



INSTITUT FRANCAIS DE RECHERCHE SCIENTIFIQUE  
POUR LE DEVELOPPEMENT EN COOPERATION

MBOUR Observatory

**REGIONAL MAGNETIC REPEAT STATION NETWORK**

**DESCRIPTION**

**WEST AFRICA 1992-1993**

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# REGIONAL MAGNETIC REPEAT STATION NETWORK DESCRIPTION

**Countries:** WEST-AFRICA: Senegal, Mali, Burkina, Niger, Ivory-Coast **Revised:** 10 November 1993

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## NETWORK CONFIGURATION

Reference Magnetic observatory: MBOUR (1952+)

IEEY-International Equatorial Electrojet Year semi-permanent observatories (1992-1994): 10

<b>Repeat Stations:</b>	Burkina-Faso	3	Niger	4
	Senegal	9	Ivory coast	7
	Mali	8		

Total: 31 stations reoccupation interval every 5-7 years

## Stations markers:

- \* 20 concrete pillar, non-magnetic, 135 cm high (BM ORS 1986)
- \* 5 suitable non-magnetic landmarks (levelling mark, landmark in Airport...)
- \* 7 non-marked stations

## Logistics:

Access: most stations are accessible with motor vehicle (4x4)  
Field work: beetwen october and may  
Total duration: 5-6 months  
Staff: 1 skilled observer + 1 assistant

## OBSERVATIONAL PROCEDURES

### Absolute measurements

D,I - Fluxgate theodolite DIFLUX  
F - Proton precession magnetometer Gem GSM19  
Geographic azimuth - Chasselon theodolite (sun observations)

- \* Instrument comparison/calibrations are carried out at the reference magnetic observatory Mbour
- \* Geodetic coordinates of the stations were up-dated with GPS satellite system.

### Variometer measurements

- D,H,Z - network of 10 permanent variometers Mosnier station with digital data recorder on memory RAM at one minute intervals along the 5°West meridian profile (IEEY observatories).
- Time - Radio receiver to calibrate the internal clock

### Frequency and duration of observations

- \* at least two sets of absolutes are made daily, one early in the morning and one late in the evening to reduce the strong effect of the diurnal change (Electrojet proximity).
- \* variometer is operated no less than 1 day and 2 nights.

### DATA REDUCTION PROCEDURES

The absolute observations of D, I and F are used to calculate absolute values of D, H and Z which are used to establish baseline values of the nearest variometer record.

The stability/reliability of the variometer records are assessed by comparison with records from the reference magnetic observatory.

#### Reduction at night level using local variometer station

The baseline values are calculated from the absolute observations. A reduction is made from the nearest IEEY-observatory to get night-time values. The averaged values for each element of the field get the station values at night-time  $t$  ( $E(S,t)$ ).

#### Reduction to a common epoch

Magnetic elements observed at the repeat stations were reduced to the common epoch 18 June 1993 (center on a 8 days very quiet period) by reference to data from the Mbour observatory. (to permit direct comparison with conventional annual mean values from magnetic observatories)

Because the geographic field is very large, there are important differences of secular variations between stations (for exemple Z is varying from -10 to -95 nT/year). Thus we use the differential secular variation at the station S, relative to that at the reference observatory O to reduce data to a common epoch.

Let  $t_0$  = common epoch to the reduction (1993 06 18)  
 $E(S,t_0)$  = mean values of the element at the station at epoch  $t_0$   
 $E(O,t_0)$  = mean values of the element at the observatory for epoch  $t_0$   
 $E(S,t)$  = value of the element at station S at night-time  $t$   
 $E(O,t)$  = value of the element at the observatory at the same time  $t$   
 $SV(S)$  = secular variation at the field station  
 $SV(O)$  = secular variation at the reference observatory

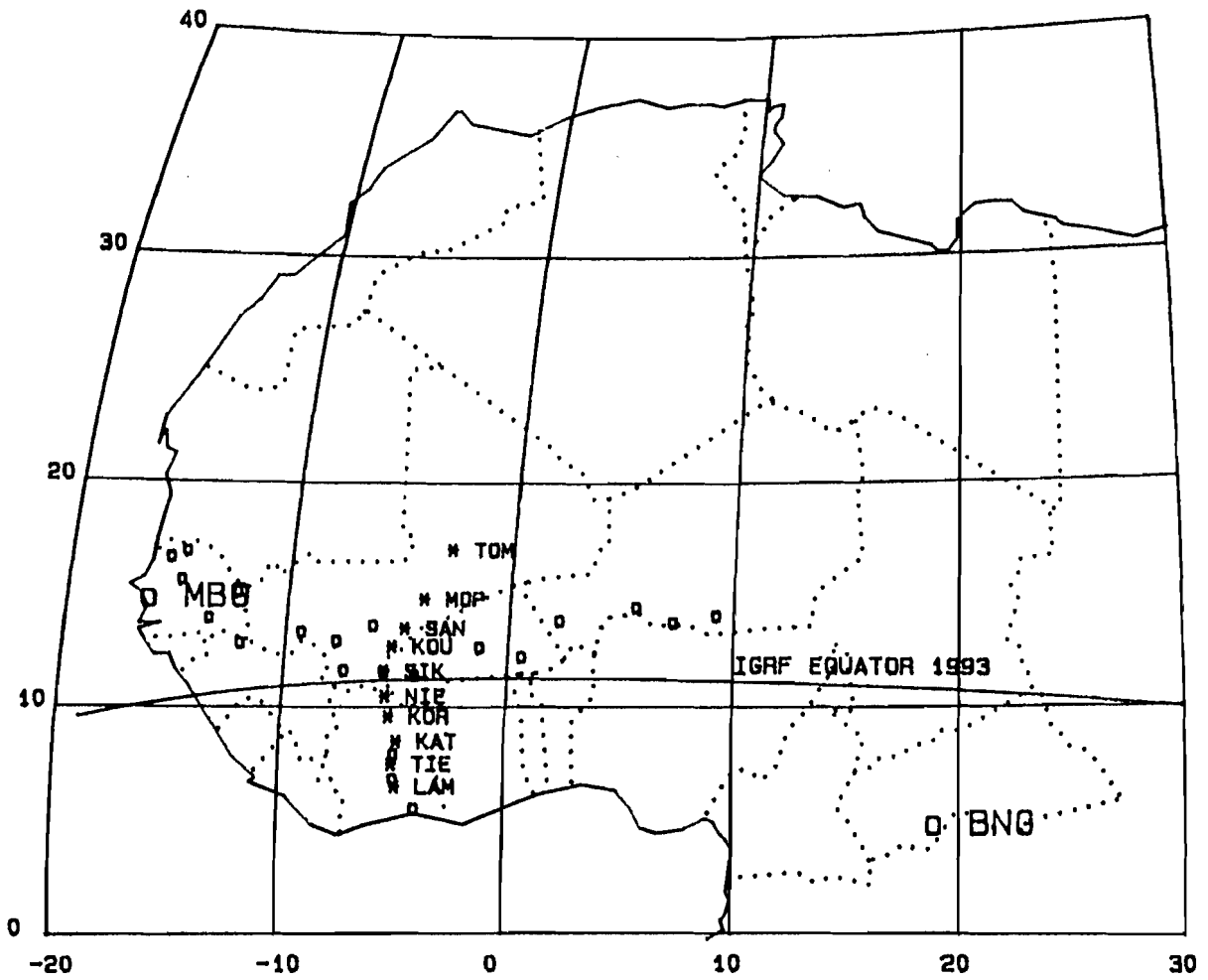
The reduced element to  $t_0$  epoch for the S station is:

