

INPE-388

*TIME-HEIGHT SECTIONS OF TEMPERATURE AND  
WIND COMPONENTS OVER NATAL, BRAZIL FOR THE  
PERIOD JANUARY 1966 - AUGUST 1973*

*September, 1973*



PRESIDÊNCIA DA REPÚBLICA  
CONSELHO NACIONAL DE PESQUISAS  
INSTITUTO DE PESQUISAS ESPACIAIS  
São José dos Campos - Estado de S. Paulo - Brasil

TIME-HEIGHT SECTIONS OF TEMPERATURE AND  
WIND COMPONENTS OVER NATAL, BRAZIL FOR THE  
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*September, 1973*

*This report contain elements of INPE's research  
program and its publication has been approved by*

*Fernando de Mendonça  
Fernando de Mendonça  
General Director*

ABSTRACT

*The time-height sections of temperature, zonal and meridional wind components are presented for the period January 1966 - August 1973 using all the available data from the EXAMETNET Rocket launchings at Barreira do Inferno, Natal, Brasil.*

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## 1 - INTRODUCTION

In Brazil the meteorological rockets are launching from the Barreira do Inferno Range, Natal ( $05^{\circ}55'S$ ,  $35^{\circ}10'W$ ). The program has been active since January 1966. However, there are a few irregularities in the launchings causing gaps in the data.

This report, to be submitted to the Ninth Annual Meeting of EXAMETNET (Kourou, French Guiana, 1973) contains time sections of temperature and wind components for the period January 1966 - August 1973.

2 - CONSTRUCTION PROCEDURE

The time sections are constructed in accordance with the recommendations of the Scientific Working Group in the Eight Annual Meeting of the EXAMETNET (Mar del Plata, Argentina, 1972).

Extrapolation in the data-void regions are shown as broken lines. Isotherms of 0°C and isopleths of zero wind components are thick. Stratopause is shown as broken line. On temperature time sections vector winds are plotted on the days of launchings at 2km intervals, using the standard meteorological conventions; and on time sections of wind components temperatures are plotted whenever thermodynamic data are available.

Appendices I, II and III are temperature, zonal and meridional wind time sections respectively.

APPENDIX I

TIME HEIGHT SECTION

TEMPERATURE

- INPE -

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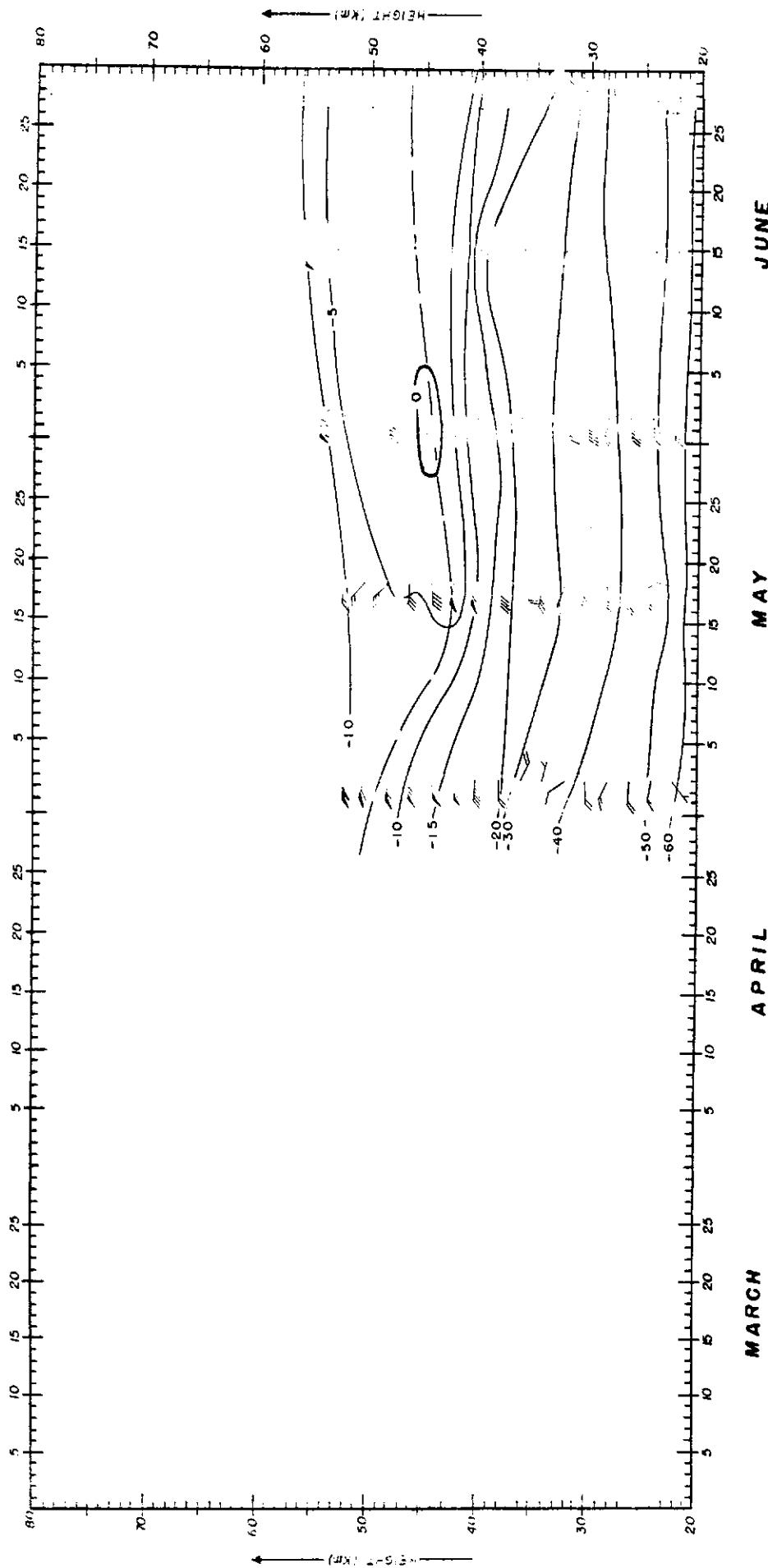
PROJECT MESA / EXAMETNET

1966

NATAL, BRAZIL

5° 55' S : 35° 15' W

- 4 -



TIME HEIGHT SECTION  
TEMPERATURE

-INPE-

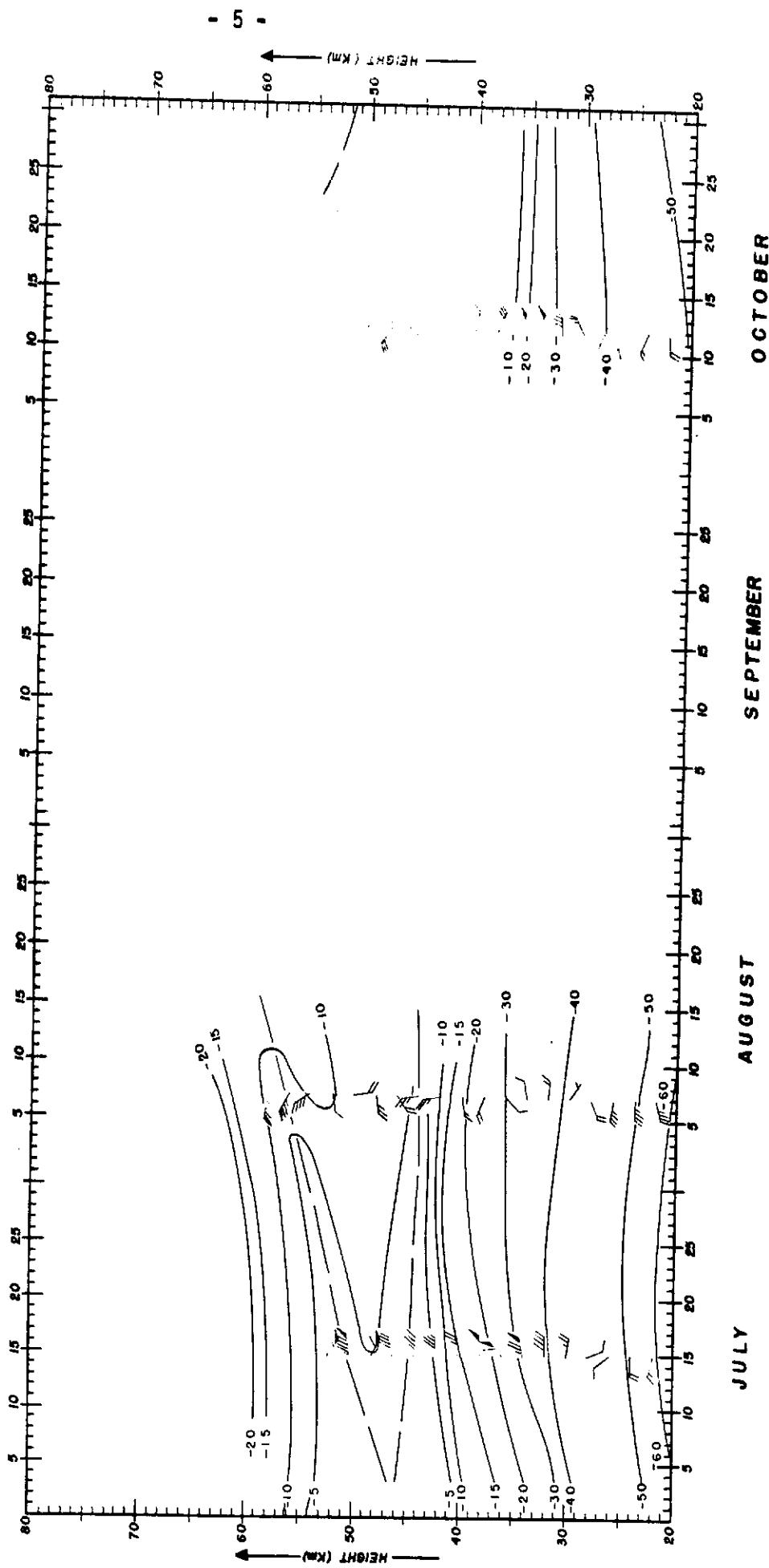
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PROJECT MESA / EXAMETNET

1966

NATAL, BRAZIL

5.55 S : 35.15.W



TIME HEIGHT SECTION  
TEMPERATURE

- INPE -

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PROJECT MESA / EXAMETNET

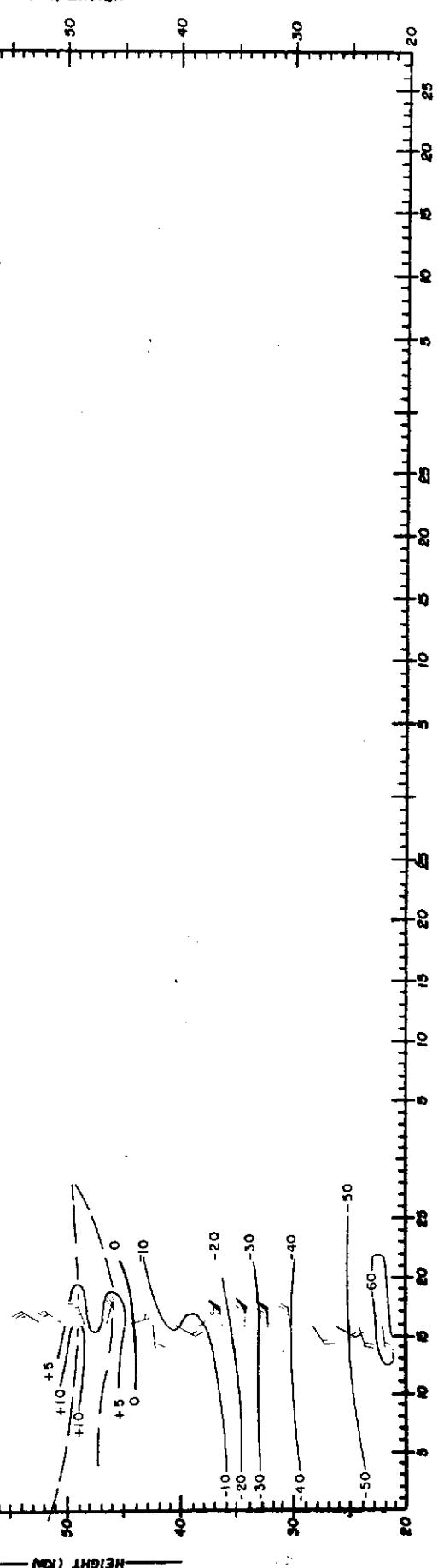
1966



1967



- 6 -



NOVEMBER DECEMBER JANUARY FEBRUARY

TIME HEIGHT SECTION

- 1 -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1967

800 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

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70

THE JOURNAL OF CLIMATE

60

102

Ergonomics in Design

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卷之三

30

JANUARY FEBRUARY  
MARCH APRIL  
MAY JUNE  
JULY AUGUST  
SEPTEMBER OCTOBER  
NOVEMBER DECEMBER

NATAL. BRAZIL

5° 55' S ; 35° 15' W

1968

- 7 -

TIME HEIGHT SECTION  
TEMPERATURE

- INPE -

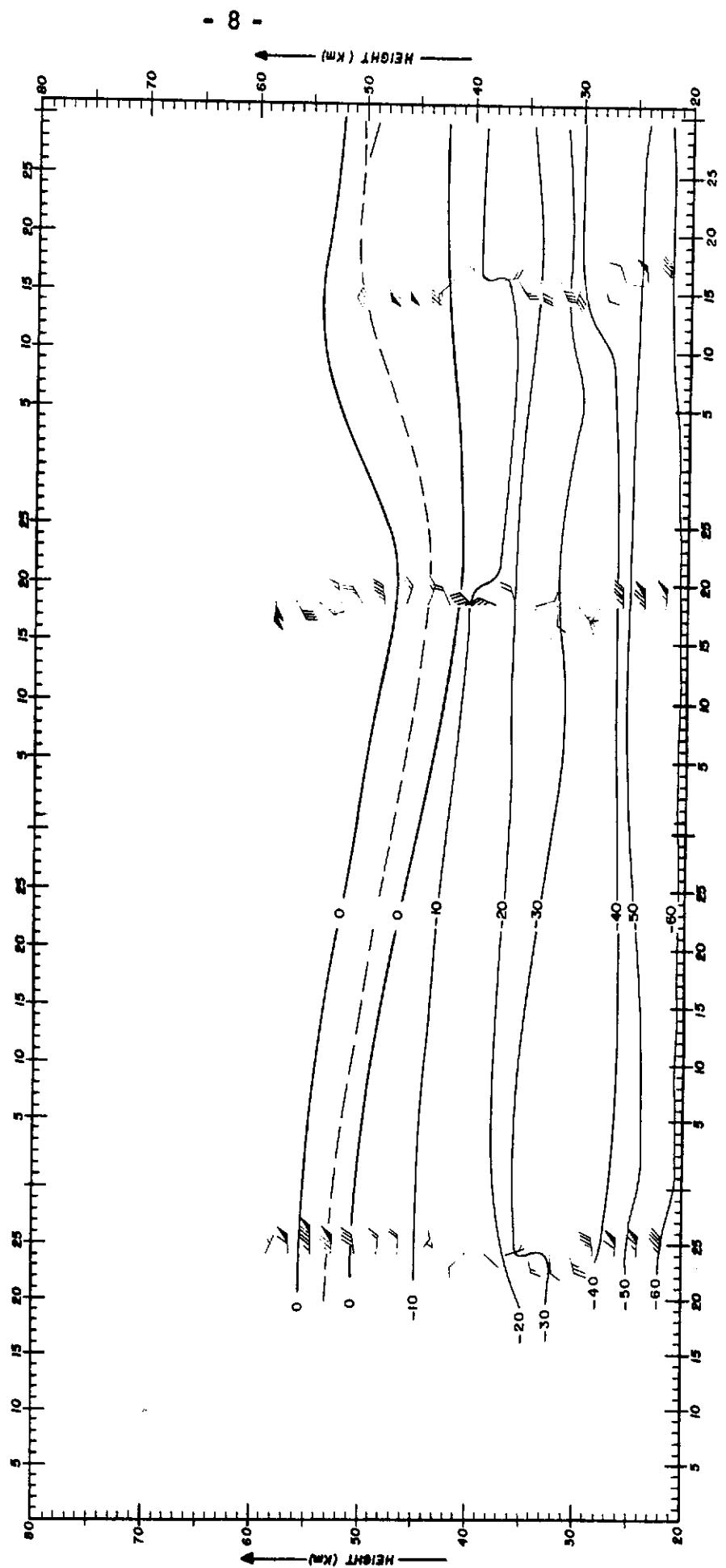
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PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1968



TIME HEIGHT SECTION

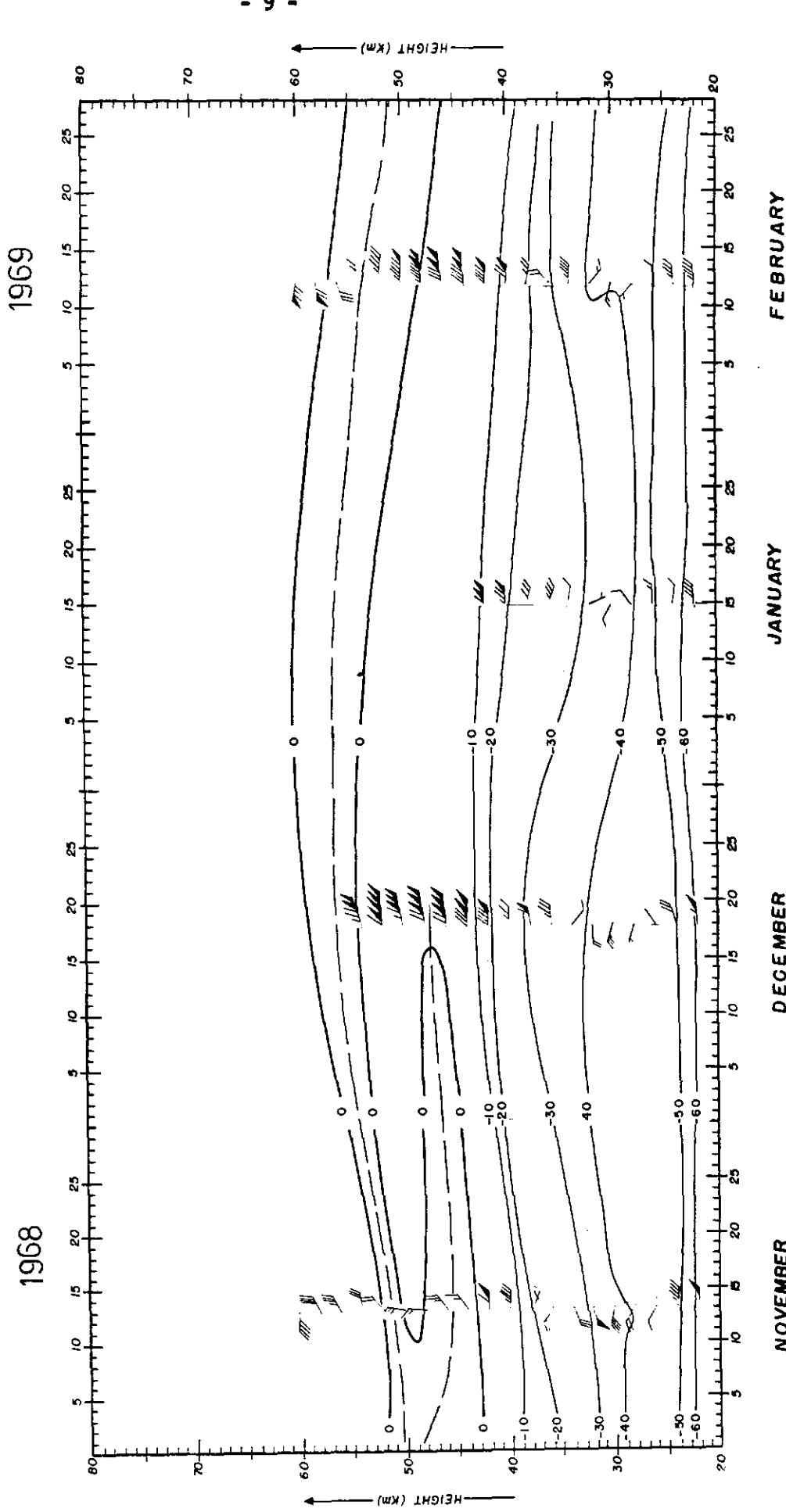
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PROJECT MESA / EXAMETNET

NATAL, BRAZIL

50 55, S; 35e 15, W



TIME HEIGHT SECTION  
TEMPERATURE

- INPE -

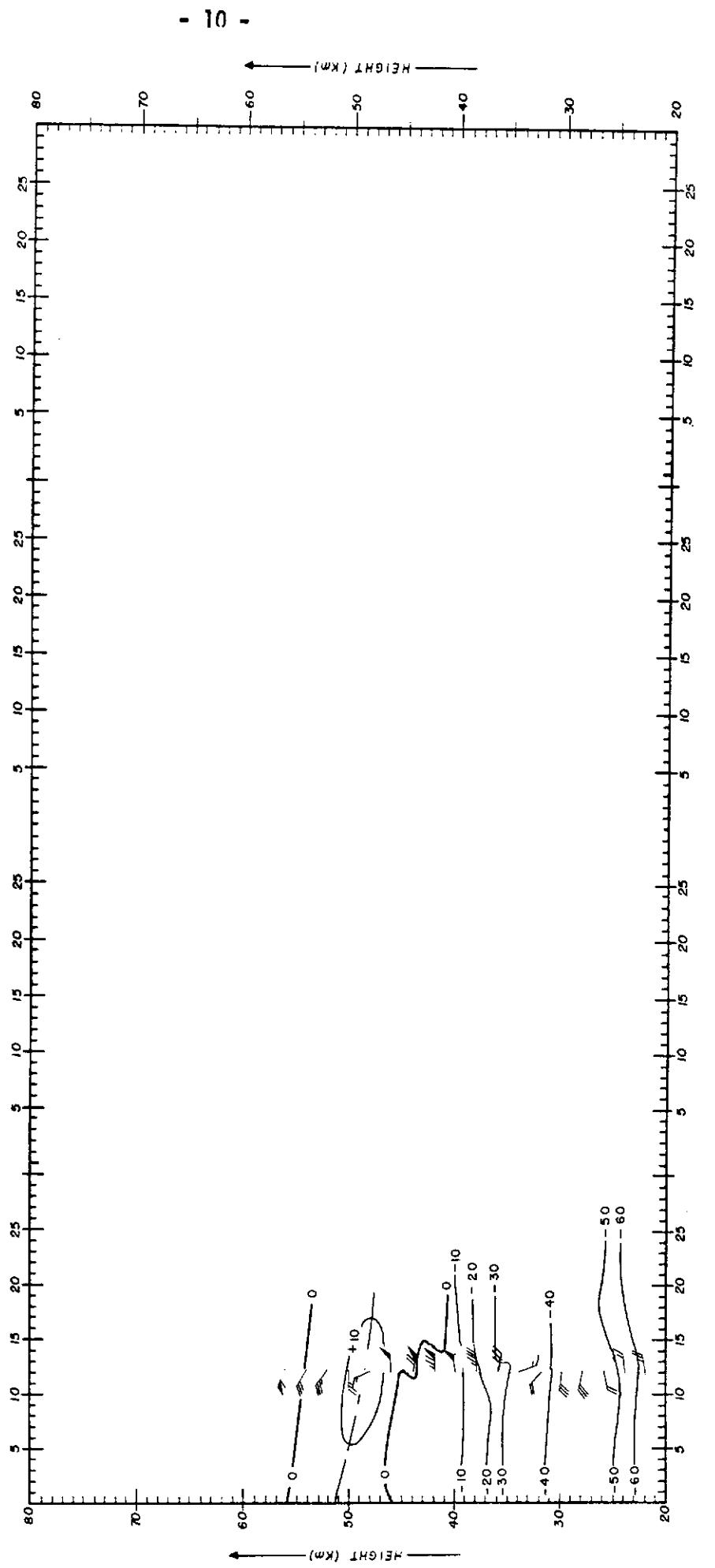
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PROJECT MESA / EXAMETNET

