ) ( )
2 1957 1991 W .
, C -B , , ,
, .

2 W .
, 2.

:

29 1.
107 2 W . A -
- .
2 E107,
E - 2 W 107
E107 .

30 2. - 2 W .
107
2.

Pancheva and Mukhtarov, 1998 , W
.

31 3.
x -B
,
0.26 0.58 M, . ,
0.5 1 M, 2
W .

32
2 .
x
x x . W
x
.
E ,
F -
-
. , -B
-
2 W .

33 **Acknowledgments.**
W C -A. A 107
://
. . . /. E107 x
://
. W x . /.
C
(40274054, 40134020) B
C (2000078407).

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E , B. ., . (1997), - , *J. Geophys. Res.*, *102*, 24,047 24,056.

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W , ., . , . , . , . , . , C. C , . , C. (1996), C , *Adv. Space Res.*, *18*(6), 187 190.
, . ., .M. (2002), E - 107, E107 M - M , 4 ( ) / (E) , , 10 14 .
, B., . . C , . . (1996), , *Radio Sci.*, *31*(3), 547 552.

. , B. , W. W , , C A , 100029 B , C . (@ . . . ; @ . . ; @ . . . ; @ . . .)