$$E(S,t_0) = E(O,t_0) + E(S,t) - E(O,t) + (t_0-t)*(SV(S)-SV(O))$$

A similar expression was used for the previous survey for reduction of data to epoch 1986.5

#### Annual change values

The annual change values for each element at station S were obtained from the difference between two successive values divided by time interval, or from interpolation of the nearest stations.



WEST-AFRICA MAGNETIC REPEAT STATIONS 1992-93

\* IEEY Observatories

o Repeat stations

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>OUAGADOUGOU</b>	<b>COUNTRY:</b>	<b>BURKINA-FASO</b>
Latitude (north):	12.381°	Is this a new station:	No
Longitude (east):	-1.504°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	293	Year of previous occupation:	1986

## RESULTS

## CLASSIFICATION

Mean date of observations: 1993 04 28

Range M 1.2

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01

: N/A

Vertical : 0.01

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. D	:	-4.931 ± 0.05°	:	-4.921 ± 0.08°
2. H	:	32982 ± 3 nT	:	32986 ± 5 nT
3. Z	:	1575 ± 3 nT	:	1566 ± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. D	:	0.11°	:	0.093°
2. H	:	12 nT	:	15.7 nT
3. Z	:	-69 nT	:	-39.2 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. MBOUR	: 1730 km	: am = 10
2'. KOUTIALA	: 436 km	: 125 nT

## Notes

- 1' used to get the common epoch values  
2' used to estimate the night-time values

Marked station

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>BAMAKO</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	12.657°	Is this a new station:	No
Longitude (east):	-7.932°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	320	Year of previous occupation:	1986

## RESULTS

## CLASSIFICATION

Mean date of observations: 1993 02 24

Range M 1.1

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01 : N/A

Vertical : 0.01 : N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. D	:	-7.171	± 0.05°	:	-7.131	± 0.08°
2. H	:	32477	± 3 nT	:	32492	± 5 nT
3. Z	:	2179	± 3 nT	:	2157	± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. D	:	0.14°	:	0.113°
2. H	:	7 nT	:	9.5 nT
3. Z	:	-93 nT	:	-60.6 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. MBOUR	: 1020 km	: am = 9
2'. KOUTIALA	: 280 km	: 111 nT

## Notes

- 1' used to get the common epoch values  
2' used to estimate the night-time values

Marked station

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>BOUGOUNI</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	<b>11.443°</b>	Is this a new station:	<b>No</b>
Longitude (east):	<b>-7.517°</b>	Is this an exact reoccupation:	<b>Yes</b>
Height above mean sea level (m):	<b>347</b>	Year of previous occupation:	<b>1986</b>

**RESULTS**

**CLASSIFICATION**

Mean date of observations: **1993 02 26**

Range **M 1.1**

Duration of station occupation: **3 days**

Uncertainly in instrument relocation (m)

Gradient of total field at station

Horizontal : **0.01** : **N/A**

Vertical : **0.01** : **N/A**

Field element (a) Mean 'night-time value and estimated uncertainly

(b) Common epoch value (Undisturbed night-time) and estimated uncertainly year = **1993 06 18**

1. <b>D</b> :	<b>-7.180 ± 0.05°</b>	:	<b>-7.142 ± 0.08°</b>
2. <b>H</b> :	<b>32242 ± 3 nT</b>	:	<b>32251 ± 5 nT</b>
3. <b>Z</b> :	<b>397 ± 3 nT</b>	:	<b>375 ± 5 nT</b>

Estimated annual change for element

∅ previous epoch = **1990**

∅ new epoch = **1995**

1. <b>D</b> :	<b>0.13°</b>	:	<b>0.124°</b>
2. <b>H</b> :	<b>4 nT</b>	:	<b>10.1 nT</b>
3. <b>Z</b> :	<b>-94 nT</b>	:	<b>-61.8 nT</b>