1969

NATAL, BRAZIL

5° 55' S ; 35° 15' W



JUNE

MAY

APRIL

MARCH

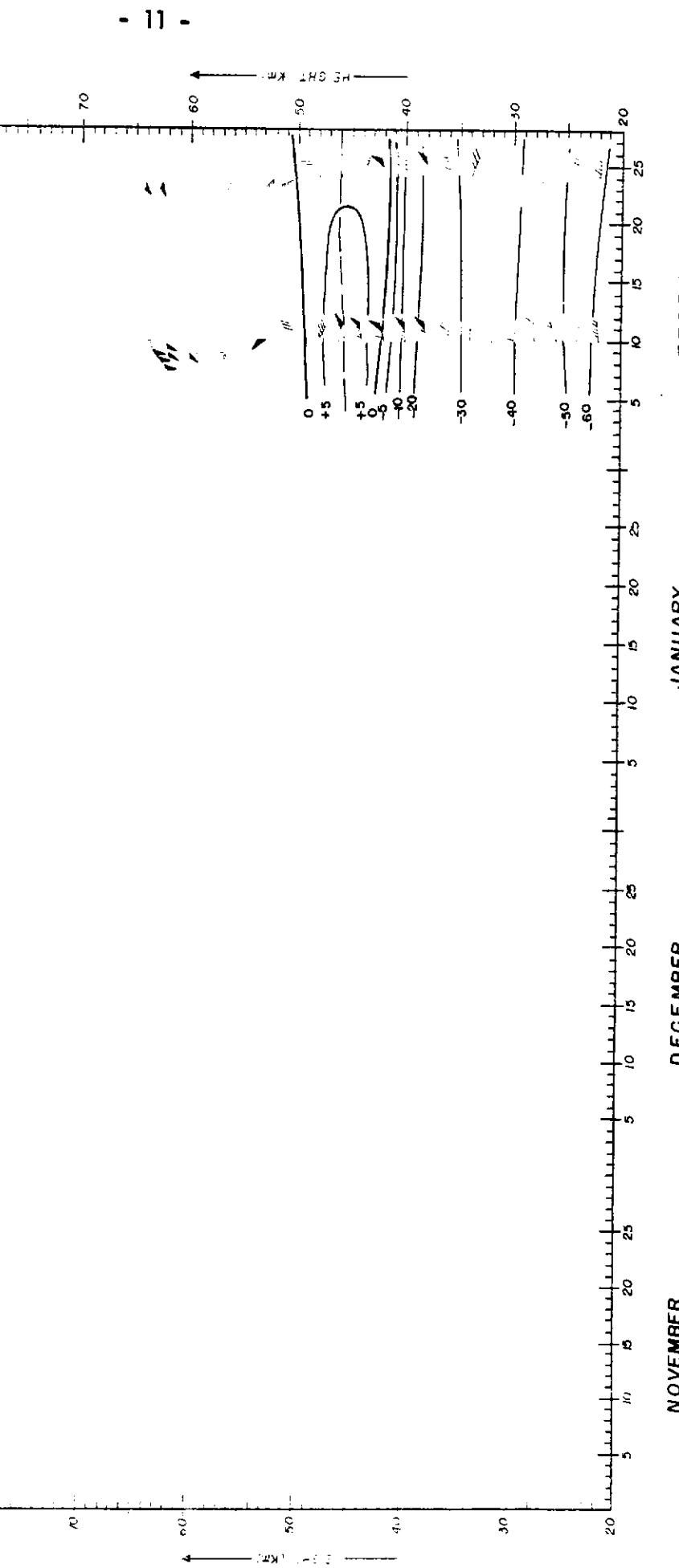
TIME HEIGHT SECTION  
TEMPERATURE

-INPE-

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1970



TIME HEIGHT SECTION  
TEMPERATURE

- INPE -

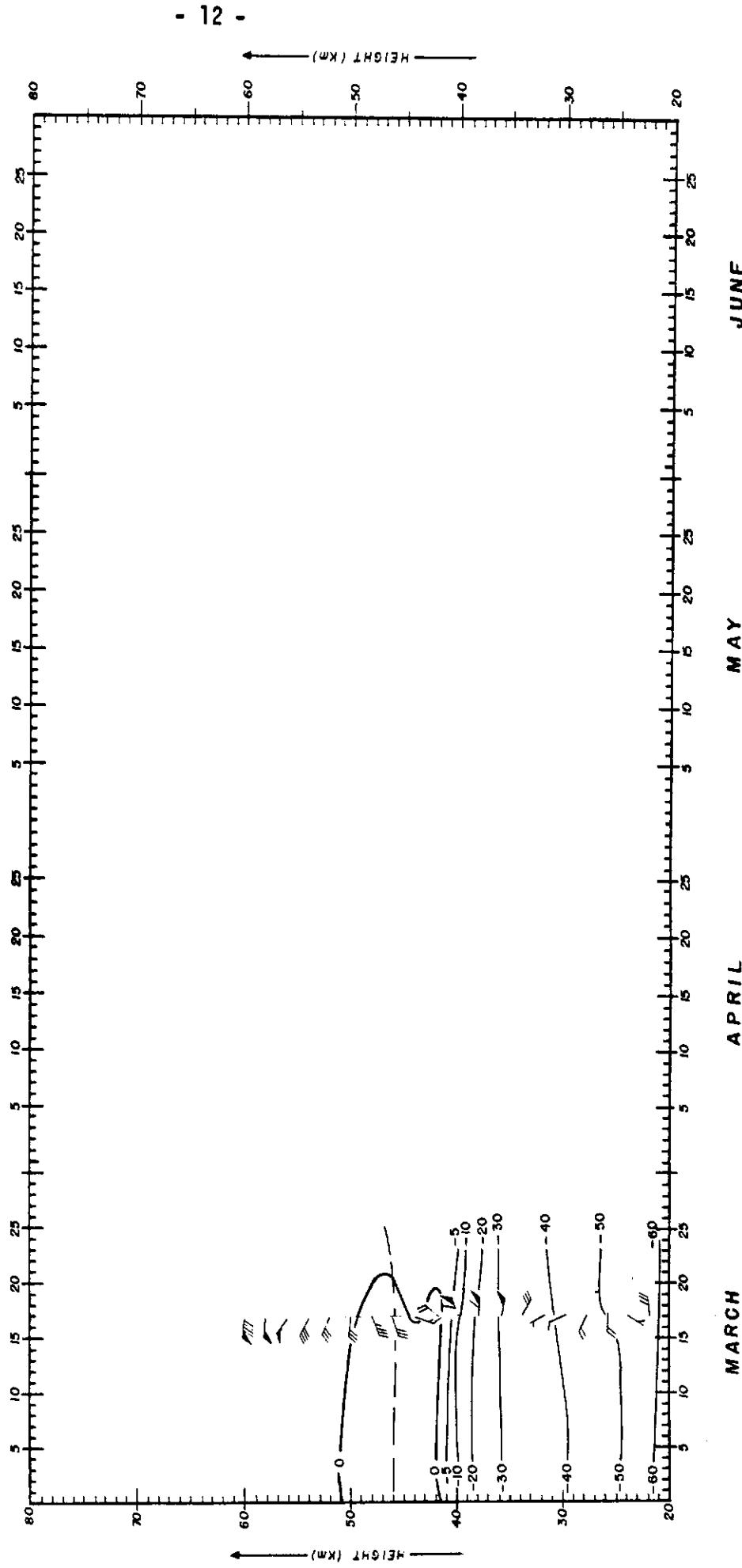
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PROJECT MESA/EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1971



TIME HEIGHT SECTION  
TEMPERATURE

- INPE -

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PROJECT MESA / EXAMETNET

1971



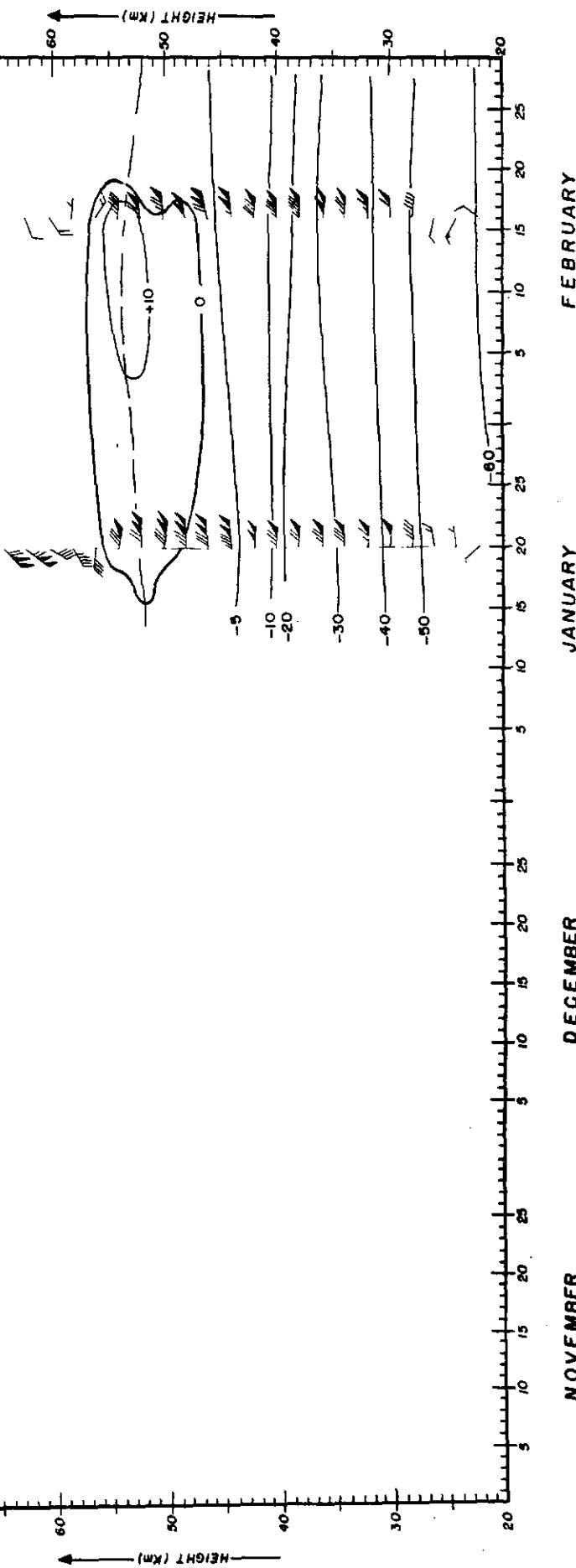
1972



NATAL, BRAZIL

5° 55' S : 35° 15' W

- 13 -



TIME - HEIGHT SECTION  
TEMPERATURE

- INPE -

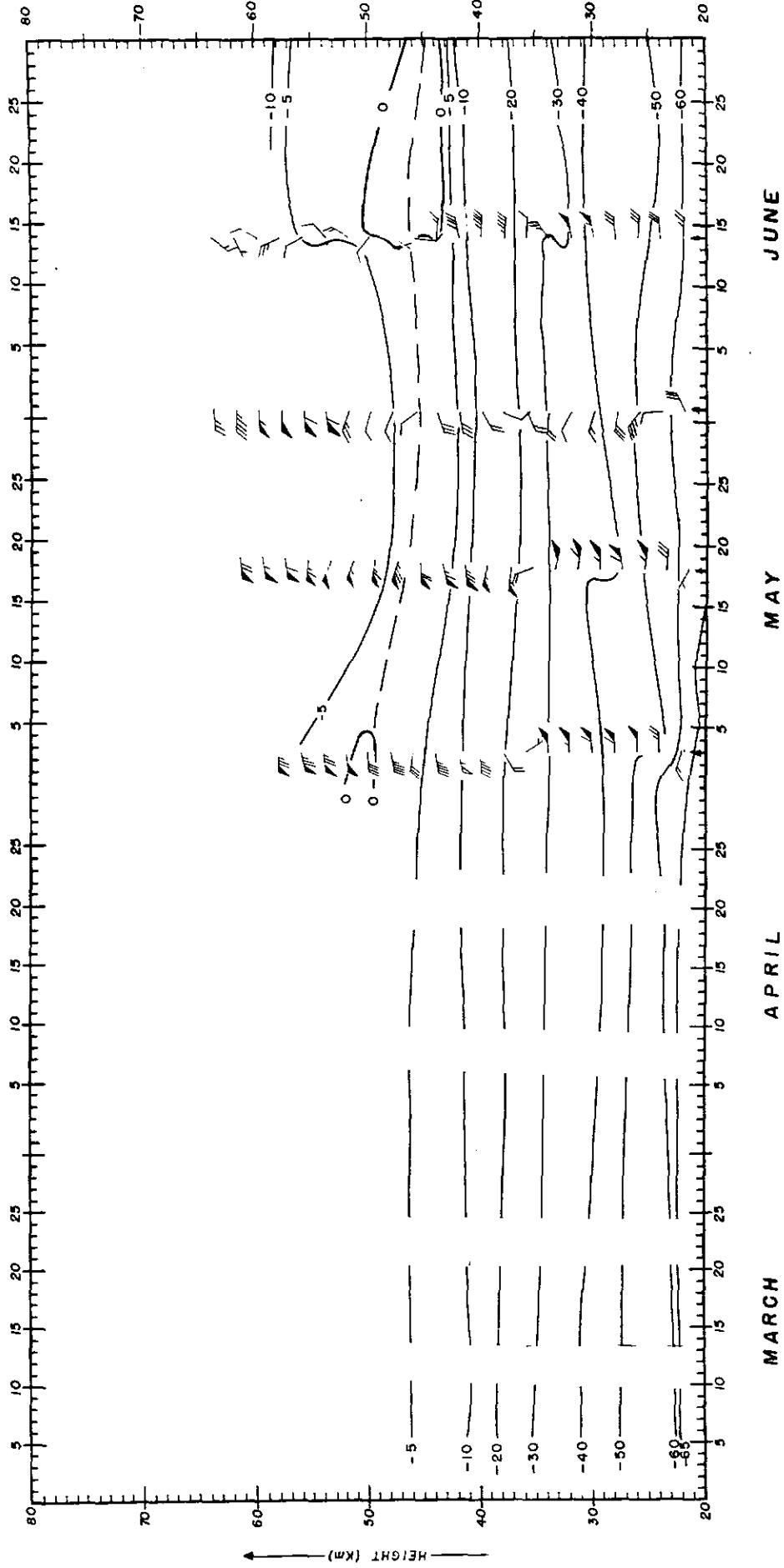
INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1972



TIME HEIGHT SECTION

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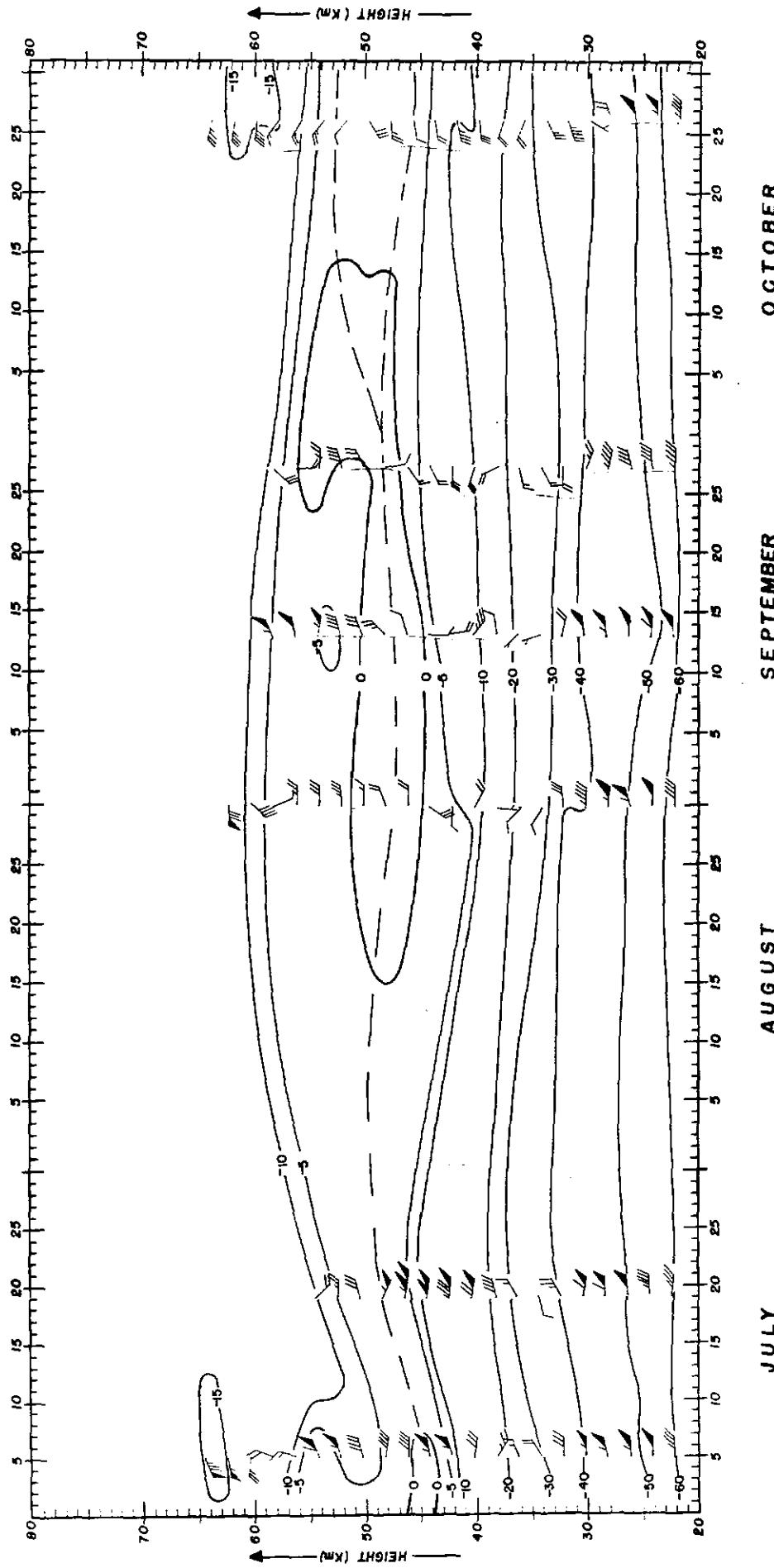
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1972

NATAL, BRAZIL

5° 55' S ; 35° 15' W



TIME HEIGHT SECTION  
TEMPERATURE

- INPE -

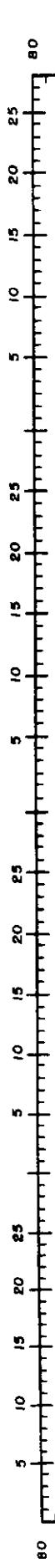
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PROJECT MESA / EXAMETNET

1972



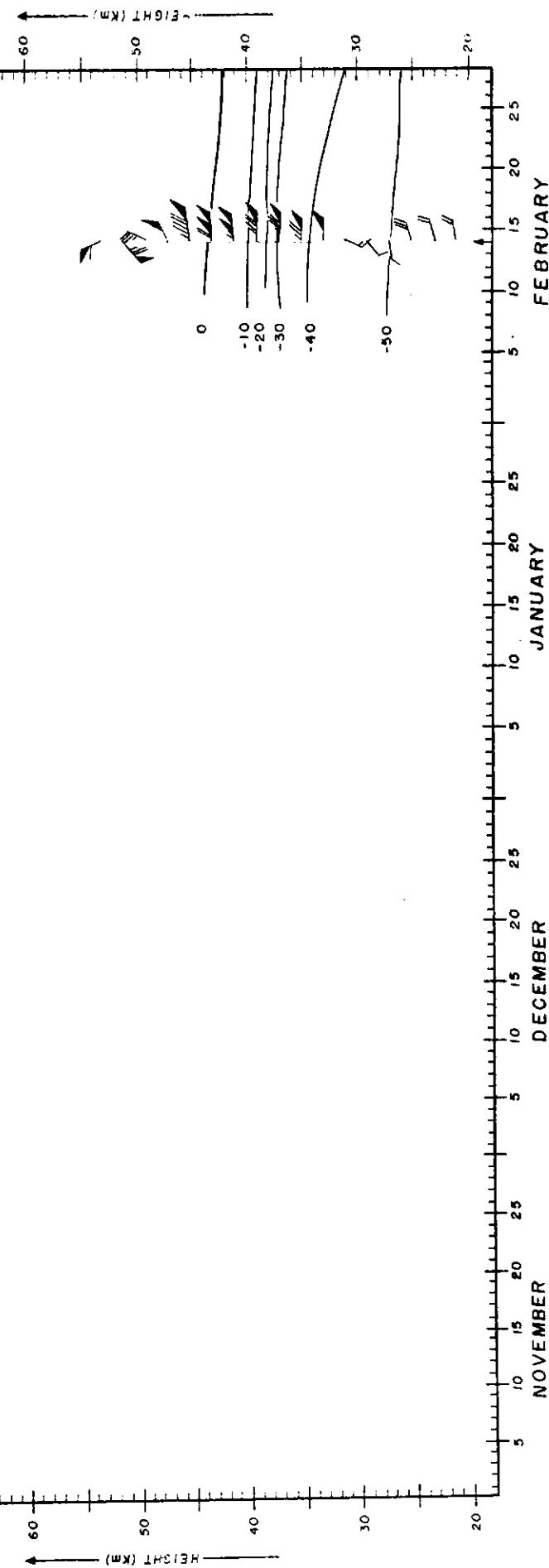
1973



NATAL, BRAZIL

5° 55' S ; 35° 15' W

- 16 -



TIME HEIGHT SECTION  
TEMPERATURE

-INPE -

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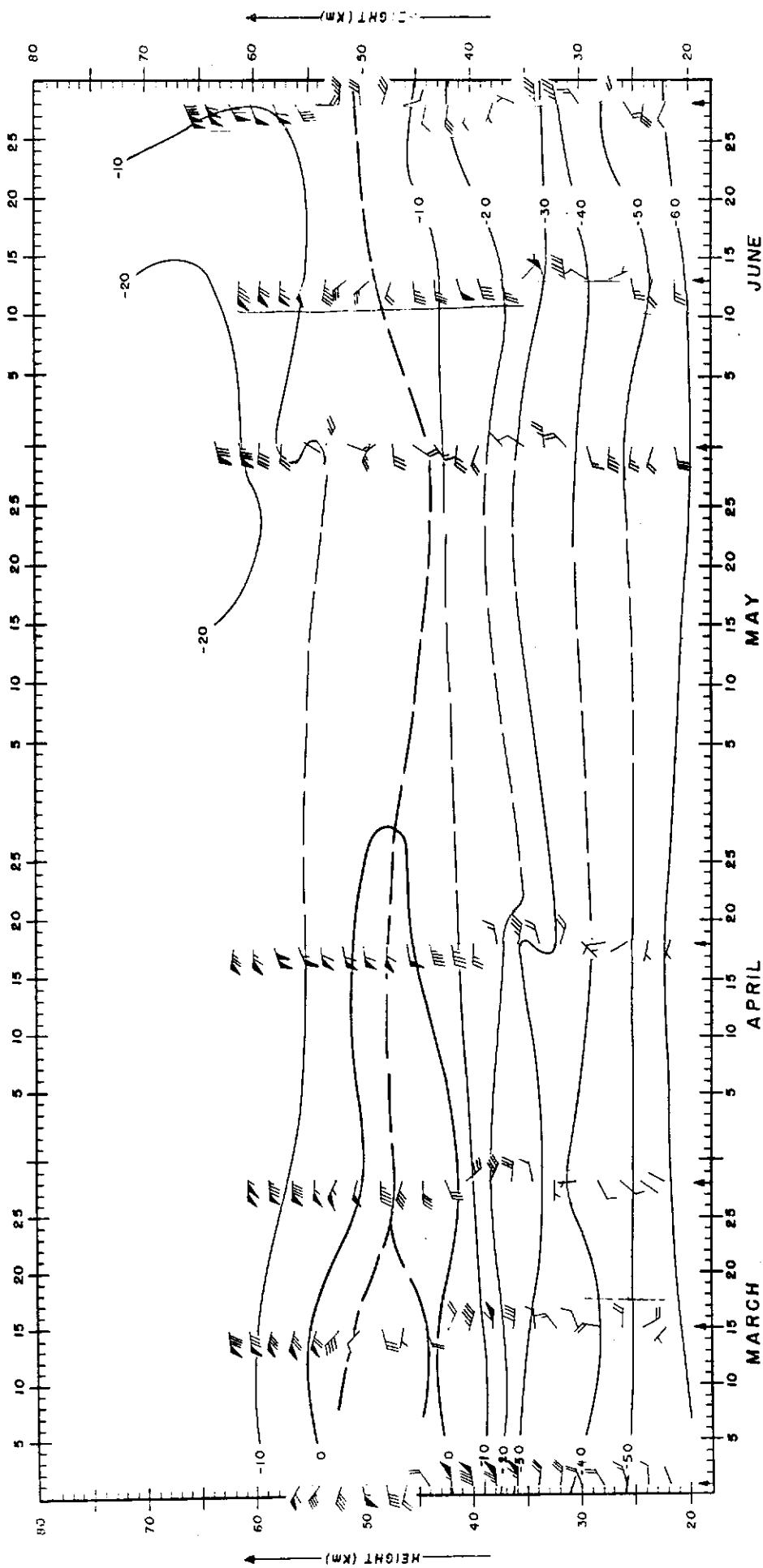
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1973

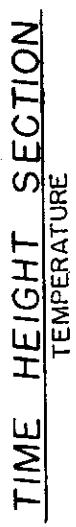
NATAL, BRAZIL

5° 55' S ; 35° 15' W

- 17 -



- 18 -



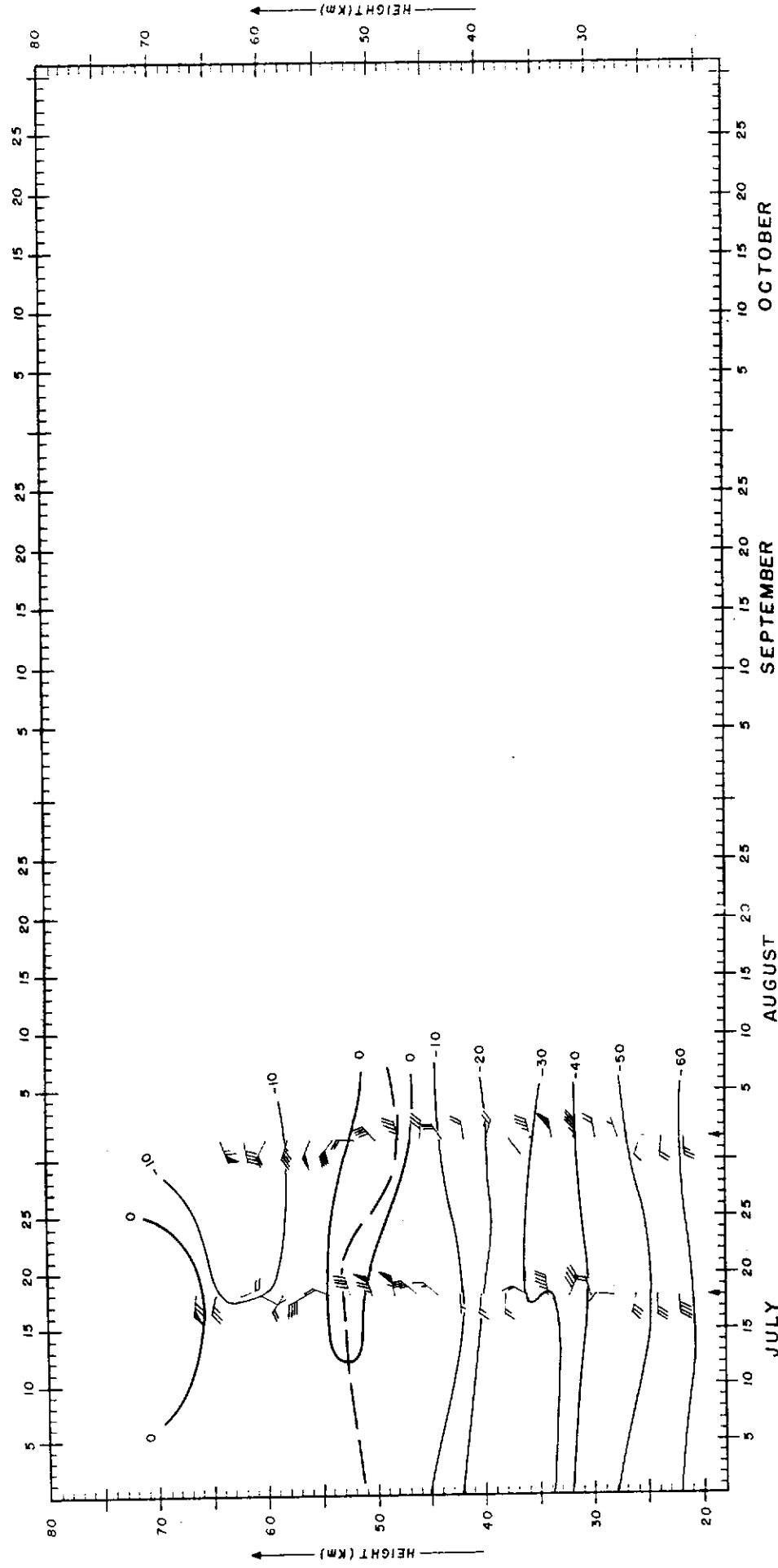
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NATAL, BRAZIL

5° 55', S : 35° 15', W



APPENDIX II

TIME HEIGHT SECTION  
ZONAL COMPONENT

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PROJECT MESA / EXAMETNET

1965



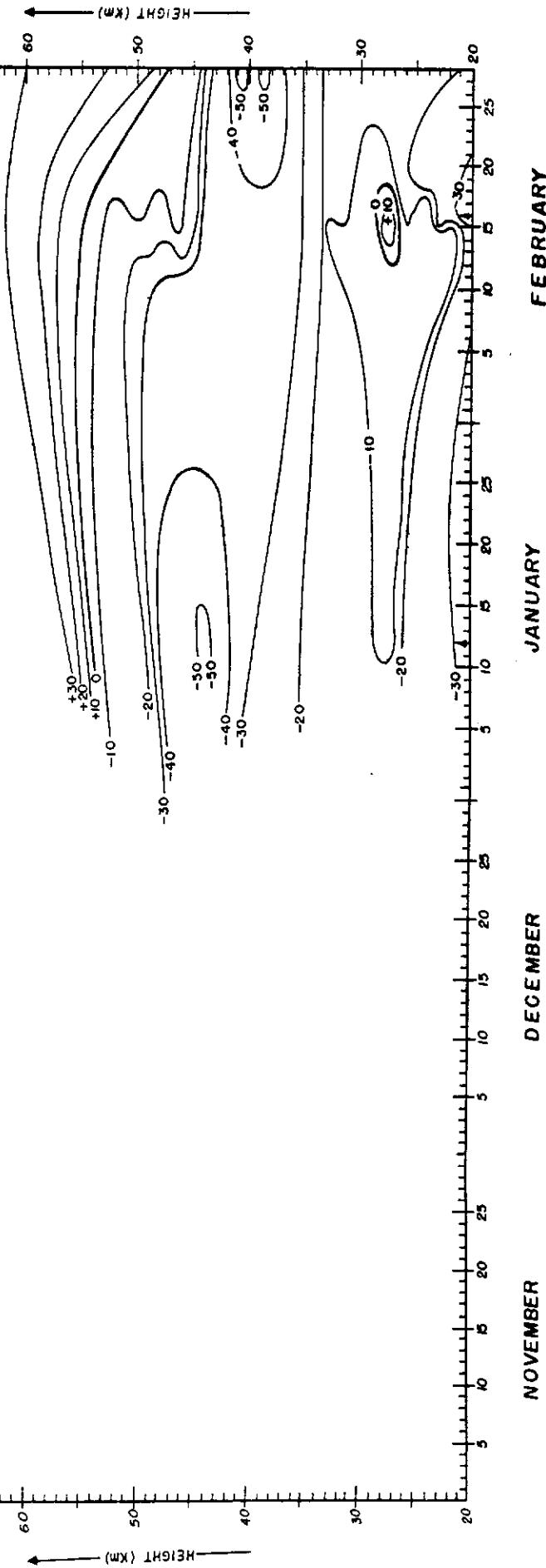
1966



NATAL, BRAZIL

5° 55' S ; 35° 15' W

- 20 -



TIME HEIGHT SECTION

OPEN

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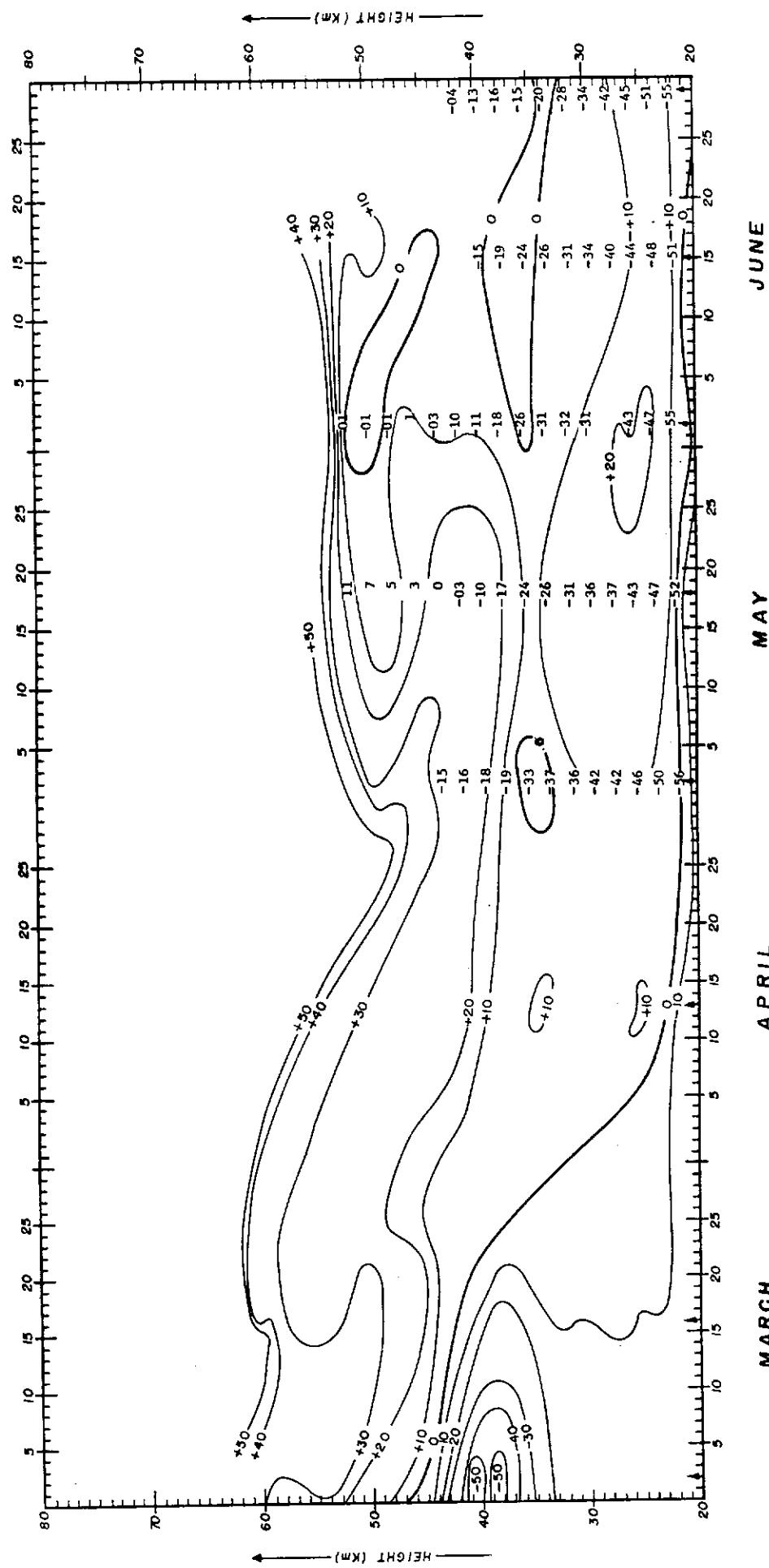
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NATAL, BRAZIL

5° 55' S : 35° 15' W

- 21 -



- 22 -



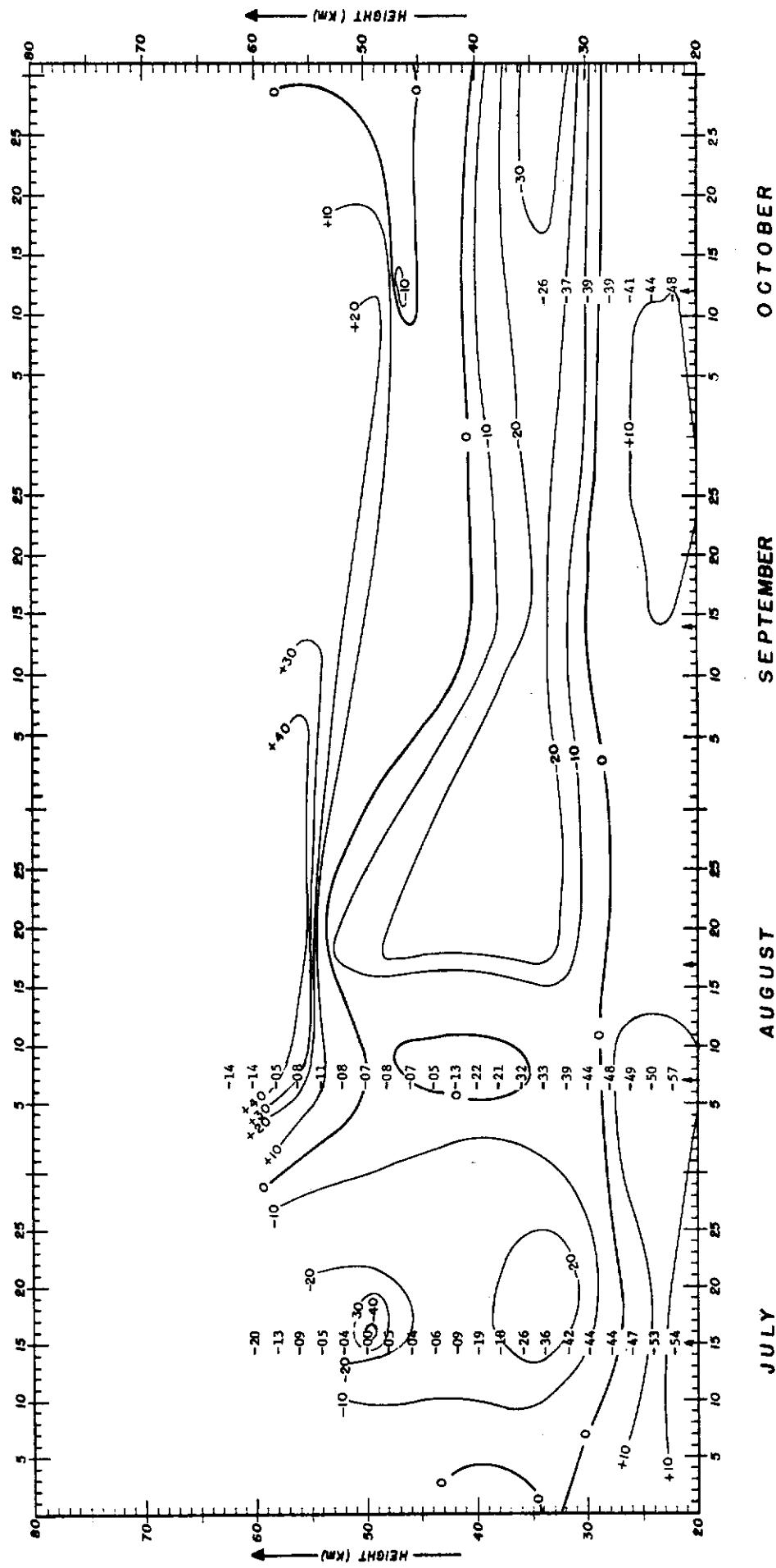
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NATAL, BRAZIL

5° 55' S : 35° 15' W



TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

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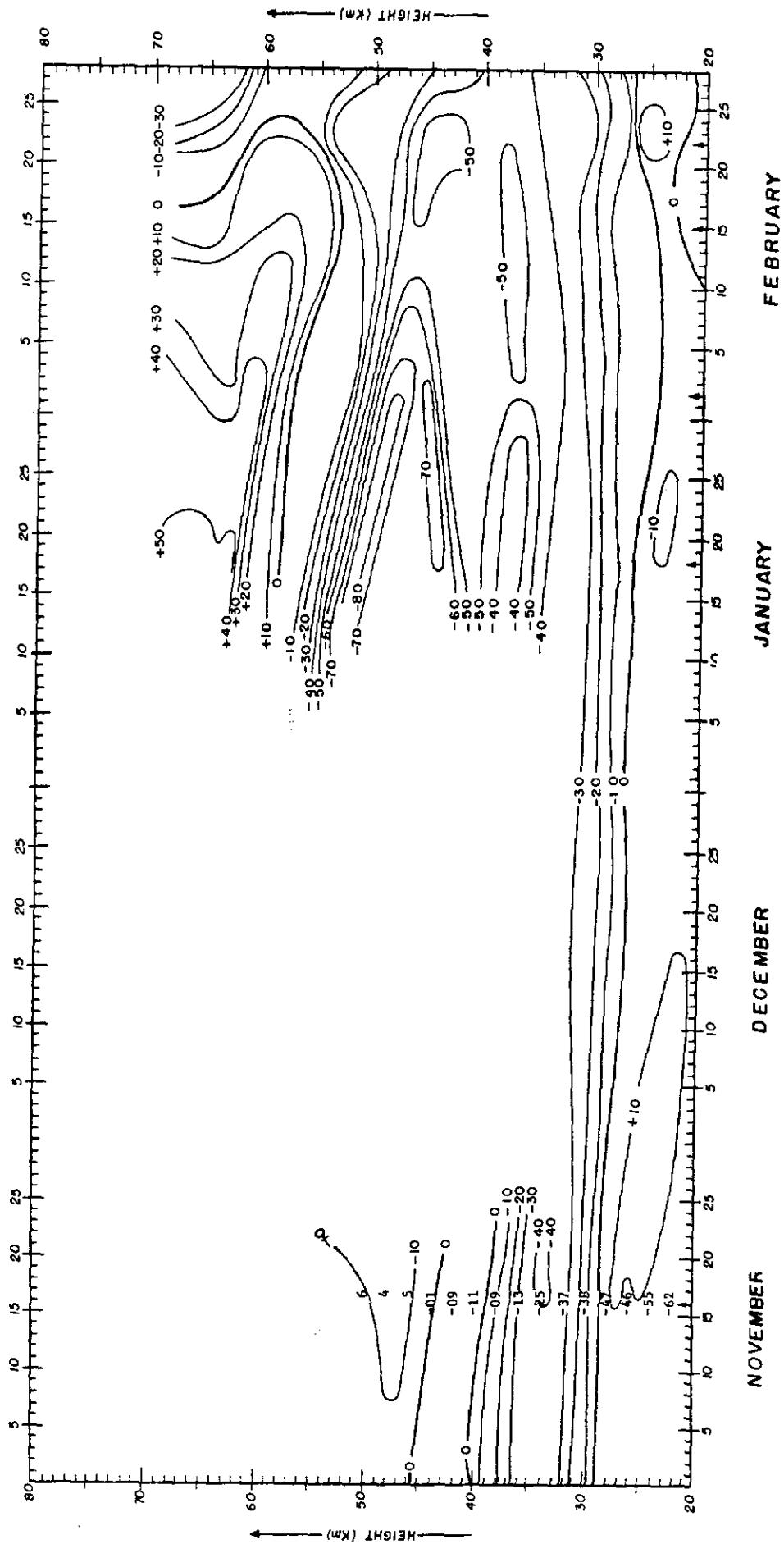
PROJECT MESA / EXAMETNET