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	<b>1098 km</b>	: <b>am = 8</b>
2'. <b>KOUTIALA</b> :	<b>252 km</b>	: <b>101 nT</b>

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

Marked station

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>KITA</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	13.070°	Is this a new station:	No
Longitude (east):	-9.493°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	360	Year of previous occupation:	1986

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**RESULTS**

**CLASSIFICATION**

Mean date of observations: 1993 03 21

Range **M 1.1**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.5

: N/A

Vertical : 0.1

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. <b>D</b> :	-7.570 ± 0.05°	:	-7.546 ± 0.08°
2. <b>H</b> :	32301 ± 3 nT	:	32307 ± 5 nT
3. <b>Z</b> :	2841 ± 3 nT	:	2817 ± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. <b>D</b> :	0.13°	:	0.121°
2. <b>H</b> :	14 nT	:	10.5 nT
3. <b>Z</b> :	-97 nT	:	-64.9 nT

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	842 km	: $\overline{am} = 41$
2'. <b>SAN</b> :	512 km	: 88 nT

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

Suitable non-magnetic land mark



**REGIONAL MAGNETIC REPEAT STATION RECORD**

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<b>STATION NAME:</b>	<b>KOUTIALA</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	12.352°	Is this a new station:	No
Longitude (east):	-5.433°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	378	Year of previous occupation:	1986

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**RESULTS**

**CLASSIFICATION**

Mean date of observations: 1993 03 02

Range **V 1.1**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01 : N/A

Vertical : 0.01 : N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

- |               |                |   |                |
|---------------|----------------|---|----------------|
| 1. <b>D</b> : | -6.279 ± 0.05° | : | -6.242 ± 0.08° |
| 2. <b>H</b> : | 32577 ± 3 nT   | : | 32607 ± 5 nT   |
| 3. <b>Z</b> : | 1633 ± 3 nT    | : | 1613 ± 5 nT    |

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

- |               |        |   |          |
|---------------|--------|---|----------|
| 1. <b>D</b> : | 0.13°  | : | 0.098°   |
| 2. <b>H</b> : | 8 nT   | : | 13.6 nT  |
| 3. <b>Z</b> : | -83 nT | : | -56.3 nT |

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	1300 km	: <b>am = 40</b>
2'. <b>KOUTIALA</b> :	2 km	: <b>93 nT</b>

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Marked station**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>MOPTI-SEVARE</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	14.512°	Is this a new station:	No
Longitude (east):	-4.090°	Is this an exact reoccupation:	No
Height above mean sea level (m):	270	Year of previous occupation:	1986

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**RESULTS**

**CLASSIFICATION**

Mean date of observations: 1993 03 01

Range **V 1.1**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 1

: N/A

Vertical : 0.1

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. <b>D</b> :	-5.468 ± 0.05°	:	-5.433 ± 0.08°
2. <b>H</b> :	33071 ± 3 nT	:	33088 ± 5 nT
3. <b>Z</b> :	4681 ± 3 nT	:	4667 ± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. <b>D</b> :	0.13°	:	0.100°
2. <b>H</b> :	15 nT	:	15.7 nT
3. <b>Z</b> :	-71 nT	:	-44.3 nT

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	1428 km	: <b>am = 33</b>
2'. <b>MOPTI-SEVARE</b> :	0.5 km	: <b>80 nT</b>

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Suitable non-magnetic land mark**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>SAN</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	13.234°	Is this a new station:	Yes
Longitude (east):	-4.879°	Is this an exact reoccupation:	
Height above mean sea level (m):	300	Year of previous occupation:	

<b>RESULTS</b>	<b>CLASSIFICATION</b>
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Mean date of observations: 1993 03 18

Range **V 1.1**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)      Gradient of total field at station

Horizontal : : **N/A**

Vertical : : **N/A**

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**

1. <b>D</b> :	-5.331 ± 0.05°	:	-5.324 ± 0.08°
2. <b>H</b> :	32590 ± 3 nT	:	32628 ± 5 nT
3. <b>Z</b> :	2880 ± 3 nT	:	2855 ± 5 nT

Estimated annual change for element

@ previous epoch =

@ new epoch = **1995 (interpolated)**

1. <b>D</b> :		:	<b>0.097°</b>
2. <b>H</b> :		:	<b>14.0 nT</b>
3. <b>Z</b> :		:	<b>-50.0 nT</b>

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	1347 km	: <b>am = 29</b>
2'. <b>SAN</b> :	0 km	: <b>93 nT</b>

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Non-Marked station**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>SEGOU-Airport</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	13.425°	Is this a new station:	No
Longitude (east):	-6.280°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	284	Year of previous occupation:	1986

RESULTS		CLASSIFICATION	
Mean date of observations:	1993 02 27	Range	M 1.1
Duration of station occupation:	3 days	Uncertainty in instrument relocation (m)	Gradient of total field at station
Horizontal	: 0.01	:	N/A
Vertical	: 0.01	:	N/A
Field element	(a) Mean 'night-time value and estimated uncertainty	(b) Common epoch value (Undisturbed night-time) and estimated uncertainty	year = 1993 06 18
1. D	: -6.412 ± 0.05°	:	-6.375 ± 0.08°
2. H	: 32741 ± 3 nT	:	32817 ± 5 nT
3. Z	: 3183 ± 3 nT	:	3167 ± 5 nT
Estimated annual change for element	@ previous epoch = 1990	@ new epoch = 1995	
1. D	: 0.12°	:	0.108°
2. H	: 15 nT	:	23.6 nT
3. Z	: -80 nT	:	-55.5 nT

MAGNETIC DISTURBANCE			
Observatory name	Distance from repeat station		Disturbance indicator
1'. MBOUR	: 1190 km	:	am = 7
2'. SAN	: 157 km	:	103 nT