1966

1967

5° 55'. S : 35° 15'. W

- 23 -



- 24 -



-INPE-

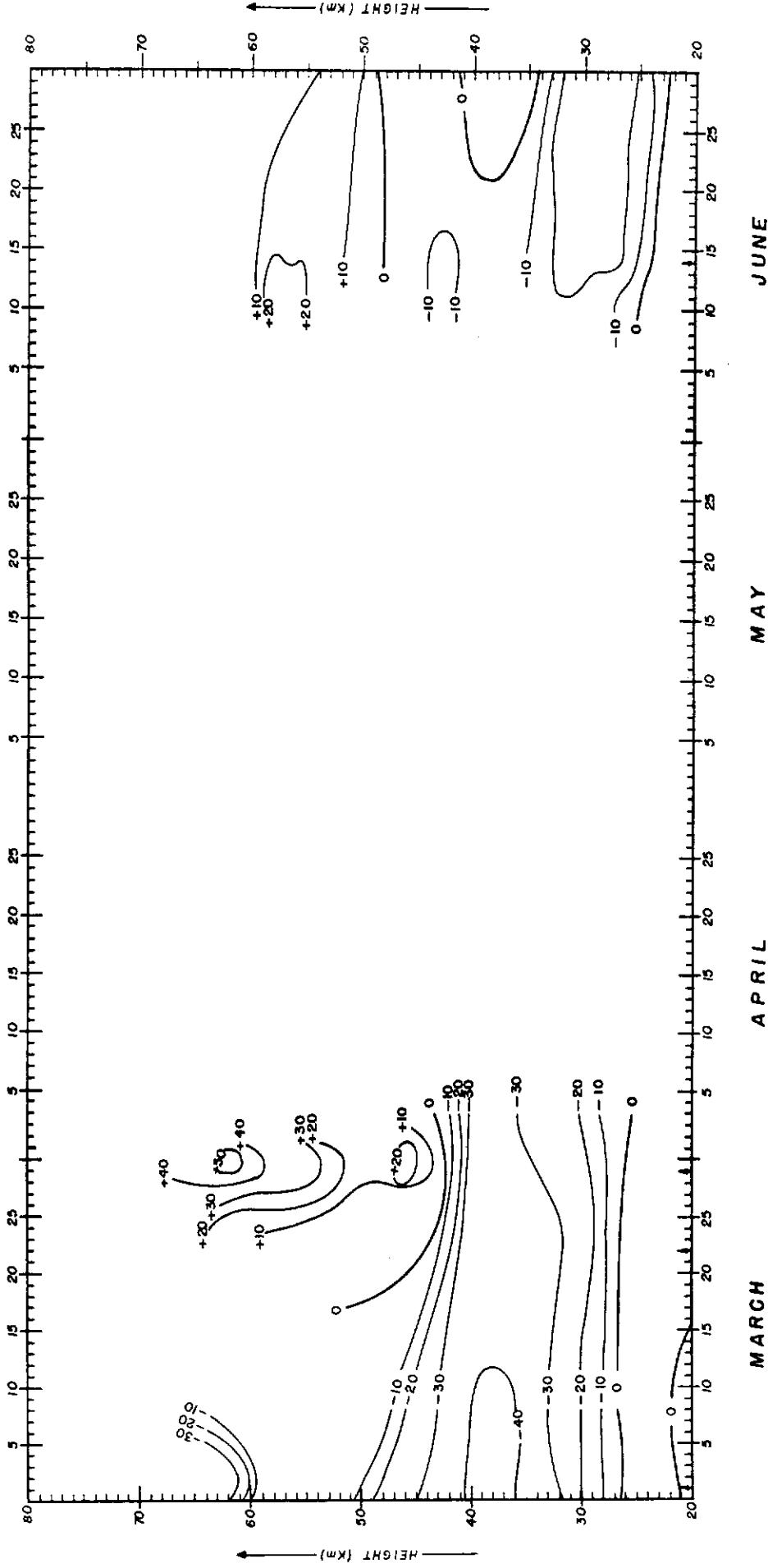
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PROJECT MESA/EXAMETNET

1967

5° 55' S ; 35° 15' W

5° 55' S ; 35° 15' W



TIME HEIGHT SECTION  
ZONAL COMPONENT

- IN PE -

INSTITUTO DE PESQUISAS ESPACIAIS

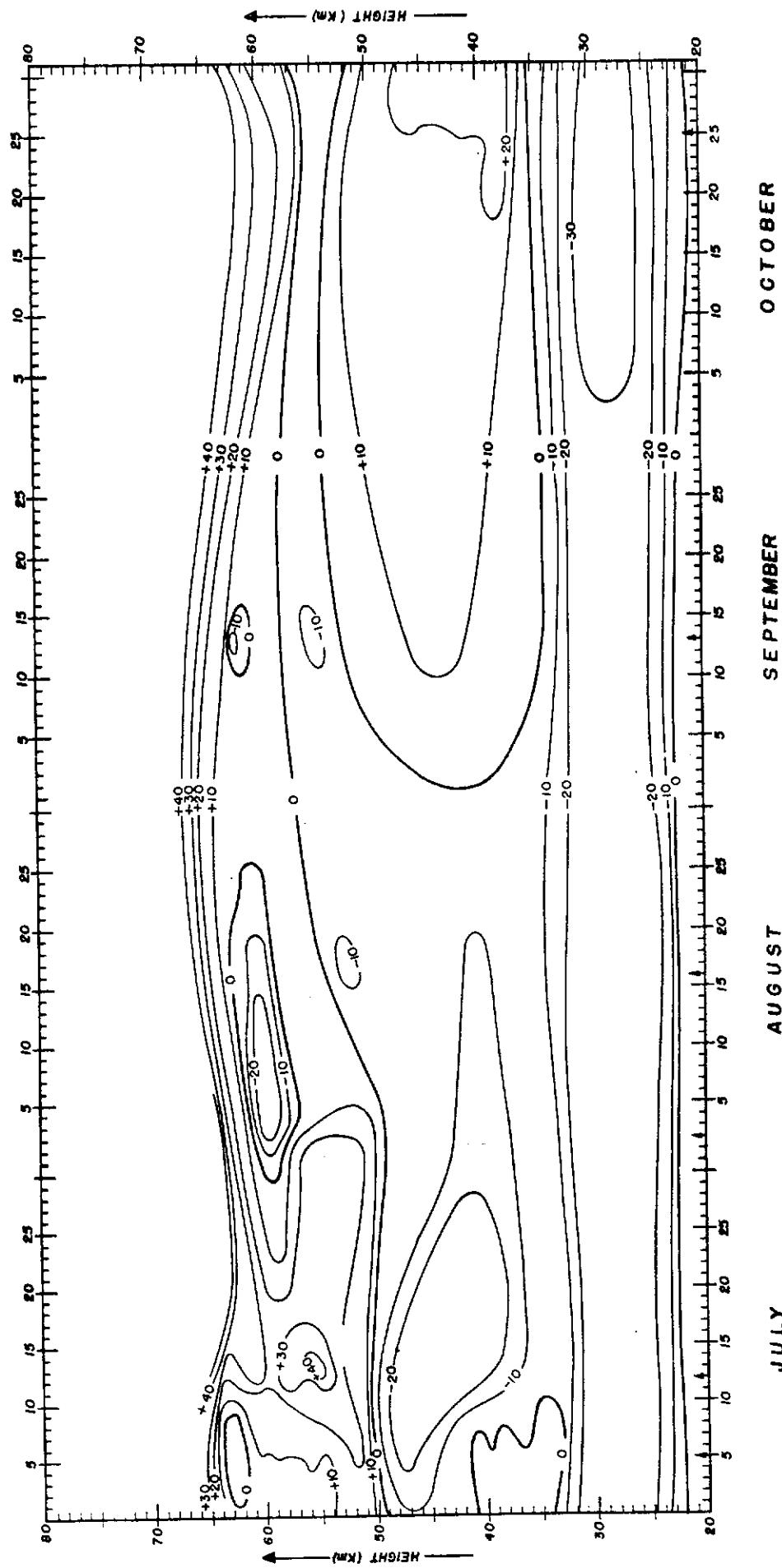
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1967

NATAL, BRAZIL

5° 55' S : 35° 15' W

- 25 -



TIME HEIGHT SECTION  
ZONAL COMPONENT

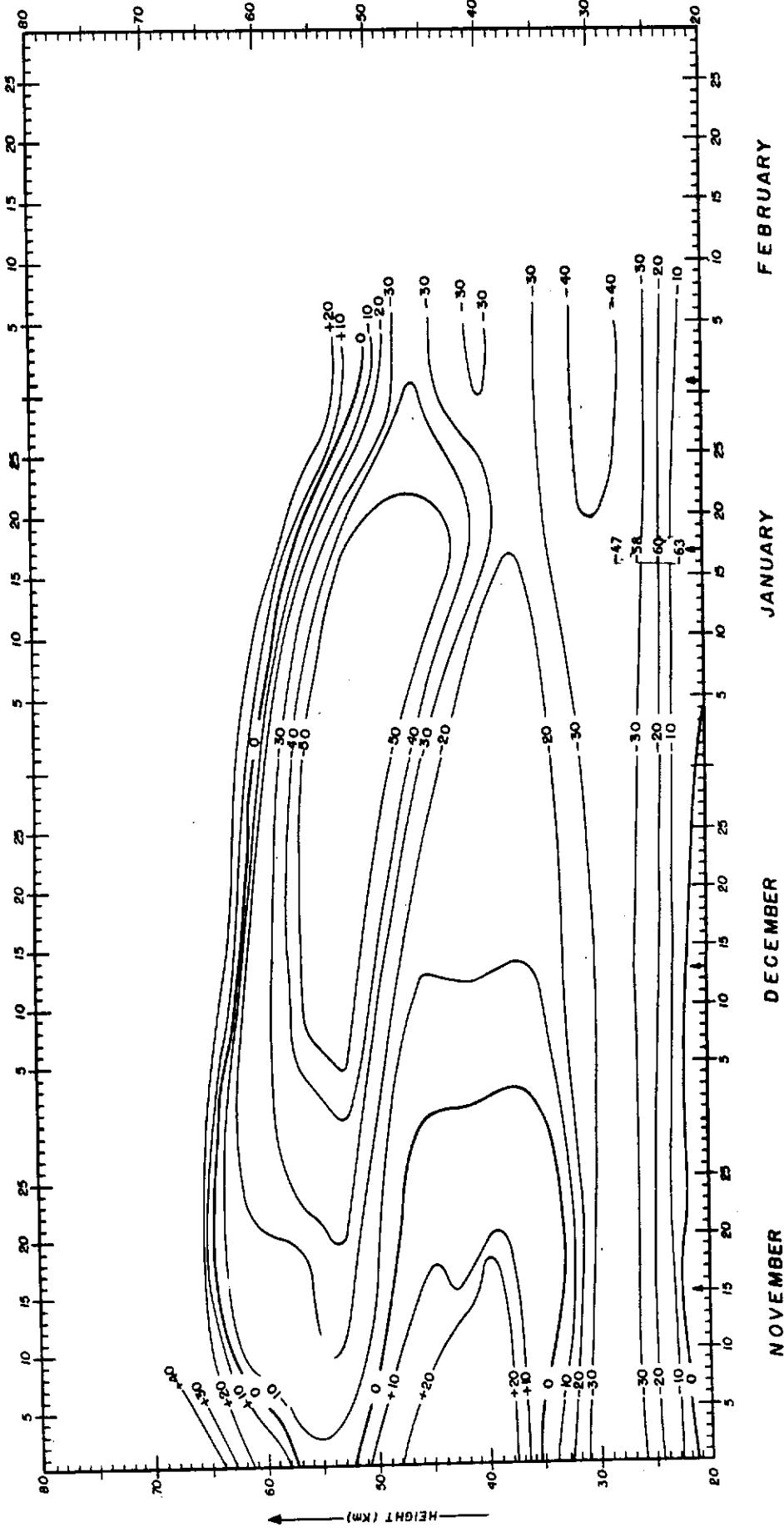
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PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1968



TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

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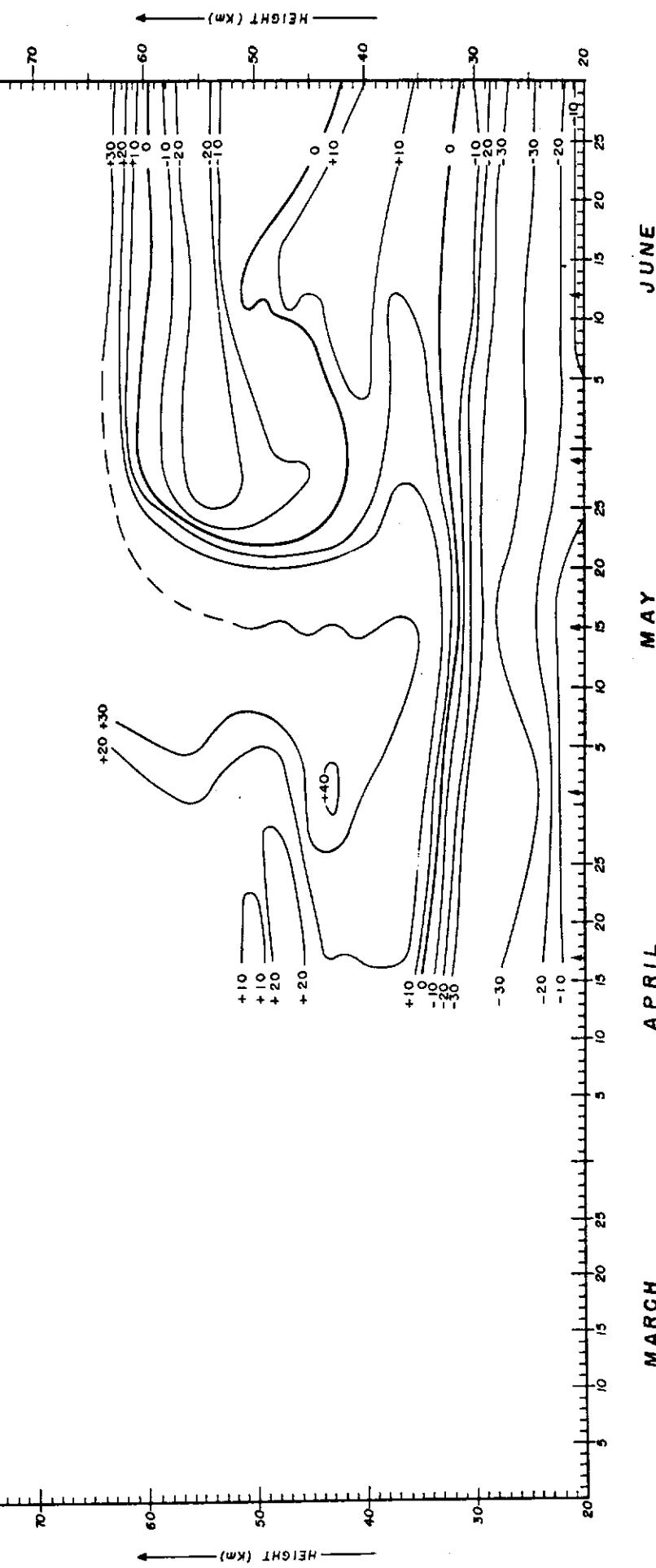
PROJECT MESA / EXAMETNET

1968

NATAL, BRAZIL

5° 55' S ; 35° 15' W

- 27 -



TIME HEIGHT SECTION  
ZONAL COMPONENT

- IN P.E -

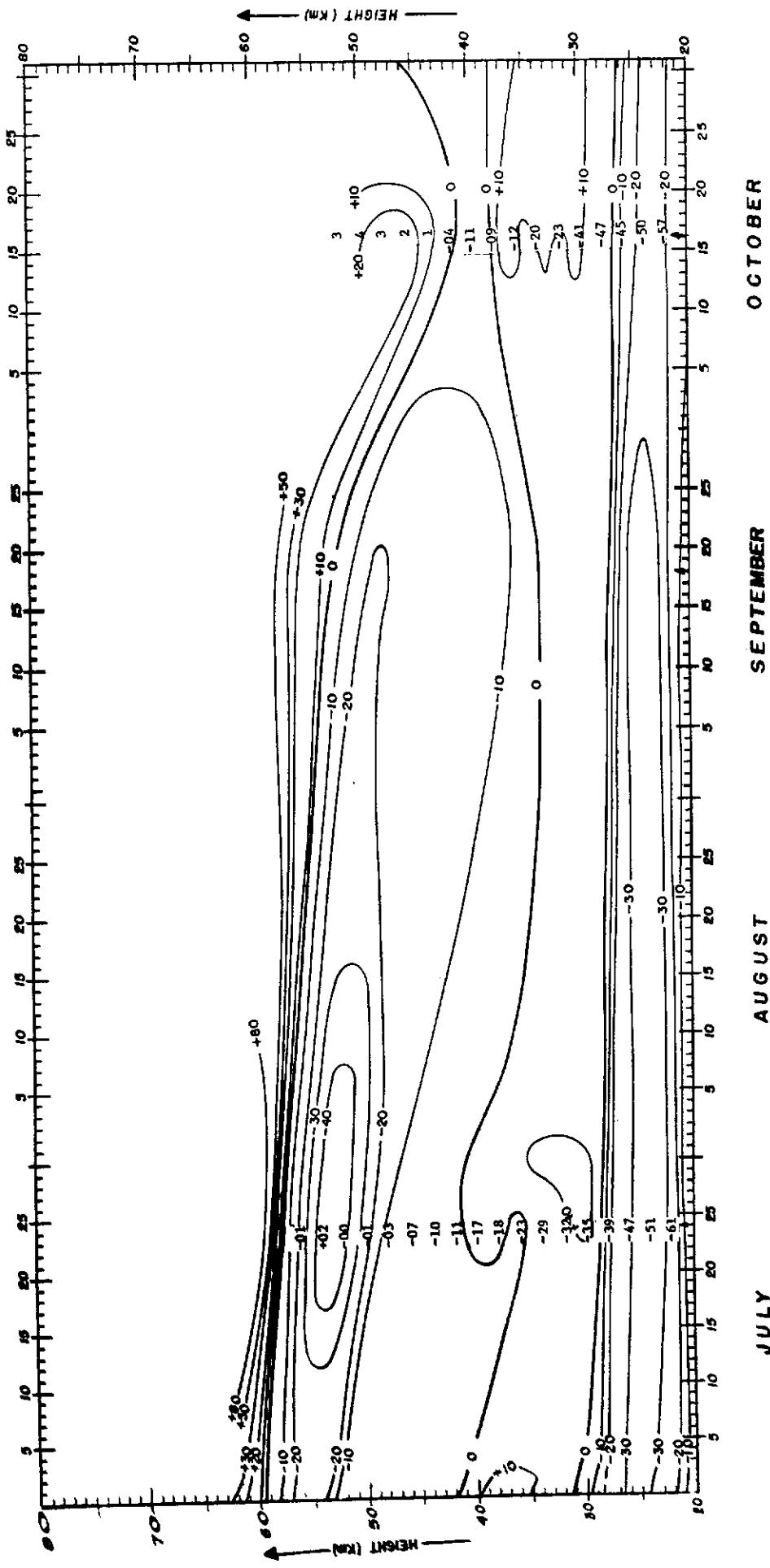
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PROJECT MESA / EXAMETNET

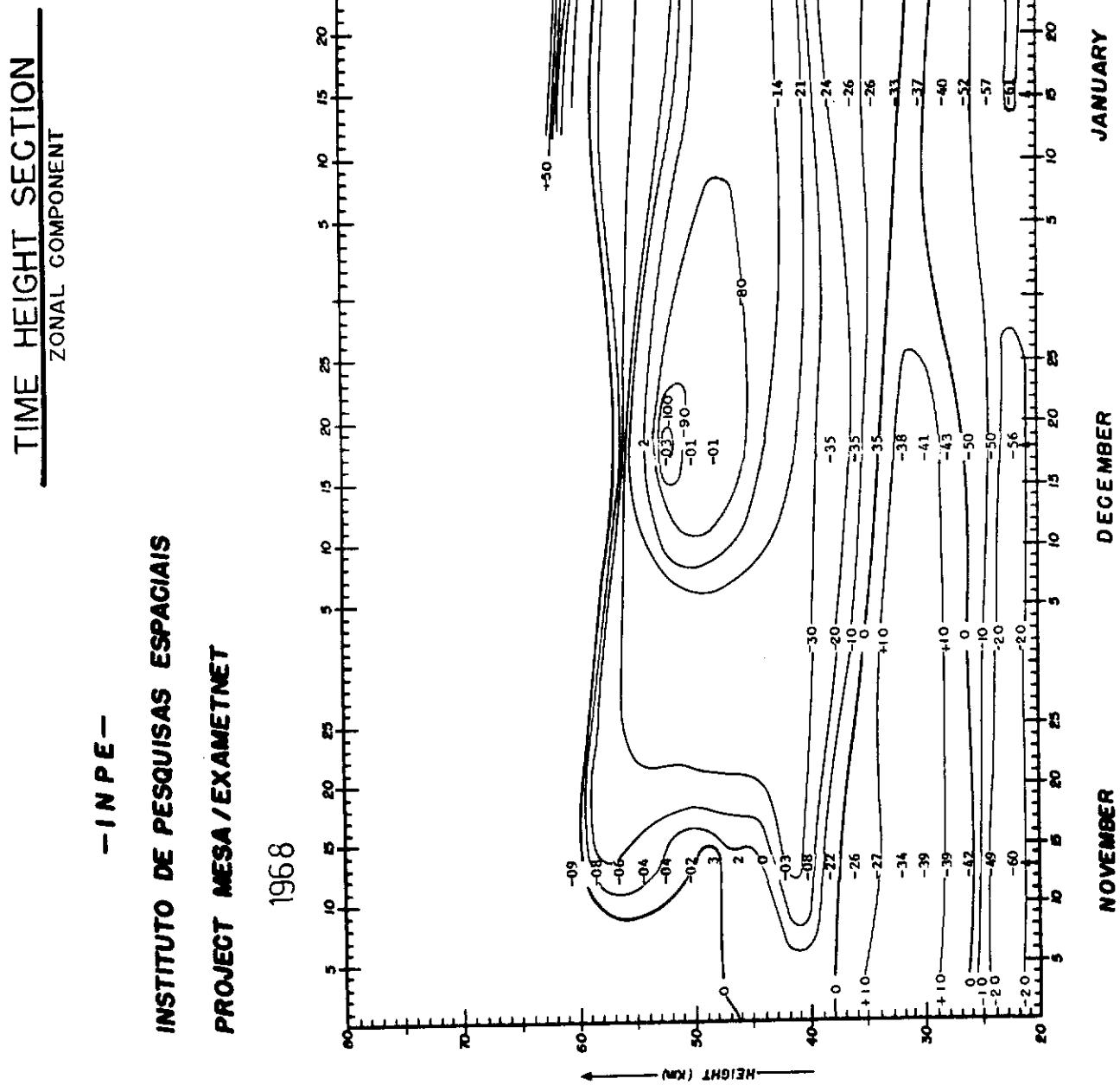
1968

NATAL, BRAZIL

5° 55' S : 35° 15' W



- 29 -



TIME HEIGHT SECTION  
ZONAL COMPONENT

- IN PE -

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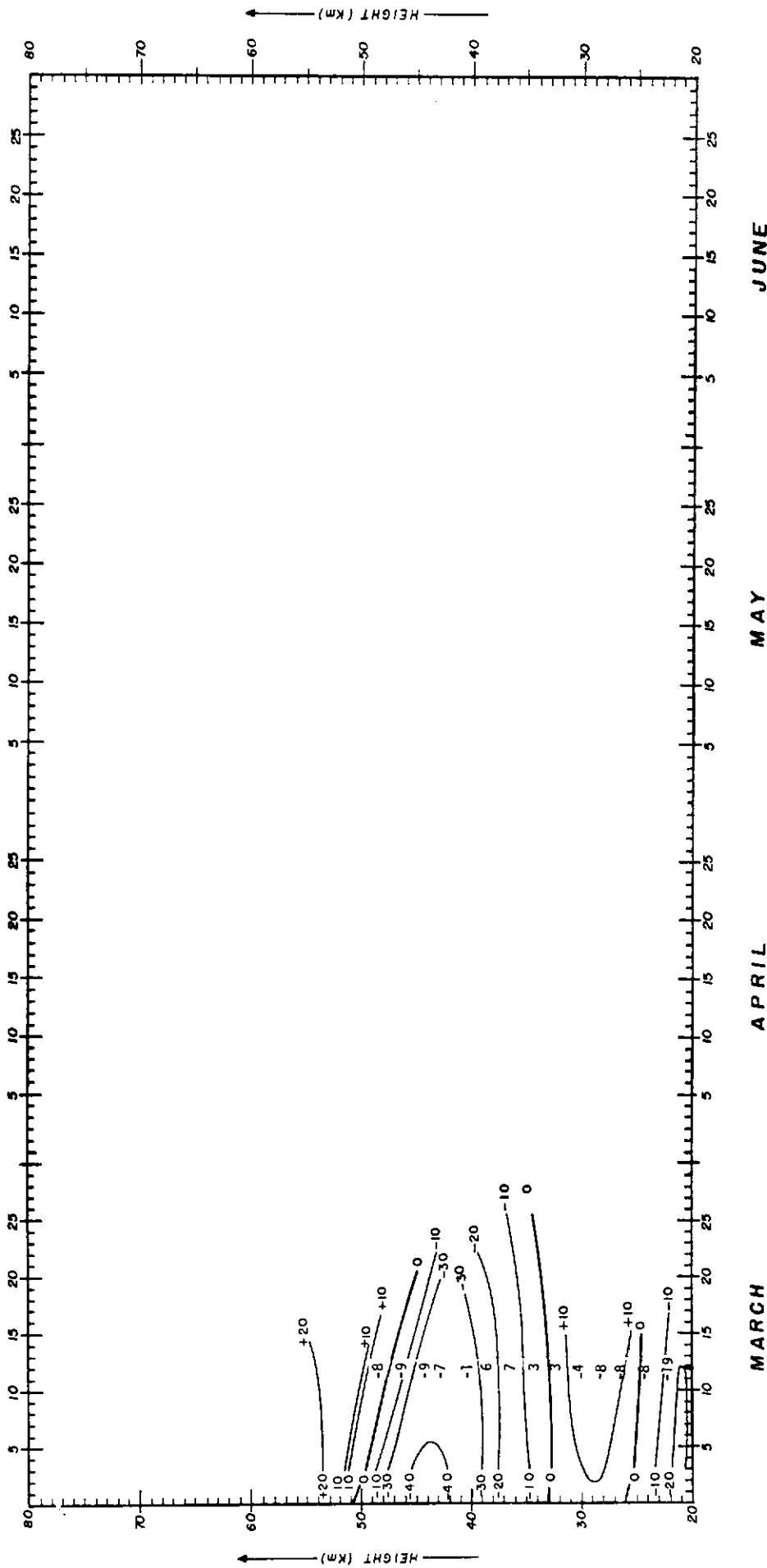
PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1969

- 30 -



TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

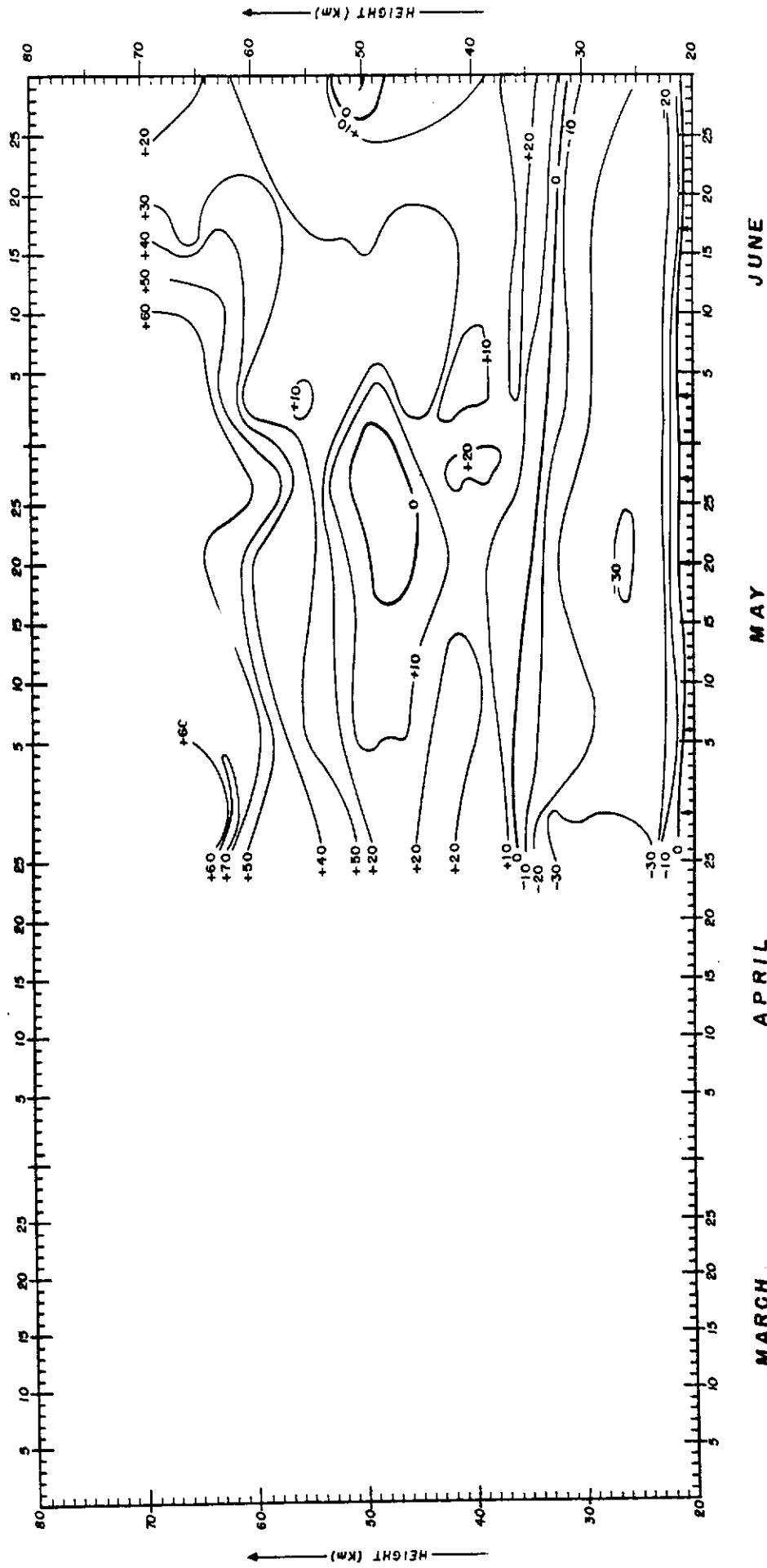
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PROJECT MESA/EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1970



TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

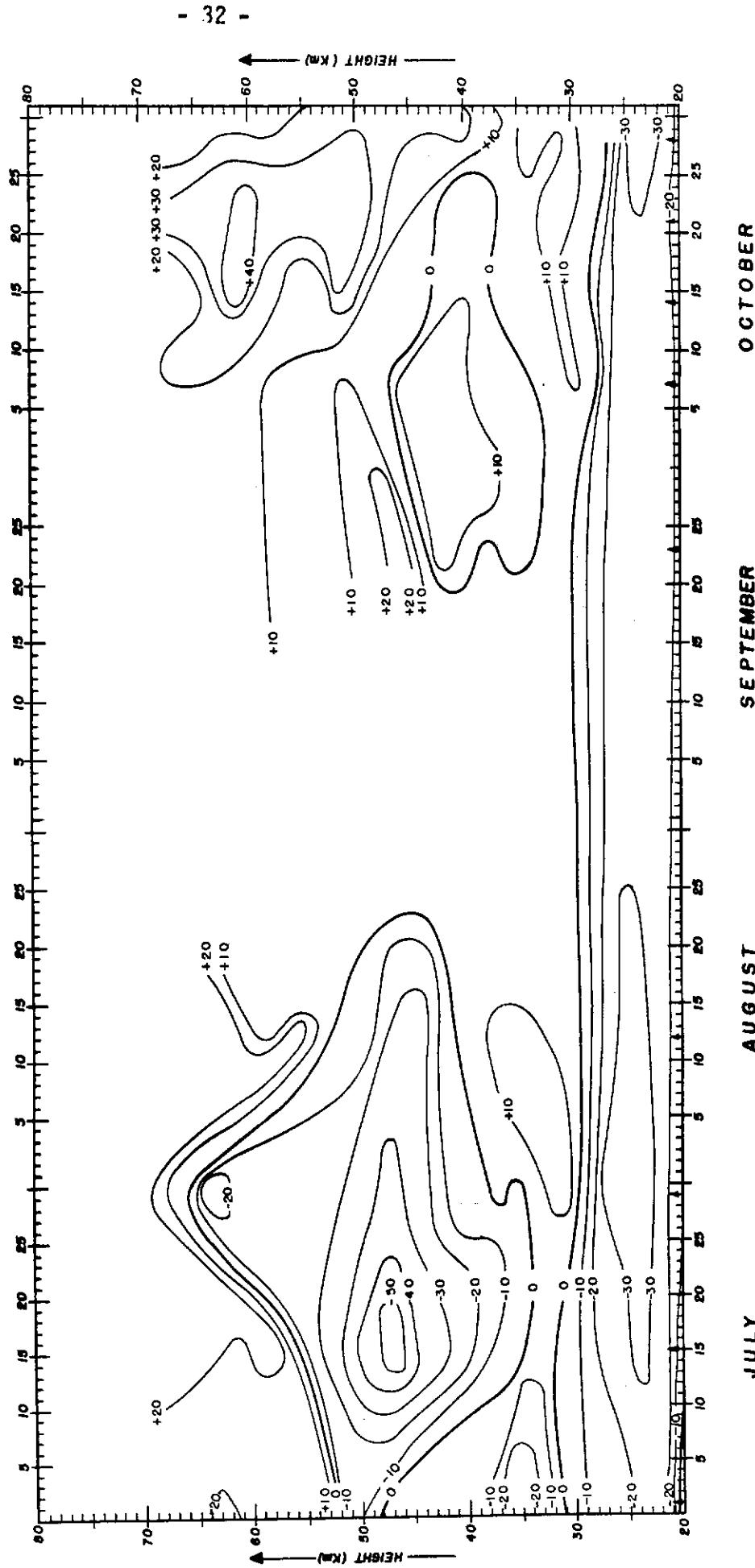
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PROJECT MESA / EXAMETNET

1970

NATAL, BRAZIL

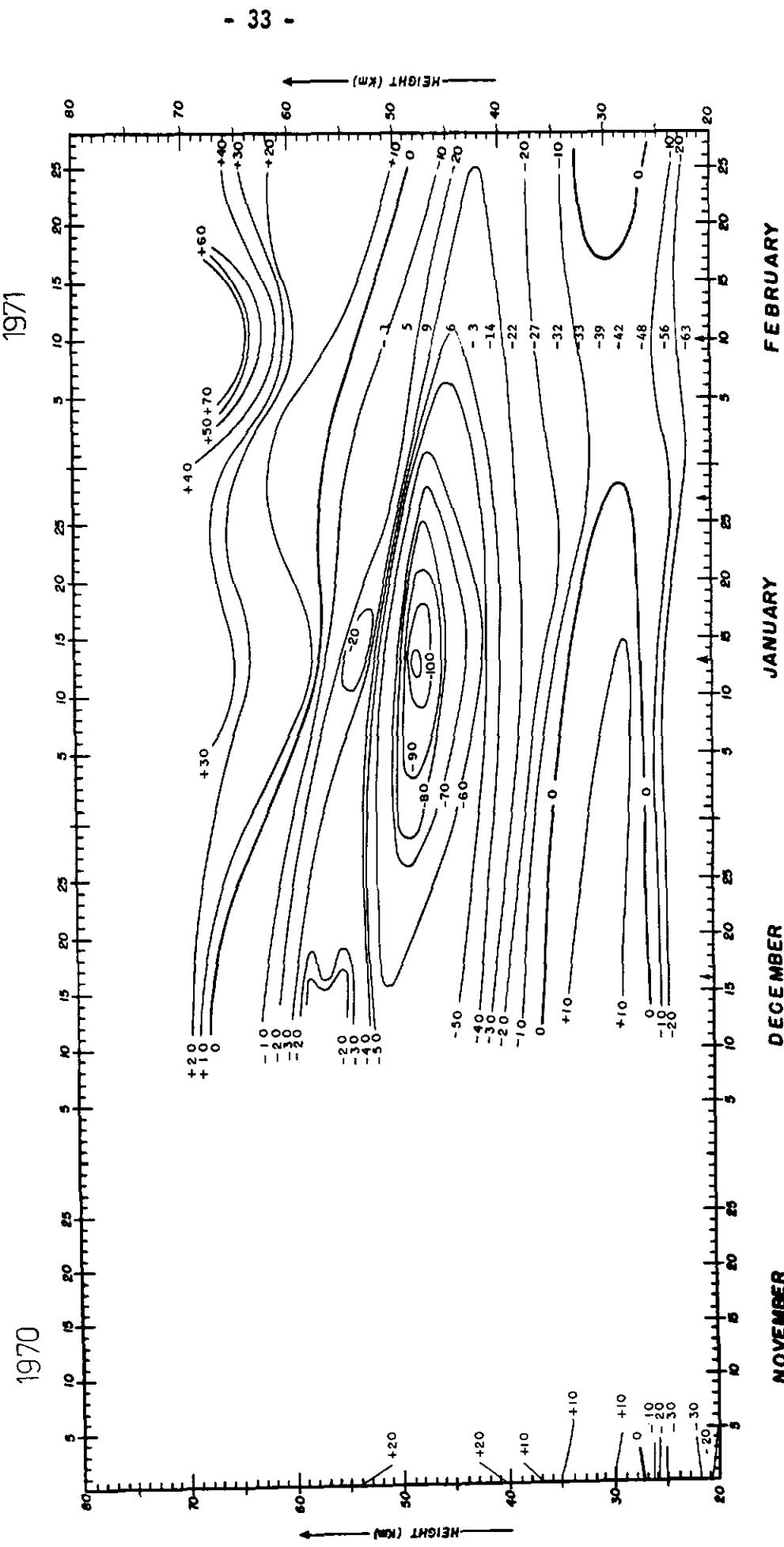
5° 55' S ; 35° 15' W



TIME HEIGHT SECTION  
— INPE —  
ZONAL COMPONENT

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PROJECT MESA / EXAMETNET

NATAL, BRAZIL  
 $5^{\circ} 55' S$ ;  $35^{\circ} 15' W$



TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

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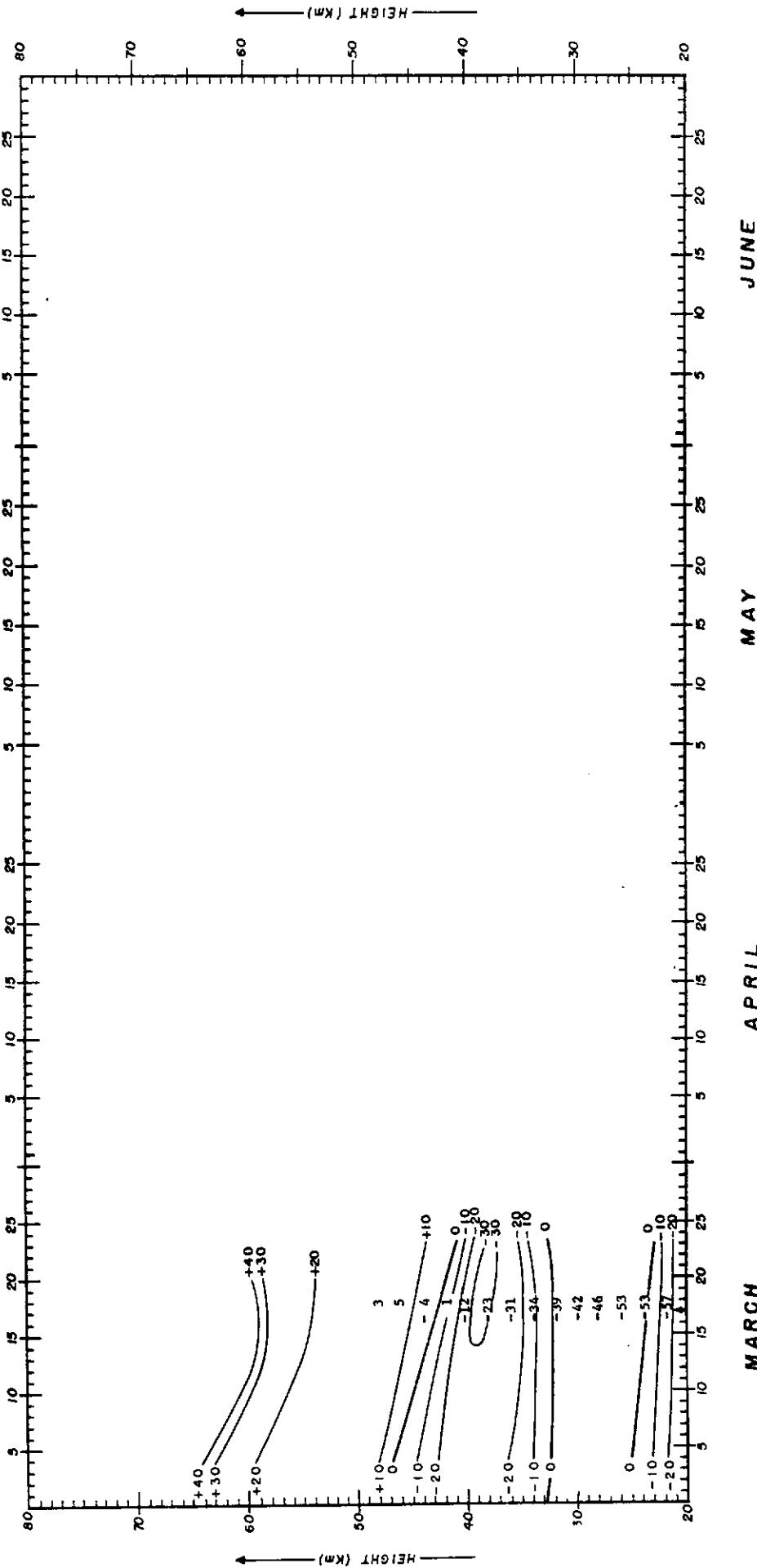
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NATAL, BRAZIL

5° 55' S : 35° 15' W

1971

- 34 -



TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

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PROJECT MESA / EXAMETNET

1971

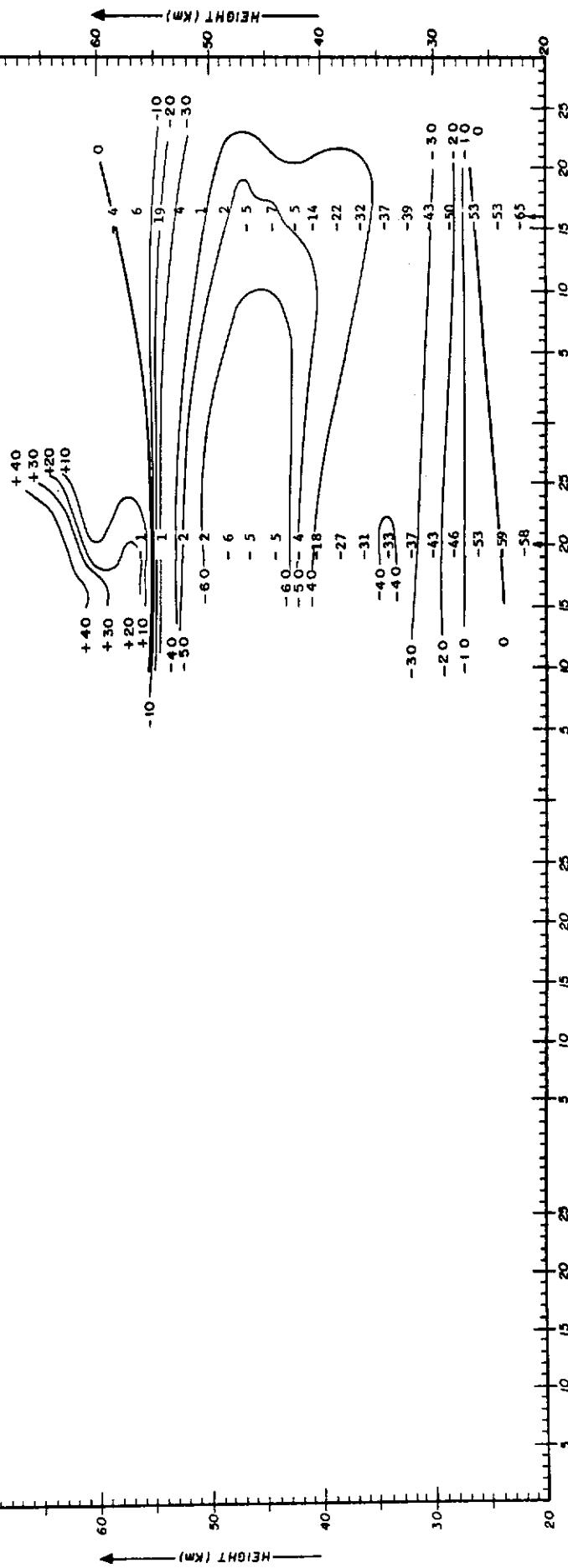


NATAL, BRAZIL

5° 55' S ; 35° 15' W

1972

- 35 -



FEBRUARY

JANUARY

DECEMBER

NOVEMBER

TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

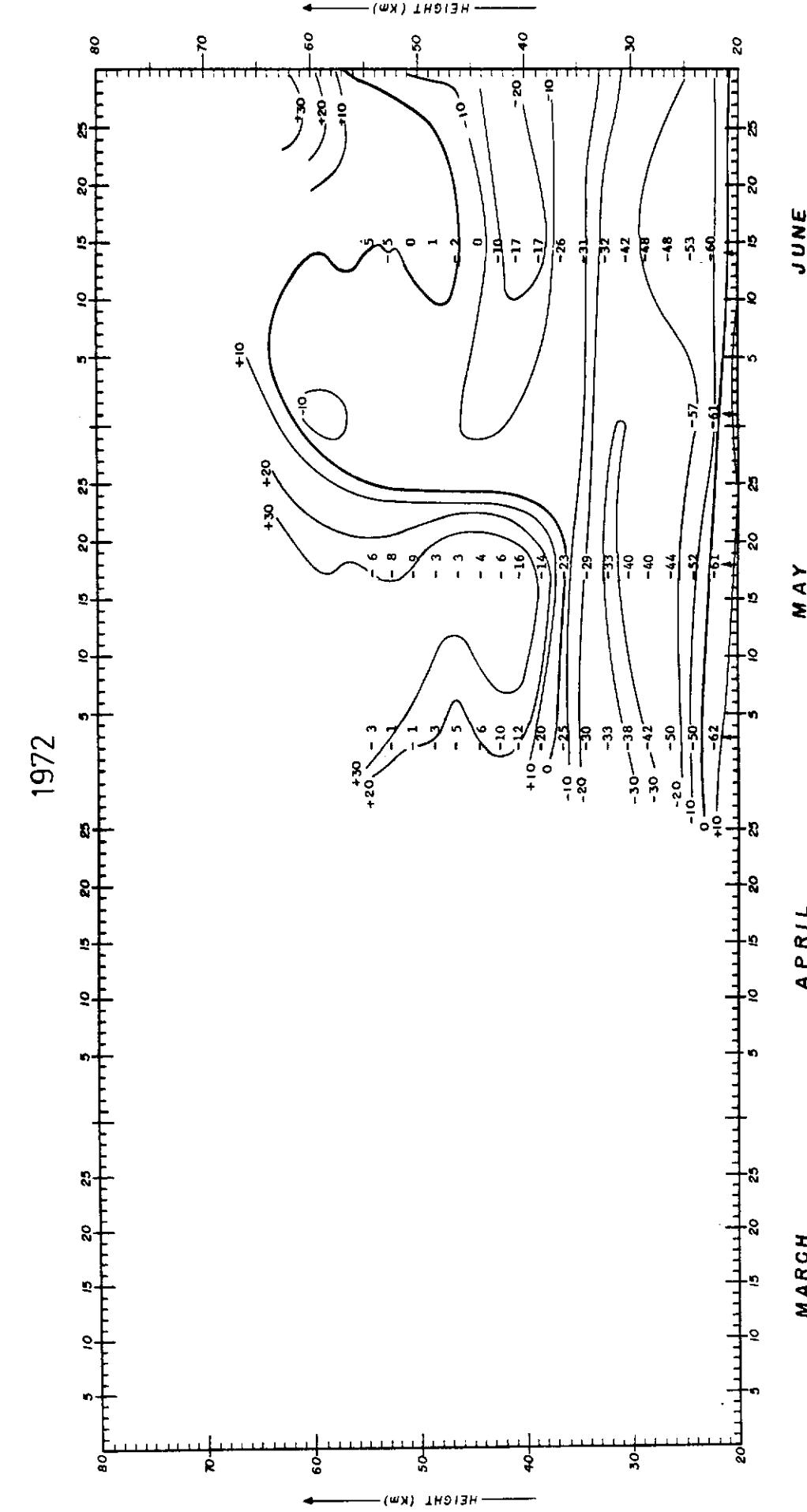
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1972