Notes  
 1' used to get the common epoch values  
 2' used to estimate the night-time values

Marked station

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>SIKASSO</b>	<b>COUNTRY:</b>	<b>MALI</b>
Latitude (north):	11.337°	Is this a new station:	No
Longitude (east):	-5.695°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	360	Year of previous occupation:	1986

RESULTS		CLASSIFICATION	
Mean date of observations:	1993 03 17	Range	V 1.1
Duration of station occupation:	3 days		
	Uncertainty in instrument relocation (m)		Gradient of total field at station
Horizontal :	0.01	:	N/A
Vertical :	0.01	:	N/A
Field element	(a) Mean 'night-time value and estimated uncertainty	(b) Common epoch value (Undisturbed night-time) and estimated uncertainty	year = 1993 06 18
1. D :	-6.649 ± 0.05°	:	-6.627 ± 0.08°
2. H :	32323 ± 3 nT	:	32365 ± 5 nT
3. Z :	166 ± 3 nT	:	140 ± 5 nT
Estimated annual change for element	@ previous epoch = 1990	@ new epoch = 1995	
1. D :	0.13°	:	0.098°
2. H :	6 nT	:	10.5 nT
3. Z :	-80 nT	:	-55.6 nT

MAGNETIC DISTURBANCE			
Observatory name	Distance from repeat station		Disturbance indicator
1'. MBOUR	: 1295 km	:	am = 39
2'. SIKASSO	: 1.5 km	:	113 nT

**Notes**  
 1' used to get the common epoch values  
 2' used to estimate the night-time values

Marked station

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>DABNOU</b>	<b>COUNTRY:</b>	<b>NIGER</b>
Latitude (north):	14.168°	Is this a new station:	No
Longitude (east):	5.358°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	310	Year of previous occupation:	1986

## RESULTS

## CLASSIFICATION

Mean date of observations: 1993 04 14

Range **M 1.2**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 1

: N/A

Vertical : 0.1

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. **D** : -2.841 ± 0.05° : -2.821 ± 0.08°2. **H** : 33866 ± 3 nT : 33897 ± 5 nT3. **Z** : 4412 ± 3 nT : 4403 ± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. **D** : 0.12° : 0.011°2. **H** : 17 nT : 19.3 nT3. **Z** : -45 nT : -16.8 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: 2470 km	: <u>am</u> = 29
2'. <b>SAN</b>	: 1140 km	: 74 nT

## Notes

- 1' used to get the common epoch values  
2' used to estimate the night-time values

Suitable non-magnetic land mark

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>MARADI</b>	<b>COUNTRY:</b>	<b>NIGER</b>
Latitude (north):	<b>13.499°</b>	Is this a new station:	<b>No</b>
Longitude (east):	<b>7.119°</b>	Is this an exact reoccupation:	<b>Yes</b>
Height above mean sea level (m):	<b>370</b>	Year of previous occupation:	<b>1986</b>

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**RESULTS**

**CLASSIFICATION**

Mean date of observations: **1993 04 20**

Range **M 1.2**

Duration of station occupation: **3** days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : **0.01** : **N/A**

Vertical : **0.01** : **N/A**

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**

- |               |                       |   |                       |
|---------------|-----------------------|---|-----------------------|
| 1. <b>D</b> : | <b>-2.607 ± 0.05°</b> | : | <b>-2.588 ± 0.08°</b> |
| 2. <b>H</b> : | <b>34043 ± 3 nT</b>   | : | <b>34055 ± 5 nT</b>   |
| 3. <b>Z</b> : | <b>3600 ± 3 nT</b>    | : | <b>3591 ± 5 nT</b>    |

Estimated annual change for element

@ previous epoch = **1990**

@ new epoch = **1995**

- |               |               |   |                 |
|---------------|---------------|---|-----------------|
| 1. <b>D</b> : | <b>0.09°</b>  | : | <b>0.066°</b>   |
| 2. <b>H</b> : | <b>16 nT</b>  | : | <b>17.4 nT</b>  |
| 3. <b>Z</b> : | <b>-43 nT</b> | : | <b>-18.1 nT</b> |

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	<b>2675 km</b>	<b>am = 40</b>
2'. <b>SAN</b> :	<b>1330 km</b>	<b>75 nT</b>

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Marked station**

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**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>NIAMEY</b>	<b>COUNTRY:</b>	<b>NIGER</b>
Latitude (north):	<b>13.559°</b>	Is this a new station:	<b>No</b>
Longitude (east):	<b>2.049°</b>	Is this an exact reoccupation:	<b>Yes</b>
Height above mean sea level (m):	<b>210</b>	Year of previous occupation:	<b>1986</b>

---

**RESULTS**

**CLASSIFICATION**

Mean date of observations: **1993 04 12**

Range **M 1.2**

Duration of station occupation: **3** days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : **0.01**

: **N/A**

Vertical : **0.01**

: **N/A**

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**

- |               |                       |   |                       |
|---------------|-----------------------|---|-----------------------|
| 1. <b>D</b> : | <b>-3.710 ± 0.05°</b> | : | <b>-3.704 ± 0.08°</b> |
| 2. <b>H</b> : | <b>33579 ± 3 nT</b>   | : | <b>33587 ± 5 nT</b>   |
| 3. <b>Z</b> : | <b>3419 ± 3 nT</b>    | : | <b>3402 ± 5 nT</b>    |

Estimated annual change for element

@ previous epoch = **1990**

@ new epoch = **1995**

- |               |               |   |                 |
|---------------|---------------|---|-----------------|
| 1. <b>D</b> : | <b>0.13°</b>  | : | <b>0.075°</b>   |
| 2. <b>H</b> : | <b>15 nT</b>  | : | <b>17.7 nT</b>  |
| 3. <b>Z</b> : | <b>-56 nT</b> | : | <b>-30.9 nT</b> |