NATAL, BRAZIL

5° 55' S : 35° 15' W



TIME HEIGHT SECTION  
ZONAL COMPONENT

- INPE -

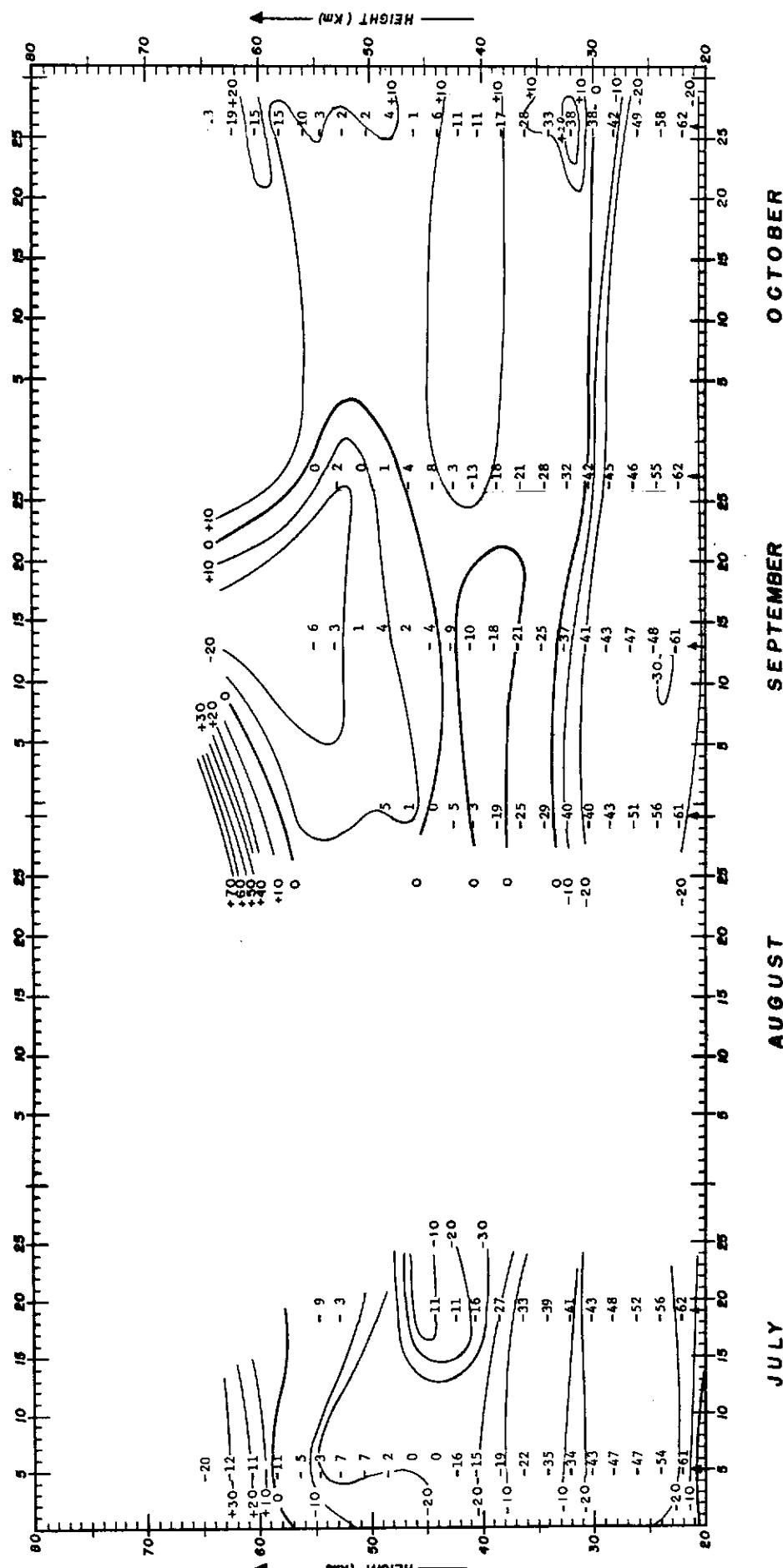
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PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1972



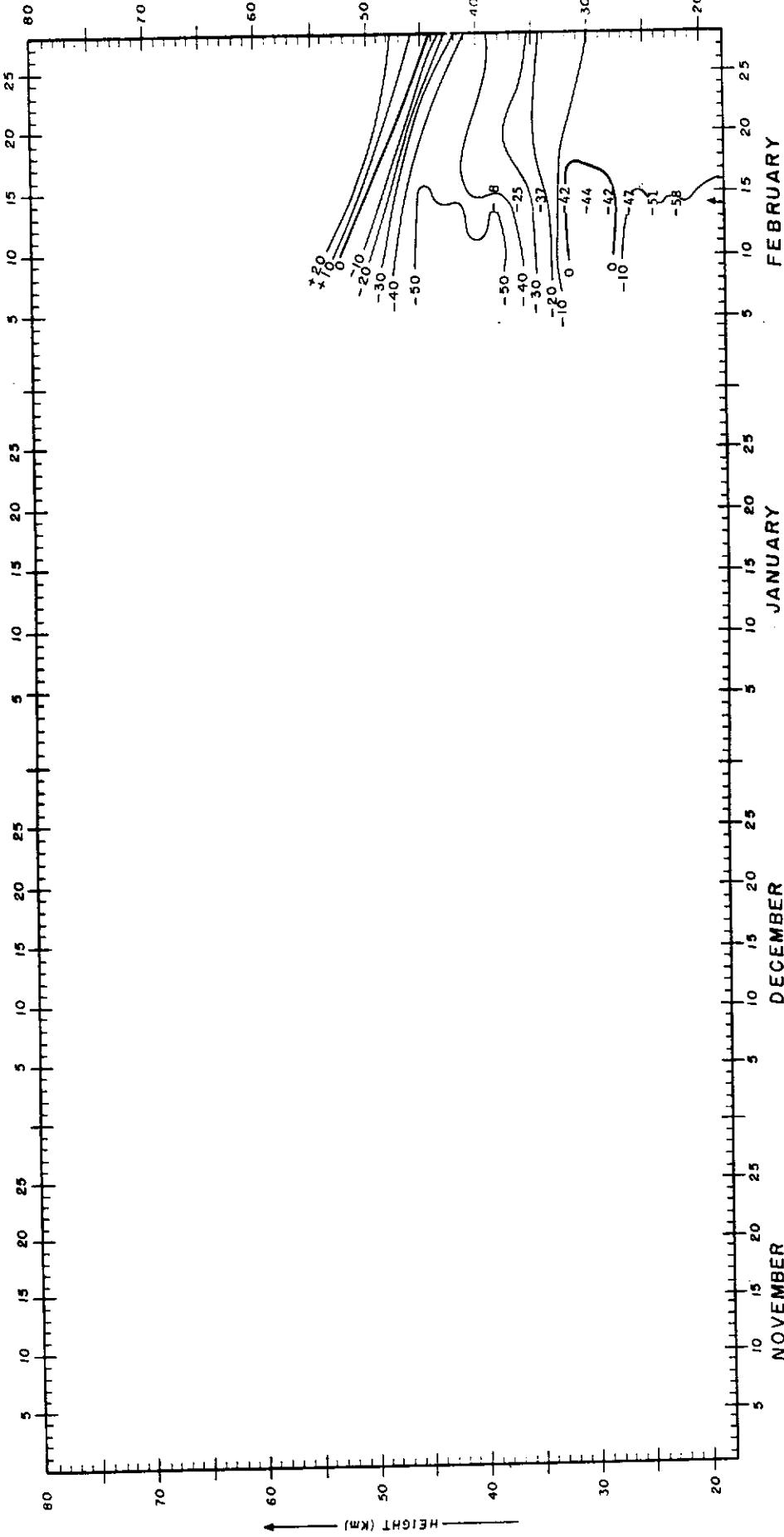
TIME HEIGHT SECTION  
ZONAL COMPONENT

— INPE —

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1972                    1973



TIME HEIGHT SECTION  
ZONAL COMPONENT

-INPE-

INSTITUTO DE PESQUISAS ESPACIAIS

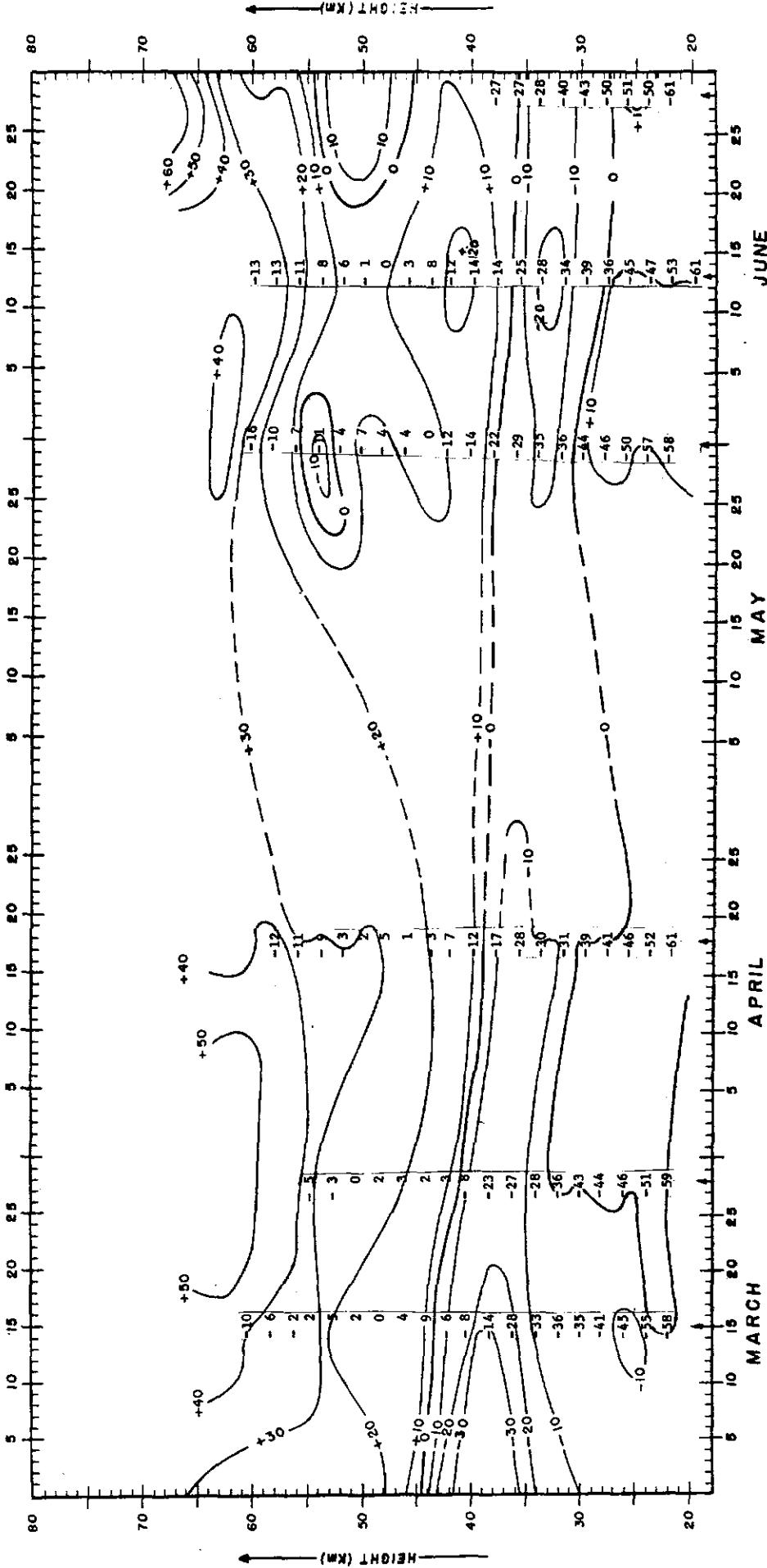
PROJECT MESA / EXAMETNET

1973

NATAL, BRAZIL

5° 55' S, 35° 15' W

- 39 -



## TIME HEIGHT SECTION

-INPE-

INSTITUTO DE PESQUISAS ESPACIAIS

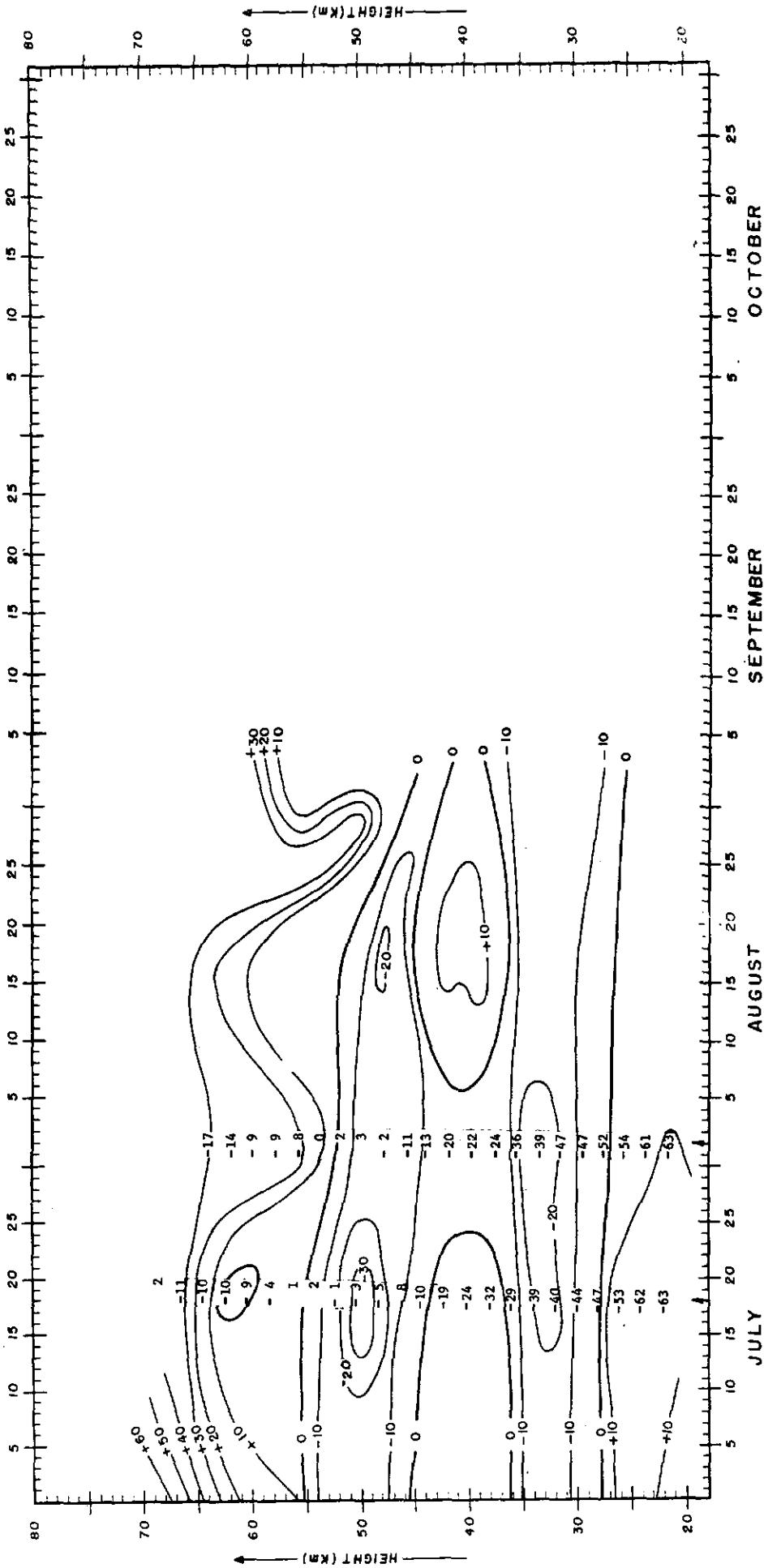
PROJECT MESA / EXAMETNET

1973

NATAL, BRAZIL

5° 55' S ; 35° 15' W

- 40 -



APPENDIX III

TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

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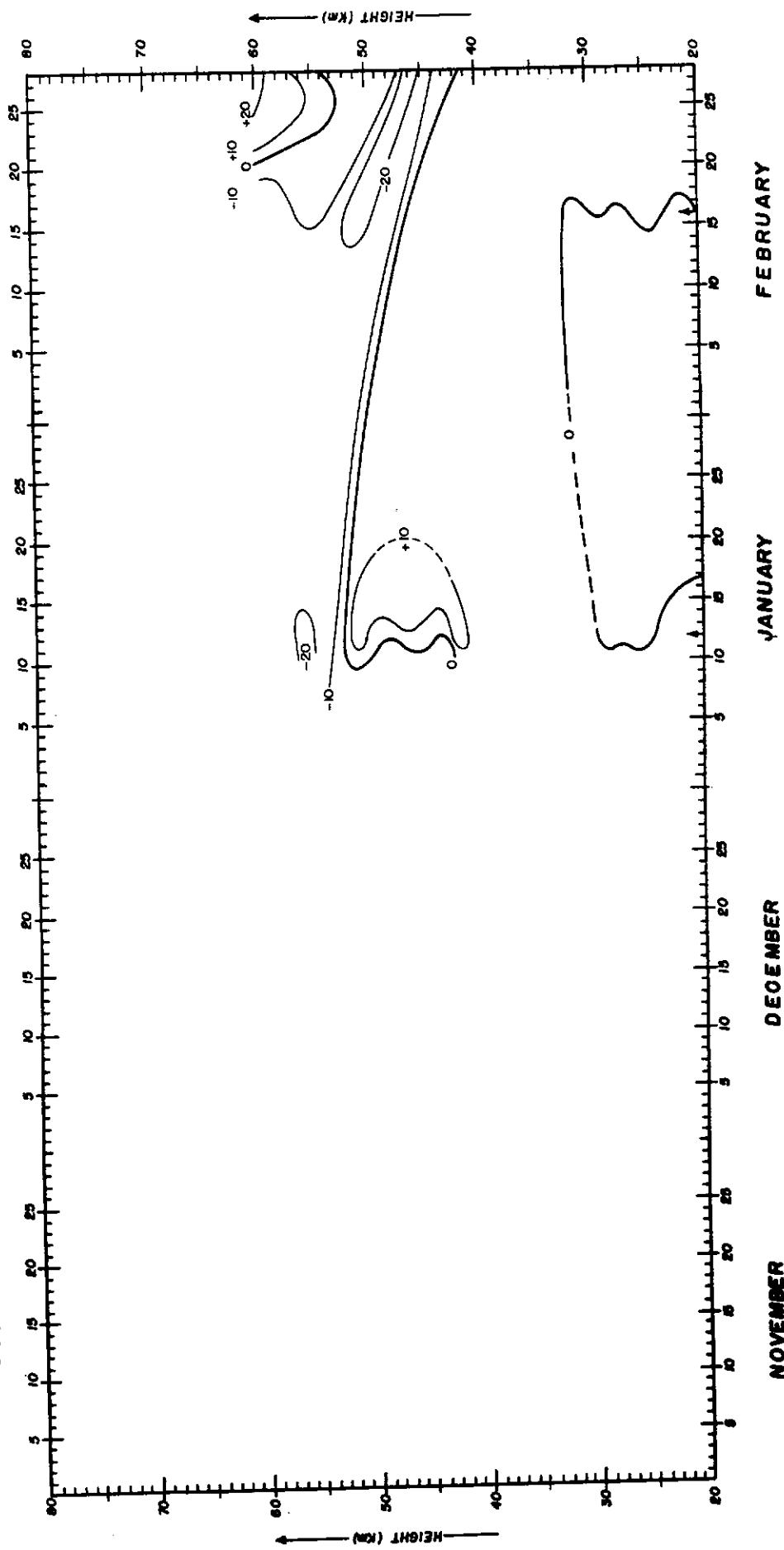
PROJECT MESA / EXAMETNET

1965

1966

NATAL, BRAZIL  
 $5^{\circ} 55' S$  :  $35^{\circ} 15' W$

- 42 -



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

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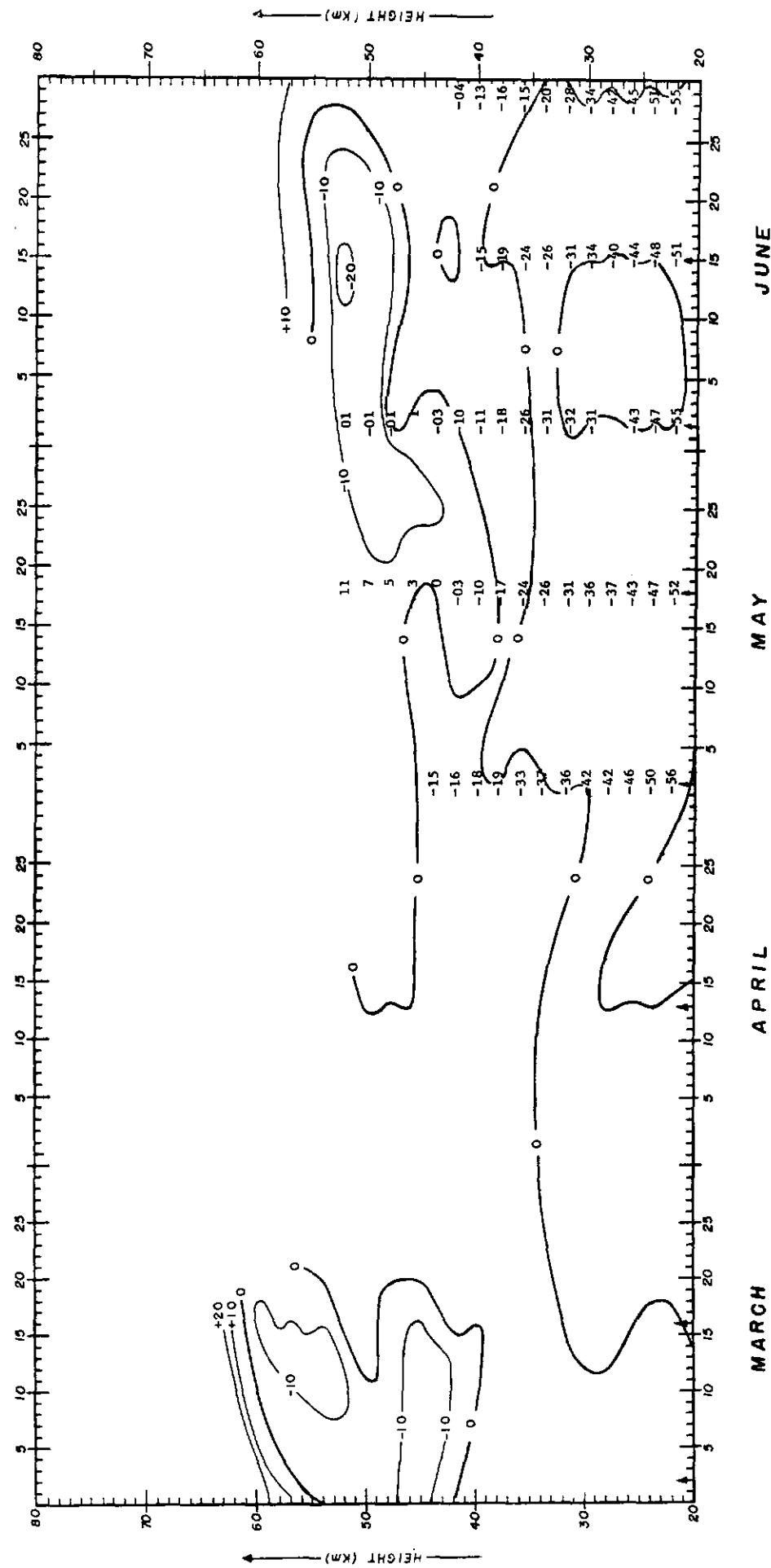
PROJECT MESA / EXAMETNET