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	<b>2112 km</b>	: <b>am = 24</b>
2'. <b>SAN</b> :	<b>770 km</b>	: <b>90 nT</b>

---

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Marked station**



**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>ZINDER</b>	<b>COUNTRY:</b>	<b>NIGER</b>
Latitude (north):	13.774°	Is this a new station:	No
Longitude (east):	8.981°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	460	Year of previous occupation:	1986

RESULTS		CLASSIFICATION	
Mean date of observations:	1993 04 16	Range	M 1.2
Duration of station occupation:	3 days	Uncertainty in instrument relocation (m)	Gradient of total field at station
Horizontal	: 0.01	:	N/A
Vertical	: 0.01	:	N/A
Field element	(a) Mean 'night-time value and estimated uncertainty	(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year =	1993 06 18
1. D	: -2.292 ± 0.05°	:	-2.273 ± 0.08°
2. H	: 34239 ± 3 nT	:	34274 ± 5 nT
3. Z	: 4031 ± 3 nT	:	4021 ± 5 nT
Estimated annual change for element	@ previous epoch = 1990	@ new epoch = 1995	
1. D	: 0.09°	:	0.065°
2. H	: 15 nT	:	14.7 nT
3. Z	: -39 nT	:	-14.5 nT

MAGNETIC DISTURBANCE			
Observatory name	Distance from repeat station		Disturbance indicator
1'. MBOUR	: 2880 km	:	am = 27
2'. SAN	: 1540 km	:	93 nT

**Notes**  
 1' used to get the common epoch values  
 2' used to estimate the night-time values

**Marked station**

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>ADIOPODOUME</b>	<b>COUNTRY:</b>	<b>IVORY-COAST</b>
Latitude (north):	5.325°	Is this a new station:	No
Longitude (east):	-4.133°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	35	Year of previous occupation:	1986

## RESULTS

## CLASSIFICATION

Mean date of observations: 1993 03 10

Range **M 1.1**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01

: N/A

Vertical : 0.01

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. **D** : -7.820 ± 0.05° : -7.807 ± 0.08°2. **H** : 30223 ± 3 nT : 30293 ± 5 nT3. **Z** : -7916 ± 3 nT : -7947 ± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. **D** : 0.11° : 0.096°2. **H** : -13 nT : 10.5 nT3. **Z** : -95 nT : -67.1 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: 1745 km	: $\overline{am} = 23$
2'. <b>LAMTO</b>	: 140 km	: 91 nT

## Notes

- 1' used to get the common epoch values  
2' used to estimate the night-time values

Marked station

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>BOUAKE</b>	<b>COUNTRY:</b>	<b>IVORY-COAST</b>
Latitude (north):	7.724°	Is this a new station:	No
Longitude (east):	-5.072°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	340	Year of previous occupation:	1986

## RESULTS

## CLASSIFICATION

Mean date of observations: 1993 03 07

Range **M 1.1**

Duration of station occupation: 3 days

Uncertainly in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01

: N/A

Vertical : 0.01

: N/A

Field element (a) Mean 'night-time value and estimated uncertainly

(b) Common epoch value (Undisturbed night-time) and estimated uncertainly year = 1993 06 18

1. <b>D</b>	:	-7.448	± 0.05°	:	-7.416	± 0.08°
2. <b>H</b>	:	31211	± 3 nT	:	31222	± 5 nT
3. <b>Z</b>	:	-4795	± 3 nT	:	-4816	± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. <b>D</b>	:	0.12°	:	0.085°
2. <b>H</b>	:	-9 nT	:	15.2 nT
3. <b>Z</b>	:	-92 nT	:	-65.5 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: 1510 km	: $\overline{\text{am}} = 35$
2'. <b>KATIOLA</b>	: 45 km	: 41 nT

## Notes

- 1' used to get the common epoch values  
2' used to estimate the night-time values

Marked station

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>KATIOLA</b>	<b>COUNTRY:</b>	<b>IVORY-COAST</b>
Latitude (north):	<b>8.125°</b>	Is this a new station:	<b>Yes</b>
Longitude (east):	<b>-5.044°</b>	Is this an exact reoccupation:	
Height above mean sea level (m):	<b>400</b>	Year of previous occupation:	

**RESULTS****CLASSIFICATION**Mean date of observations: **1993 03 15**Range **V 1.1**Duration of station occupation: **3** days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : : **N/A**Vertical : : **N/A**

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**1. **D** : **-7.561 ± 0.05°** : **-7.549 ± 0.08°**2. **H** : **31280 ± 3 nT** : **31304 ± 5 nT**3. **Z** : **-4223 ± 3 nT** : **-4 249 ± 5 nT**

Estimated annual change for element

@ previous epoch =

@ new epoch = **1995 (Interpolated)**1. **D** : : **0.090°**2. **H** : : **8.0 nT**3. **Z** : : **-63.0 nT****MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: <b>1500</b> km	: <b>am = 81</b>
2'. <b>KATIOLA</b>	: <b>0</b> km	: <b>20 nT</b>

**Notes**

- 1' used to get the common epoch values  
 2' used to estimate the night-time values

Non-Marked station

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>KORHOGO</b>	<b>COUNTRY:</b>	<b>IVORY-COAST</b>
Latitude (north):	<b>9.411°</b>	Is this a new station:	<b>No</b>
Longitude (east):	<b>-5.623°</b>	Is this an exact reoccupation:	<b>Yes</b>
Height above mean sea level (m):	<b>380</b>	Year of previous occupation:	<b>1986</b>

---

**RESULTS**

**CLASSIFICATION**

Mean date of observations: **1993 03 04**

Range **V 1.0**

Duration of station occupation: **3** days

Uncertainty in instrument relocation (m)      Gradient of total field at station

Horizontal      :      **0.01**      :      **N/A**

Vertical      :      **0.01**      :      **N/A**

Field element      (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**

- |    |          |   |                       |   |                       |
|----|----------|---|-----------------------|---|-----------------------|
| 1. | <b>D</b> | : | <b>-7.058 ± 0.05°</b> | : | <b>-7.036 ± 0.08°</b> |
| 2. | <b>H</b> | : | <b>31731 ± 3 nT</b>   | : | <b>31799 ± 5 nT</b>   |
| 3. | <b>Z</b> | : | <b>-2501 ± 3 nT</b>   | : | <b>-2528 ± 5 nT</b>   |

Estimated annual change for element

@ previous epoch = **1990**

@ new epoch = **1995**

- |    |          |   |               |   |                 |
|----|----------|---|---------------|---|-----------------|
| 1. | <b>D</b> | : | <b>0.12°</b>  | : | <b>0.102°</b>   |
| 2. | <b>H</b> | : | <b>3 nT</b>   | : | <b>3.4 nT</b>   |
| 3. | <b>Z</b> | : | <b>-91 nT</b> | : | <b>-61.6 nT</b> |

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**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: <b>1375</b> km	: <b>am = 33</b>
2'. <b>KORHOGO</b>	: <b>23</b> km	: <b>102 nT</b>

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**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Marked station**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>LAMTO</b>	<b>COUNTRY:</b>	<b>IVORY-COAST</b>
Latitude (north):	<b>6.224°</b>	Is this a new station:	<b>Yes</b>
Longitude (east):	<b>-5.017°</b>	Is this an exact reoccupation:	
Height above mean sea level (m):	<b>150</b>	Year of previous occupation:	

---

**RESULTS**

**CLASSIFICATION**

Mean date of observations: **1993 03 12**

Range **V 1.1**

Duration of station occupation: **3 days**

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : : **N/A**

Vertical : : **N/A**

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**

1. <b>D</b> :	<b>-7.401 ± 0.05°</b>	:	<b>-7.373 ± 0.08°</b>
2. <b>H</b> :	<b>30438 ± 3 nT</b>	:	<b>30535 ± 5 nT</b>
3. <b>Z</b> :	<b>-6695 ± 3 nT</b>	:	<b>-6725 ± 5 nT</b>

Estimated annual change for element

@ previous epoch =

@ new epoch = **1995 (interpolated)**

1. <b>D</b> :		:	<b>0.095°</b>
2. <b>H</b> :		:	<b>10.6 nT</b>
3. <b>Z</b> :		:	<b>-68 nT</b>

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	<b>1605 km</b>	: <b>am = 44</b>
2'. <b>LAMTO</b> :	<b>0 km</b>	: <b>102 nT</b>

---

**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Non-Marked station**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>NIELLE</b>	<b>COUNTRY:</b>	<b>IVORY-COAST</b>
Latitude (north):	<b>10.201°</b>	Is this a new station:	<b>Yes</b>
Longitude (east):	<b>-5.636°</b>	Is this an exact reoccupation:	
Height above mean sea level (m):	<b>350</b>	Year of previous occupation:	

---

**RESULTS**

**CLASSIFICATION**

Mean date of observations: **1993 03 16**

Range **V 1.1**

Duration of station occupation: **3 days**

Uncertainly in instrument relocation (m)

Gradient of total field at station

Horizontal : : **N/A**

Vertical : : **N/A**

Field element (a) Mean 'night-time value and estimated uncertainly

(b) Common epoch value (Undisturbed night-time) and estimated uncertainly year = **1993 06 18**

1. <b>D</b> :	<b>-6.956 ± 0.05°</b>	:	<b>-6.923 ± 0.08°</b>
2. <b>H</b> :	<b>31993 ± 3 nT</b>	:	<b>32053 ± 5 nT</b>
3. <b>Z</b> :	<b>-1528 ± 3 nT</b>	:	<b>-1560 ± 5 nT</b>

Estimated annual change for element

@ previous epoch =

@ new epoch = **1995 (interpolated)**

1. <b>D</b> :		:	<b>0.100°</b>
2. <b>H</b> :		:	<b>7.0 nT</b>
3. <b>Z</b> :		:	<b>-58 nT</b>

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b> :	<b>1340 km</b>	<b>am = 50</b>
2'. <b>NIELLE</b> :	<b>0 km</b>	<b>120 nT</b>

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**Notes**

- 1' used to get the common epoch values
- 2' used to estimate the night-time values

**Non-Marked station**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>TOUMODI</b>	<b>COUNTRY:</b>	<b>IVORY-COAST</b>
Latitude (north):	<b>6.582°</b>	Is this a new station:	<b>No</b>
Longitude (east):	<b>-5.065°</b>	Is this an exact reoccupation:	<b>No</b>
Height above mean sea level (m):	<b>138</b>	Year of previous occupation:	<b>1986</b>

<b>RESULTS</b>	<b>CLASSIFICATION</b>
Mean date of observations: <b>1993 03 08</b>	Range <b>M 1.1</b>
Duration of station occupation: <b>3 days</b>	

	Uncertainty in instrument relocation (m)	Gradient of total field at station
Horizontal :	<b>0.5</b>	<b>N/A</b>
Vertical :	<b>0.1</b>	<b>N/A</b>
Field element	(a) Mean 'night-time value and estimated uncertainty	(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = <b>1993 06 18</b>

1. <b>D</b> :	<b>-7.829 ± 0.05°</b>	:	<b>-7.797 ± 0.08°</b>
2. <b>H</b> :	<b>30796 ± 3 nT</b>	:	<b>30845 ± 5 nT</b>
3. <b>Z</b> :	<b>-6339 ± 3 nT</b>	:	<b>-6367 ± 5 nT</b>