1966

NATAL, BRAZIL

5° 55' S : 35° 15' W

- 43 -



- 44 -



- INPE -

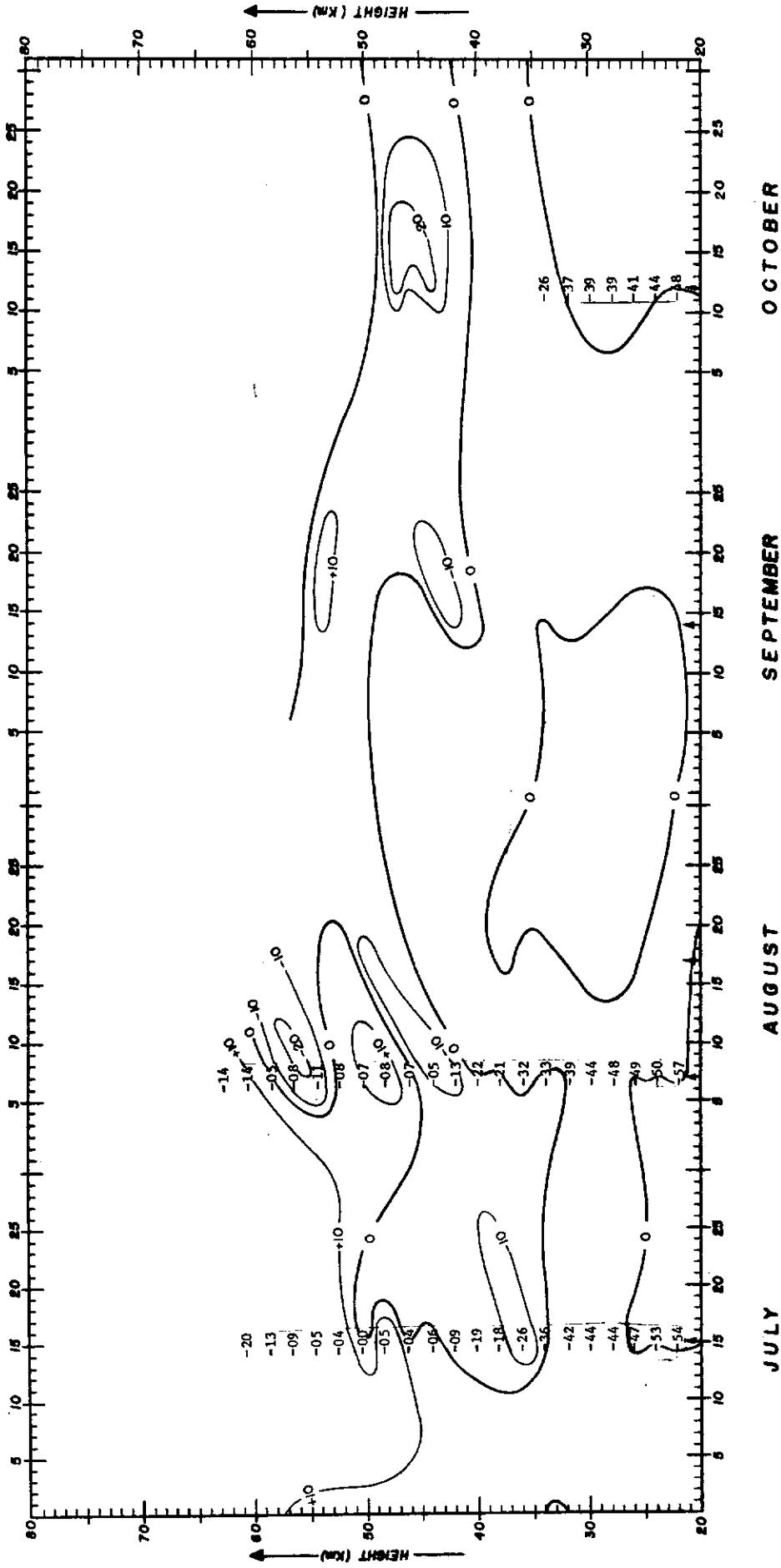
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PROJECT MESA / EXAMETNET

1966

NATAL, BRAZIL

5° 55' S ; 35° 15' W



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

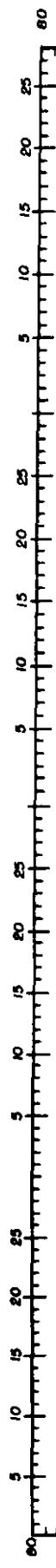
INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S ; 35° 15' W

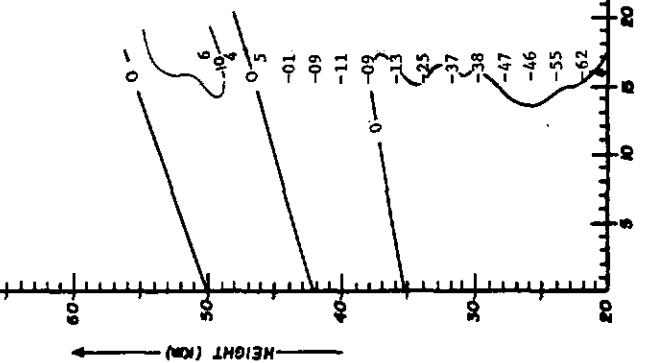
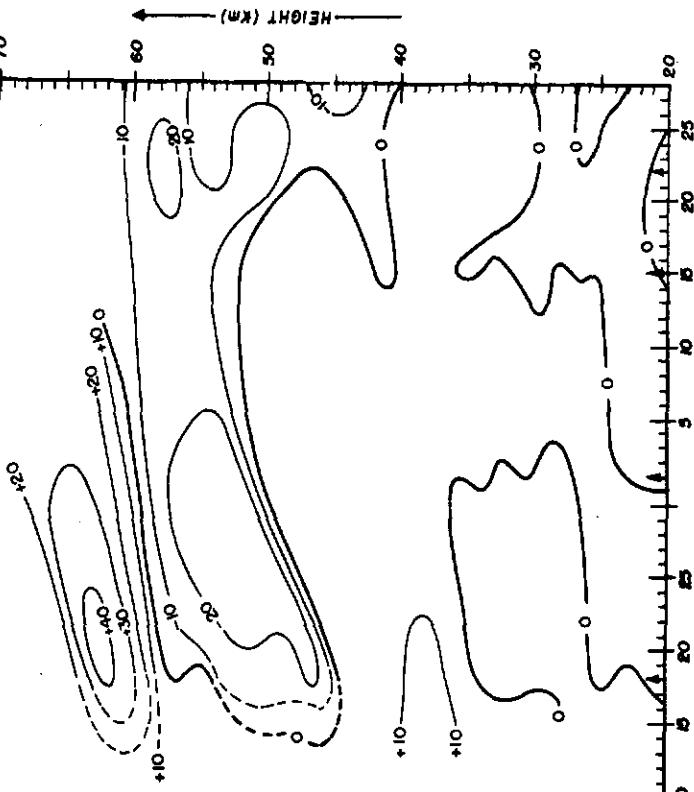
1966



1967



- 45 -



NOVEMBER

DECEMBER

JANUARY FEBRUARY

TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

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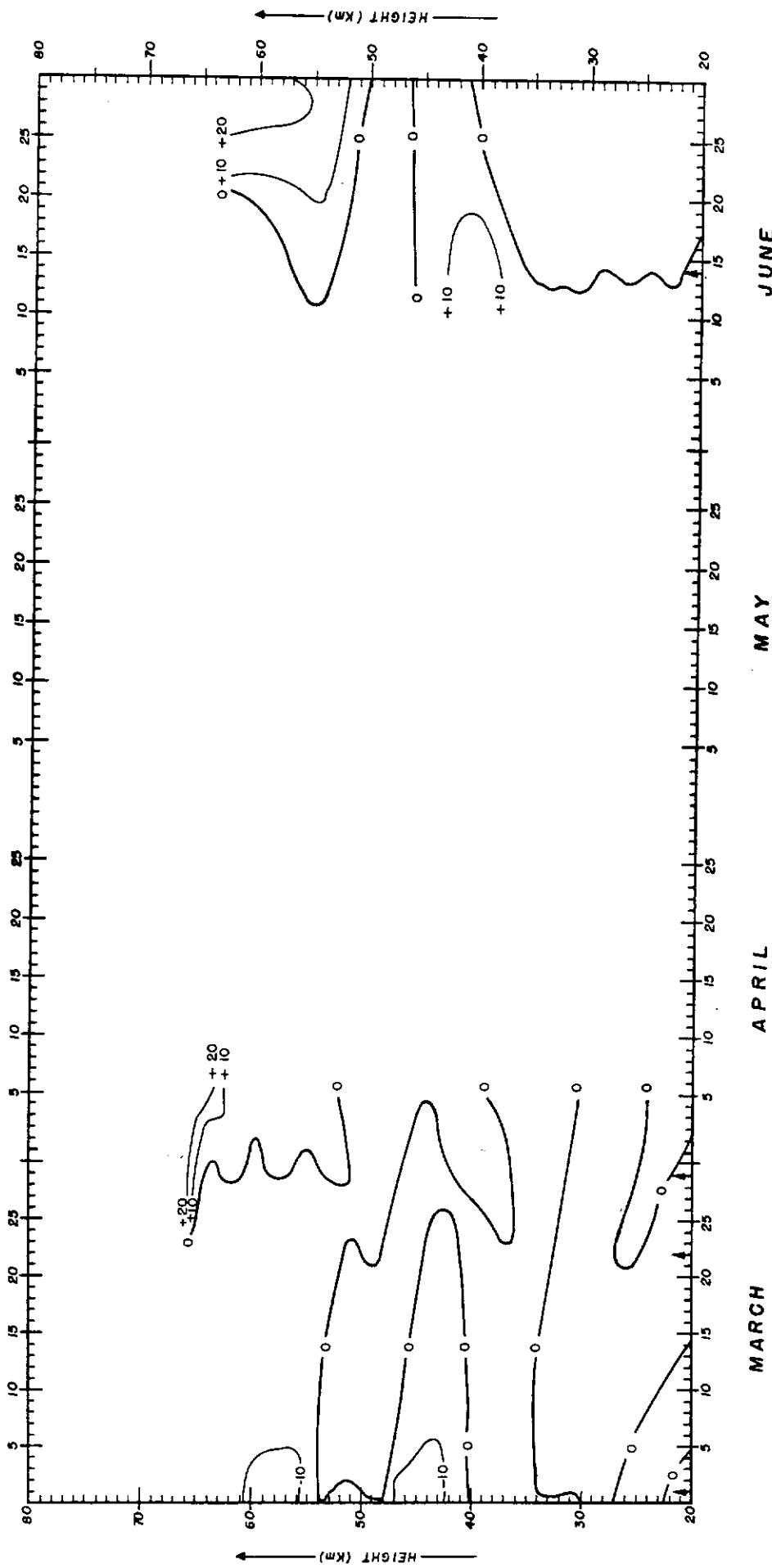
PROJECT MESA / EXAMETNET

1967

NATAL, BRAZIL

3° 55' S : 35° 15' W

- 46 -



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

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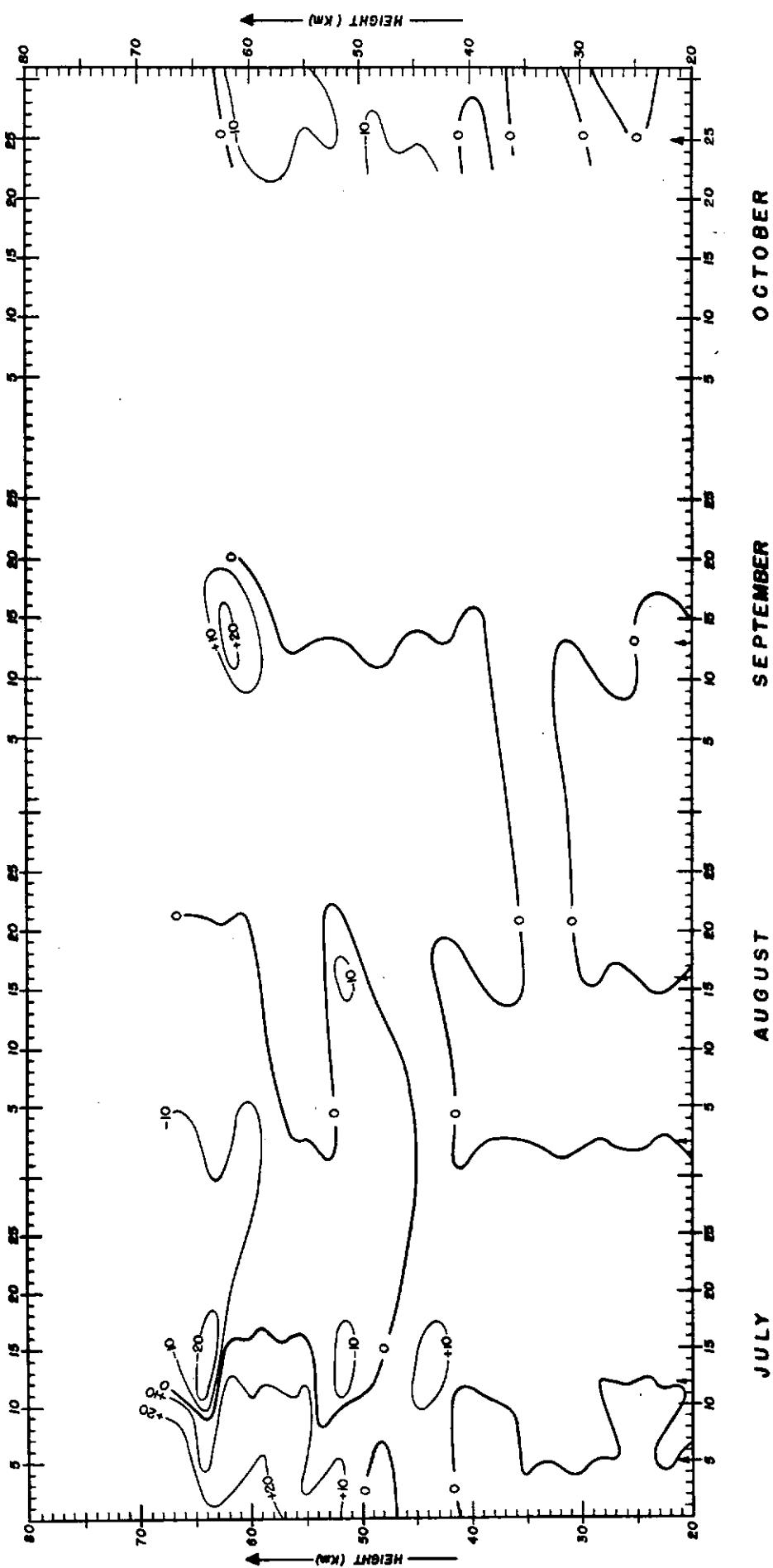
PROJECT MESA / EXAMETNET

1967

NATAL, BRAZIL

5° 55' S ; 35° 15' W

- 47 -



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

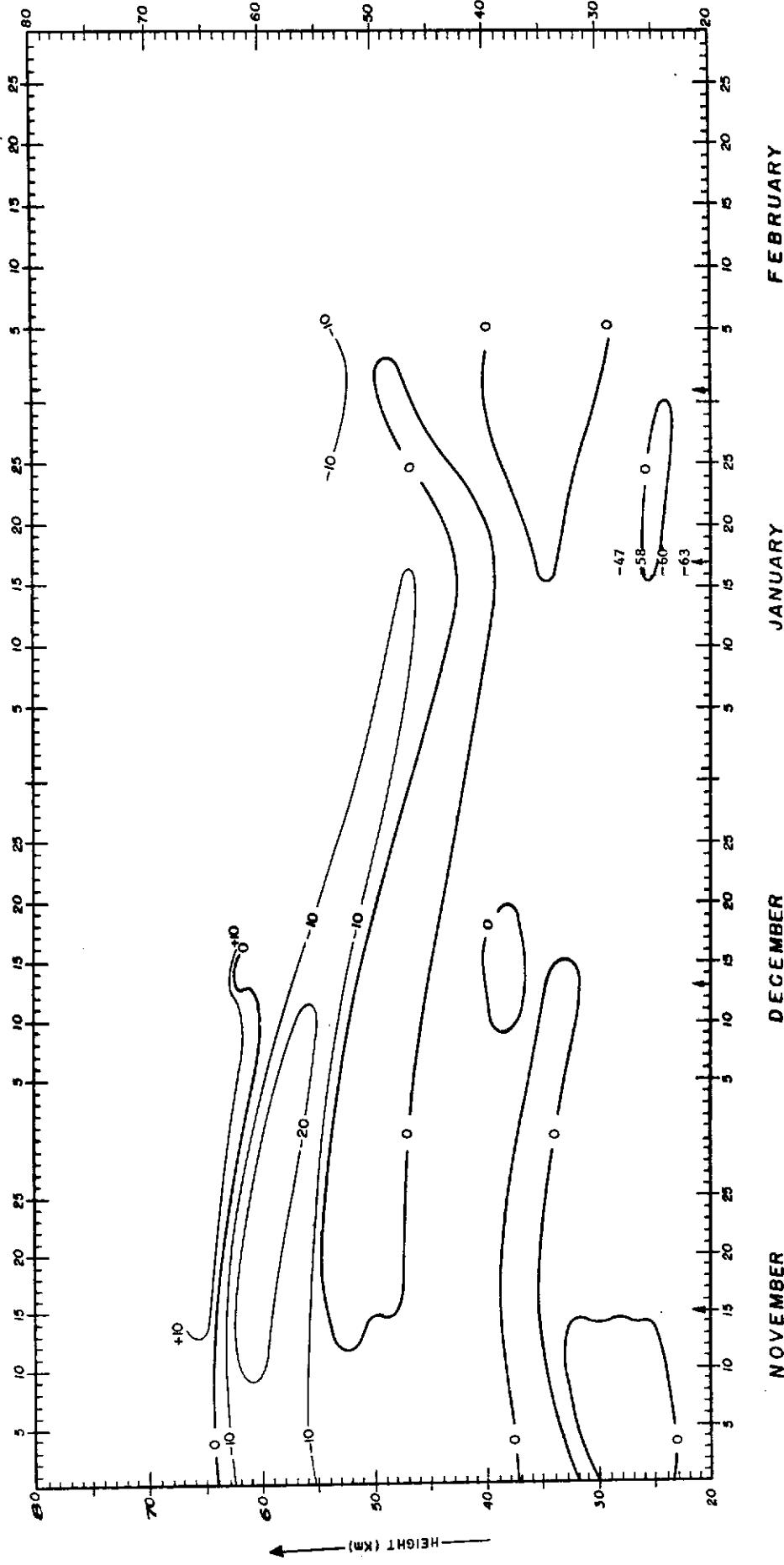
NATAL, BRAZIL

5° 55' S ; 35° 15' W

1967



1968



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

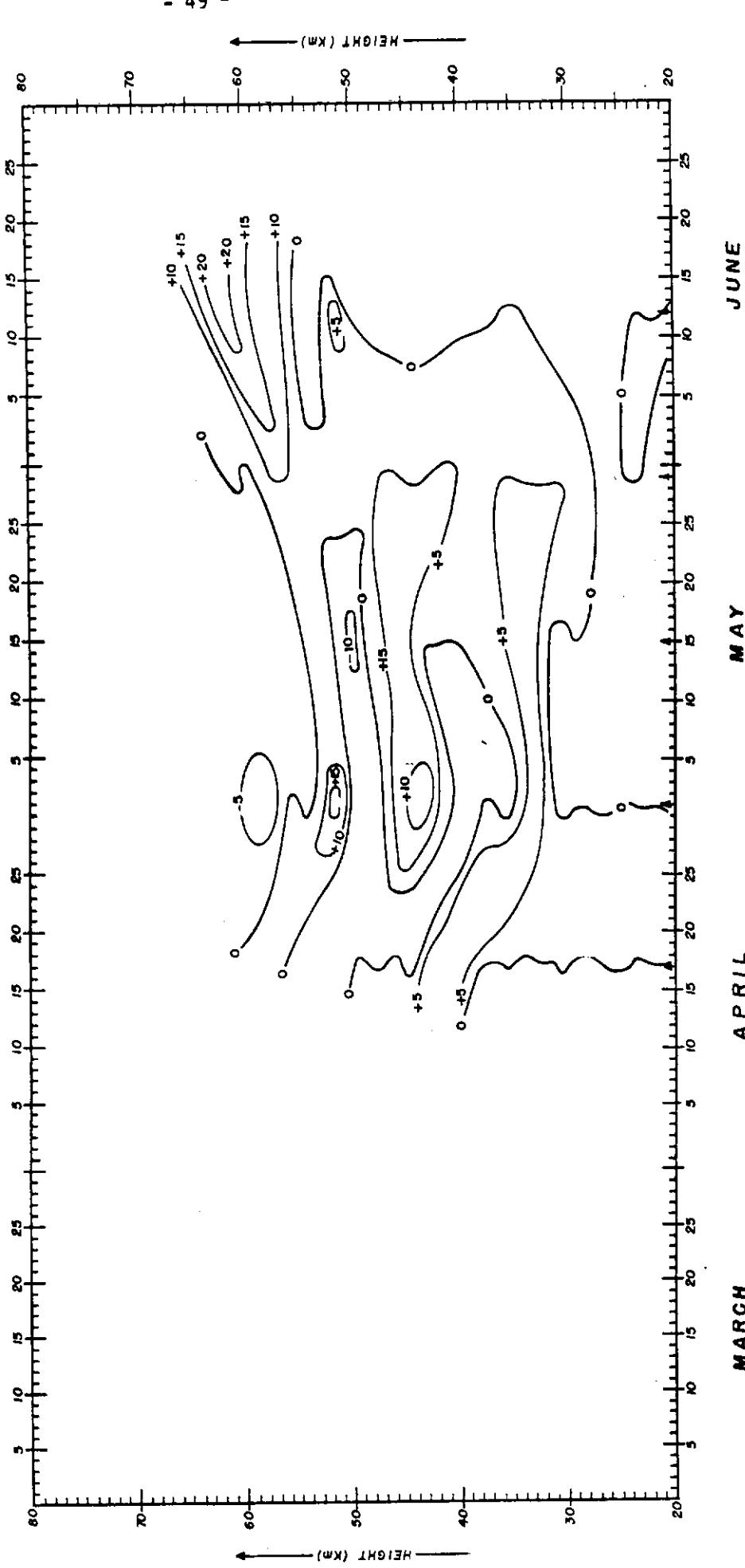
INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA/EXAMETNET