Estimated annual change for element	@ previous epoch = <b>1990</b>	@ new epoch = <b>1995</b>	
1. <b>D</b> :	<b>0.14°</b>	:	<b>0.096°</b>
2. <b>H</b> :	<b>-9 nT</b>	:	<b>10.3 nT</b>
3. <b>Z</b> :	<b>-101 nT</b>	:	<b>-69.4 nT</b>

<b>MAGNETIC DISTURBANCE</b>		
Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: <b>1580 km</b>	: <b>am = 43</b>
2'. <b>LAMTO</b>	: <b>40 km</b>	: <b>87 nT</b>

**Notes**  
 1' used to get the common epoch values  
 2' used to estimate the night-time values

**Marked station**



**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4, Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>BAKEL</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	14.892°	Is this a new station:	No
Longitude (east):	-12.451°	Is this an exact reoccupation:	No
Height above mean sea level (m):	22	Year of previous occupation:	1956

---

**RESULTS**

**CLASSIFICATION**

Mean date of observations: 1992 12 13

Range **M 1.2**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 10 : N/A

Vertical : 0.1 : N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. **D** : -8.149 ± 0.05° : -8.095 ± 0.08°

2. **H** : 32446 ± 3 nT : 32456 ± 5 nT

3. **Z** : 5808 ± 3 nT : 5764 ± 5 nT

Estimated annual change for element

@ previous epoch =

@ new epoch = 1995 (interpolated)

1. **D** : / : 0.145°

2. **H** : / : 15.2 nT

3. **Z** : / : -82 nT

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1. <b>MBOUR</b>	: 527 km	: <b>am = 15</b>
2 .	: km	:

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**Notes**

1' used to get the common epoch values

**Non-Marked station**

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>KEDOUGOU</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	12.565°	Is this a new station:	No
Longitude (east):	-12.217°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	110	Year of previous occupation:	1986

## RESULTS

## CLASSIFICATION

Mean date of observations: 1992 12 22

Range **M 1.2**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01

: N/A

Vertical : 0.01

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. <b>D</b>	:	-8.883	± 0.05°	:	-8.819	± 0.08°
2. <b>H</b>	:	32083	± 3 nT	:	32102	± 5 nT
3. <b>Z</b>	:	2470	± 3 nT	:	2434	± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. <b>D</b>	:	0.142°	:	0.138°
2. <b>H</b>	:	7 nT	:	13.4 nT
3. <b>Z</b>	:	-108 nT	:	-84.6 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: 565 km	: $\overline{am} = 14$
2 .	: km	:

## Notes

1' used to get the common epoch values

Marked station

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>KIDIRA</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	<b>14.439°</b>	Is this a new station:	<b>Yes</b>
Longitude (east):	<b>-12.203°</b>	Is this an exact reoccupation:	
Height above mean sea level (m):	<b>80</b>	Year of previous occupation:	

## RESULTS

## CLASSIFICATION

Mean date of observations: **1992 12 13**Range **M 1.2**Duration of station occupation: **3 days**

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : : **N/A**Vertical : : **N/A**

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**1. **D** : **-8.470 ± 0.05°** : **-8.416 ± 0.08°**2. **H** : **32395 ± 3 nT** : **32403 ± 5 nT**3. **Z** : **5119 ± 3 nT** : **5074 ± 5 nT**

Estimated annual change for element

@ previous epoch =

@ new epoch = **1995 (Interpolated)**1. **D** : : **0.140°**2. **H** : : **14.0 nT**3. **Z** : : **-85.0 nT**

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. <b>MBOUR</b>	: <b>528 km</b>	: <b>am = 15</b>
2 .	: km	:

## Notes

1' used to get the common epoch values

**Marked station**

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>LINGUERE</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	15.398°	Is this a new station:	No
Longitude (east):	-15.102°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	18	Year of previous occupation:	1986

## RESULTS

## CLASSIFICATION

Mean date of observations: 1992 12 17

Range M 1.2

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01

: N/A

Vertical : 0.01

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. D : -9.421 ± 0.05° : -9.351 ± 0.08°

2. H : 32289 ± 3 nT : 32300 ± 5 nT

3. Z : 6808 ± 3 nT : 6772 ± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. D : / : 0.141°

2. H : 18 nT : 14.8 nT

3. Z : -109 nT : -84.8 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1'. MBOUR	: 235 km	: am = 44
2 .	: km	:

## Notes

1' used to get the common epoch values

Marked station

## REGIONAL MAGNETIC REPEAT STATION RECORD

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>MBOUR-Observatory</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	14.392°	Is this a new station:	No
Longitude (east):	-16.958°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	3	Year of previous occupation:	Permanent

## RESULTS

## CLASSIFICATION

Mean date of observations: 1993 06 18

Range V 1

Duration of station occupation: 3 days

Uncertainly in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.001

: N/A

Vertical : 0.001

: N/A

Field element (a) Mean 'night-time value and estimated uncertainly

(b) Common epoch value (Undisturbed night-time) and estimated uncertainly year = 1993 06 18

1. <b>D</b> :		:	-10.338 ± 0.01°
2. <b>H</b> :		:	32075 ± 2 nT
3. <b>Z</b> :		:	5855 ± 2 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. <b>D</b> :	0.123°	:	0.118°
2. <b>H</b> :	15 nT	:	10.6 nT
3. <b>Z</b> :	-121 nT	:	-95.0 nT

## MAGNETIC DISTURBANCE

Observatory name	Distance from repeat station	Disturbance indicator
1. <b>MBOUR</b> :	0 km	: am = 4
2. :	km	:

## Notes

Permanent Observatory

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>MATAM</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	15.600°	Is this a new station:	No
Longitude (east):	-13.328°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	35	Year of previous occupation:	1986

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<b>RESULTS</b>	<b>CLASSIFICATION</b>
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Mean date of observations:	1992 12 10	Range	M 1.2
Duration of station occupation:	3 days		

	Uncertainty in instrument relocation (m)	Gradient of total field at station
Horizontal :	0.01	N/A
Vertical :	0.01	N/A

Field element	(a) Mean 'night-time value and estimated uncertainty	(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18
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1. D :	-8.808 ± 0.05°	:	-8.742 ± 0.08°
2. H :	32348 ± 3 nT	:	32372 ± 5 nT
3. Z :	6966 ± 3 nT	:	6920 ± 5 nT

Estimated annual change for element	@ previous epoch = 1990	@ new epoch = 1995
	.....	.....

1. D :	N/A	:	0.143°
2. H :	17 nT	:	14.8 nT
3. Z :	-97 nT	:	-78.6 nT

**MAGNETIC DISTURBANCE**

Observatory name	Distance from repeat station	Disturbance indicator
1'. MBOUR :	527 km	: am = 30
2 . :	km	:

**Notes**

1' used to get the common epoch values

**Marked station**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

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<b>STATION NAME:</b>	<b>PODOR</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	<b>16.680°</b>	Is this a new station:	<b>No</b>
Longitude (east):	<b>-14.963°</b>	Is this an exact reoccupation:	<b>Yes</b>
Height above mean sea level (m):	<b>8</b>	Year of previous occupation:	<b>1986</b>

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**RESULTS**

**CLASSIFICATION**

Mean date of observations: **1992 12 10**

Range **M 1.2**

Duration of station occupation: **3** days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : **0.01**

: **N/A**

Vertical : **0.01**

: **N/A**

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = **1993 06 18**

1. **D** : **-9.012 ± 0.05°**

: **-8.945 ± 0.08°**

2. **H** : **32235 ± 3 nT**

: **32261 ± 5 nT**

3. **Z** : **8614 ± 3 nT**

: **8567 ± 5 nT**

Estimated annual change for element

@ previous epoch = **1990**

@ new epoch = **1995**

.....

.....

1. **D** : **0.138°**

: **0.150°**

2. **H** : **21 nT**

: **15.9 nT**

3. **Z** : **-104 nT**

: **-80.6 nT**

**MAGNETIC DISTURBANCE**

Observatory name

Distance from repeat station

Disturbance indicator

1'. **MBOUR**

: **337 km**

: **am = 30**

2 .

: km

:

**Notes**

1' used to get the common epoch values

**Marked station**

**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>RICHARD-TOLL</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	16.437°	Is this a new station:	No
Longitude (east):	-15.657°	Is this an exact reoccupation:	Yes
Height above mean sea level (m):	12	Year of previous occupation:	1986

**RESULTS**

**CLASSIFICATION**

Mean date of observations: 1992 12 09

Range **M 1.2**

Duration of station occupation: 3 days

Uncertainty in instrument relocation (m)

Gradient of total field at station

Horizontal : 0.01

: N/A

Vertical : 0.01

: N/A

Field element (a) Mean 'night-time value and estimated uncertainty

(b) Common epoch value (Undisturbed night-time) and estimated uncertainty year = 1993 06 18

1. **D** : -9.514 ± 0.05°

: -9.454 ± 0.08°

2. **H** : 32160 ± 3 nT

: 32191 ± 5 nT

3. **Z** : 8467 ± 3 nT

: 8414 ± 5 nT

Estimated annual change for element

@ previous epoch = 1990

@ new epoch = 1995

1. **D** : 0.134°

: 0.099°

2. **H** : 21 nT

: 16.4 nT

3. **Z** : -109 nT

: -84.3 nT

**MAGNETIC DISTURBANCE**

Observatory name

Distance from repeat station

Disturbance indicator

1. **MBOUR** : 269 km

: am = 33

2. : km

:

**Notes**

1' used to get the common epoch values

**Marked station**



**REGIONAL MAGNETIC REPEAT STATION RECORD**

Referred to the document "Regional Magnetic Repeat Station Records. Explanatory Notes" issued by IAGA Working Group V-4. Revised 11 march 1991.

<b>STATION NAME:</b>	<b>TAMBACOUNDA</b>	<b>COUNTRY:</b>	<b>SENEGAL</b>
Latitude (north):	13.732°	Is this a new station:	No
Longitude (east):	-13.657°	Is this an exact reoccupation:	No
Height above mean sea level (m):	18	Year of previous occupation:	1958

RESULTS		CLASSIFICATION	
Mean date of observations:	1992 12 23	Range	M 1.2
Duration of station occupation:	3 days		
	Uncertainly in instrument relocation (m)		Gradient of total field at station
Horizontal :	10	:	N/A
Vertical :	0.1	:	N/A
Field element	(a) Mean 'night-time value and estimated uncertainly	(b) Common epoch value (Undisturbed night-time) and estimated uncertainly year =	1993 06 18
1. D :	-9.146 ± 0.05°	:	-9.081 ± 0.08°
2. H :	32127 ± 3 nT	:	32140 ± 5 nT
3. Z :	4322 ± 3 nT	:	4284 ± 5 nT
Estimated annual change for element	@ previous epoch =	@ new epoch =	1995 (extrapolated)
1. D :	/	:	0.140°
2. H :	/	:	14.0 nT
3. Z :	/	:	-83.0 nT

MAGNETIC DISTURBANCE			
Observatory name	Distance from repeat station		Disturbance indicator
1'. MBOUR	: 374 km	:	am = 16
2 .	: km	:	

**Notes**  
 1' used to get the common epoch values  
**Non-Marked station**