1968

NATAL, BRAZIL

5° 55' S : 35° 15' W



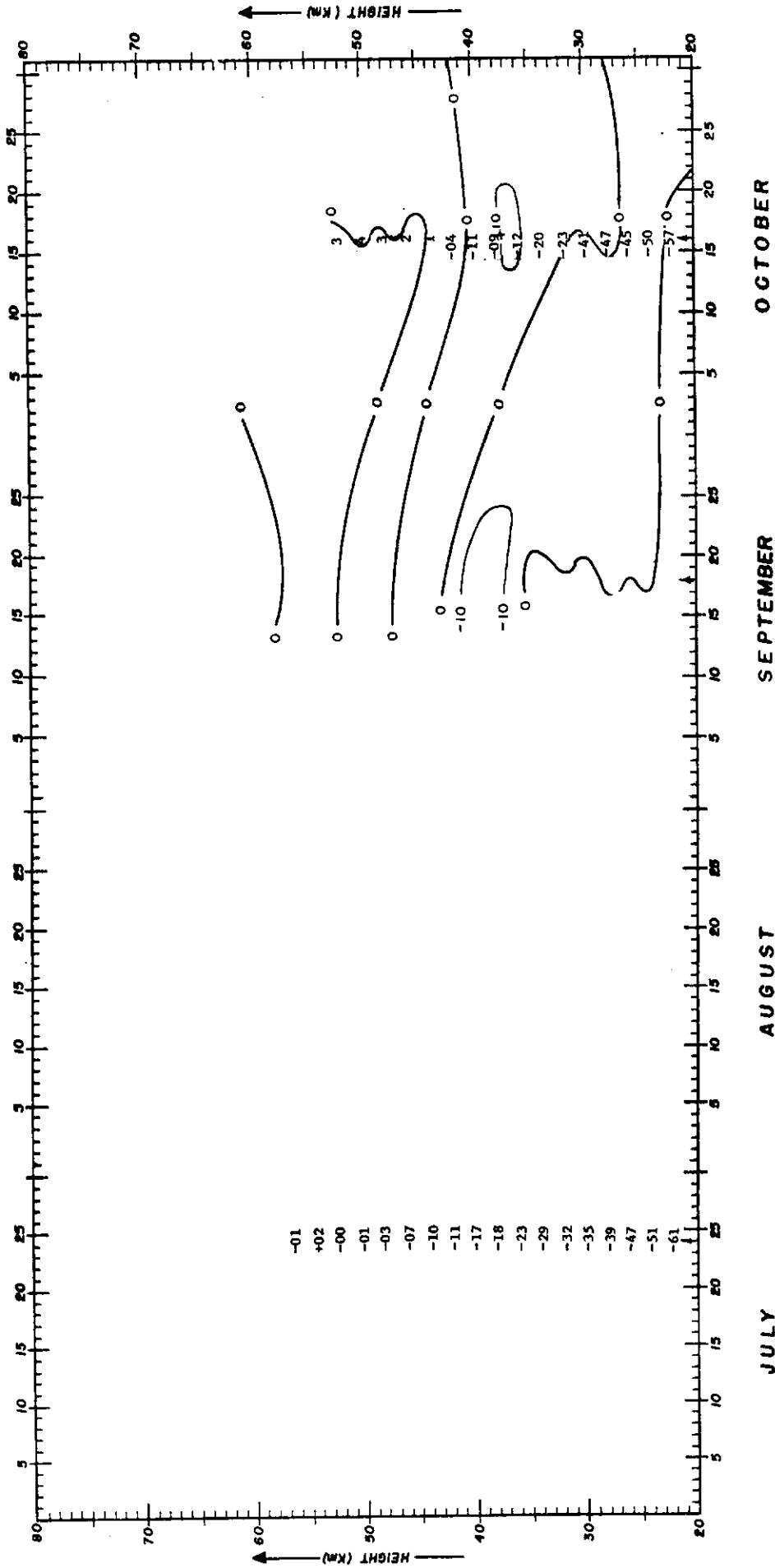
TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- IN P.E -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJET MESA / EXAMETNET

1968



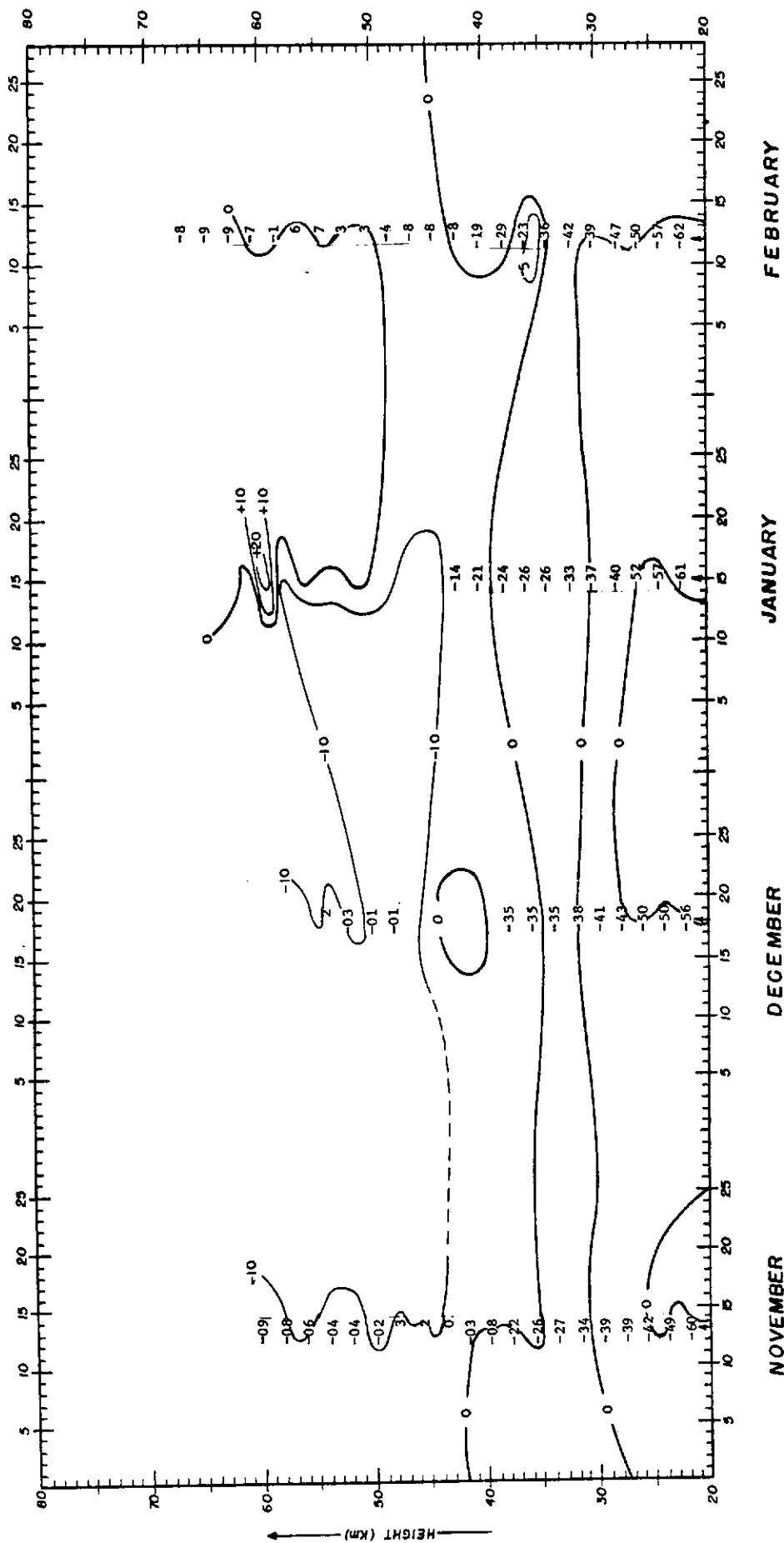
TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1968



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

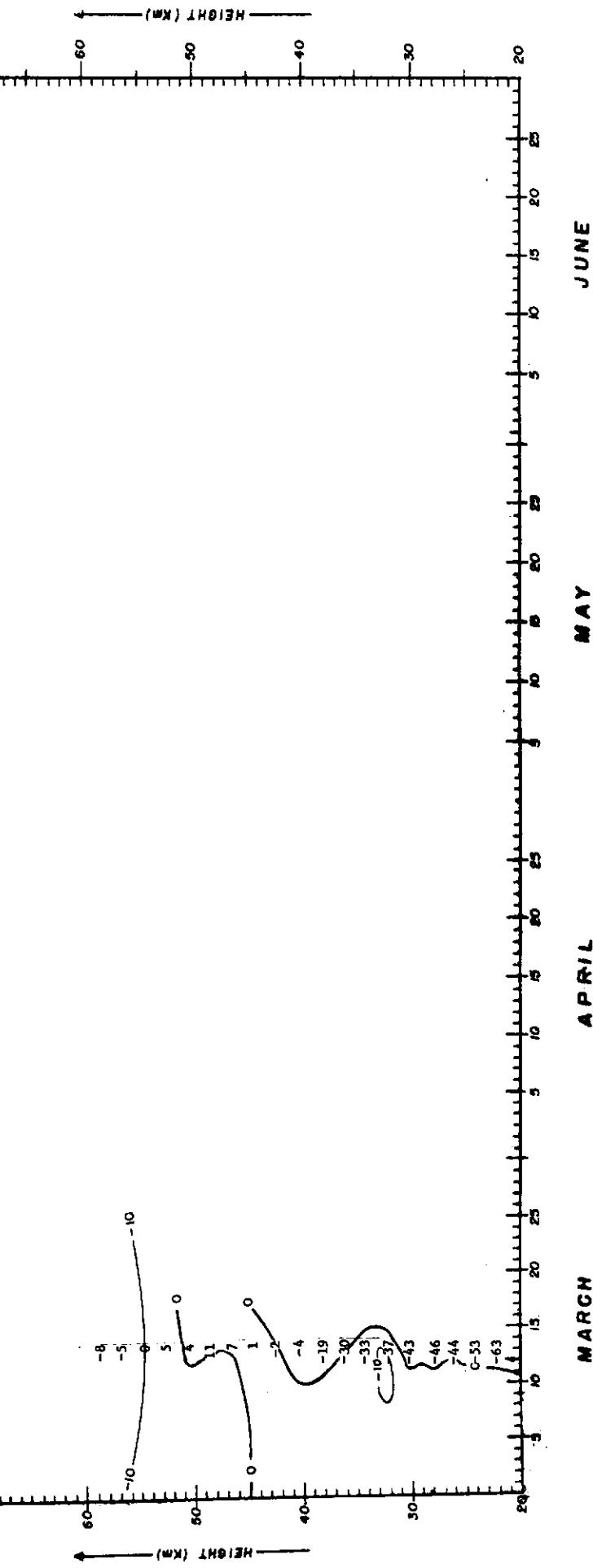
PROJECT MEGA / EXAMETNET

NATAL, BRAZIL

5° 55' S, 35° 15' W

1969

- 52 -



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

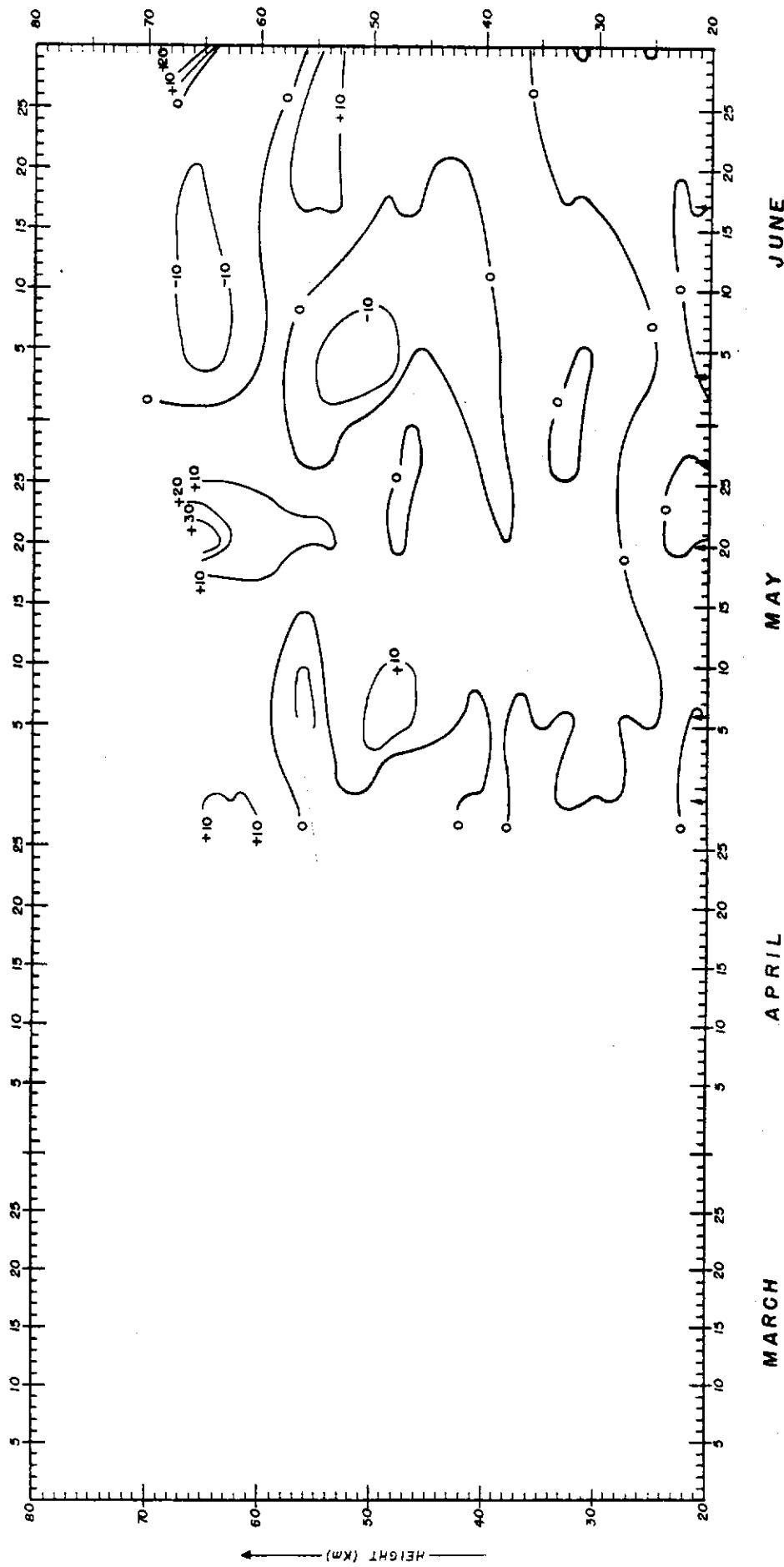
INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1970



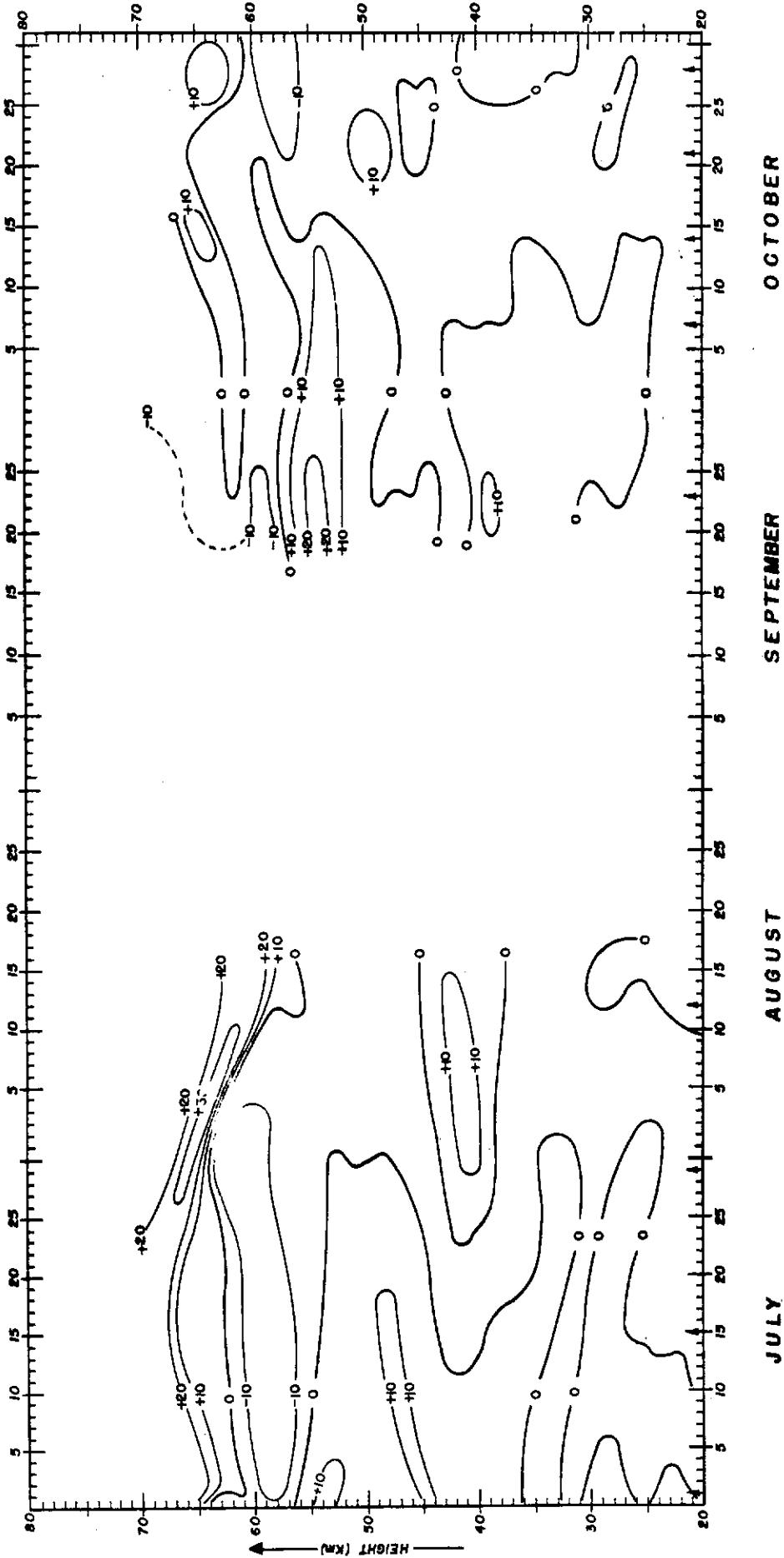
TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1970



NATAL, BRAZIL

5° 55' S : 35° 15' W

HEI GHT (km)

20  
15  
10  
5  
0  
5  
10  
15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80

OCTOBER

SEPTEMBER

AUGUST

JULY

HEI GHT (km)

TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

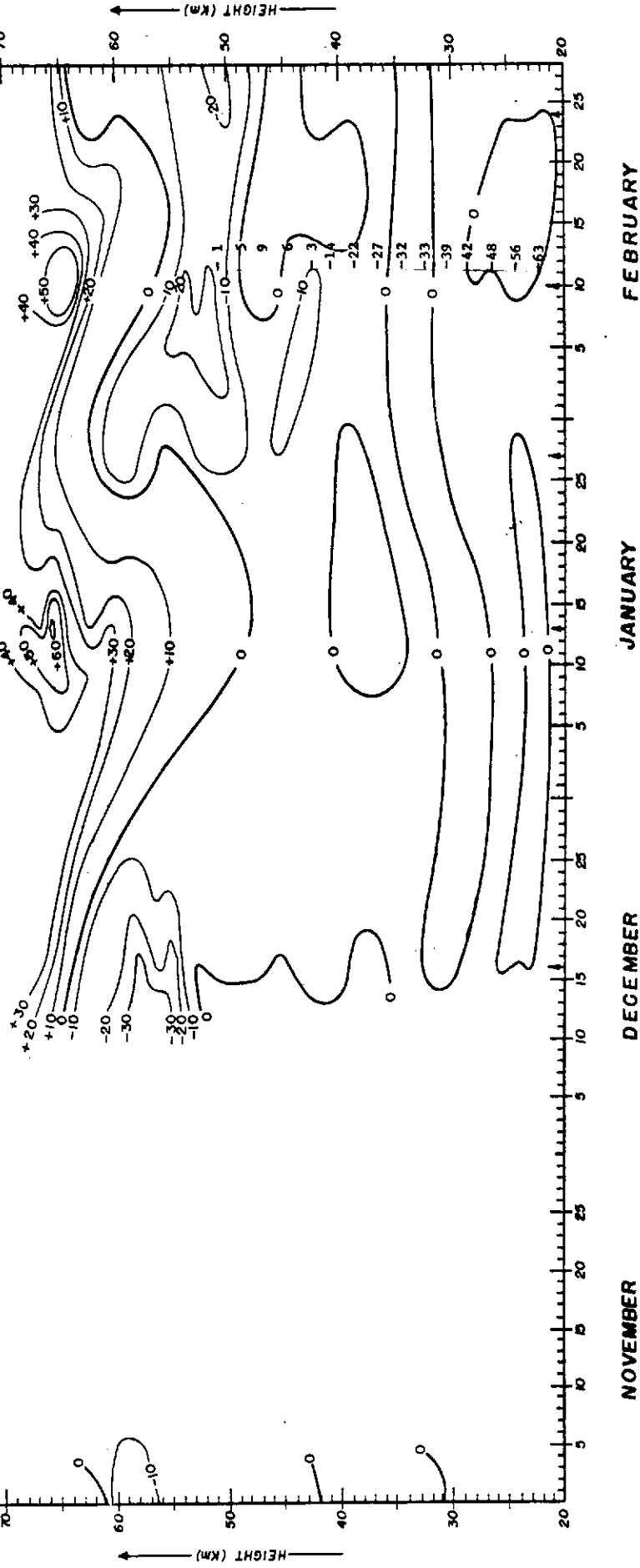
INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1970



1971



NATAL, BRAZIL

5° 55' S : 35° 15' W

- 55 -

## TIME HEIGHT SECTION MERIDIONAL COMPONENT

—INPE—

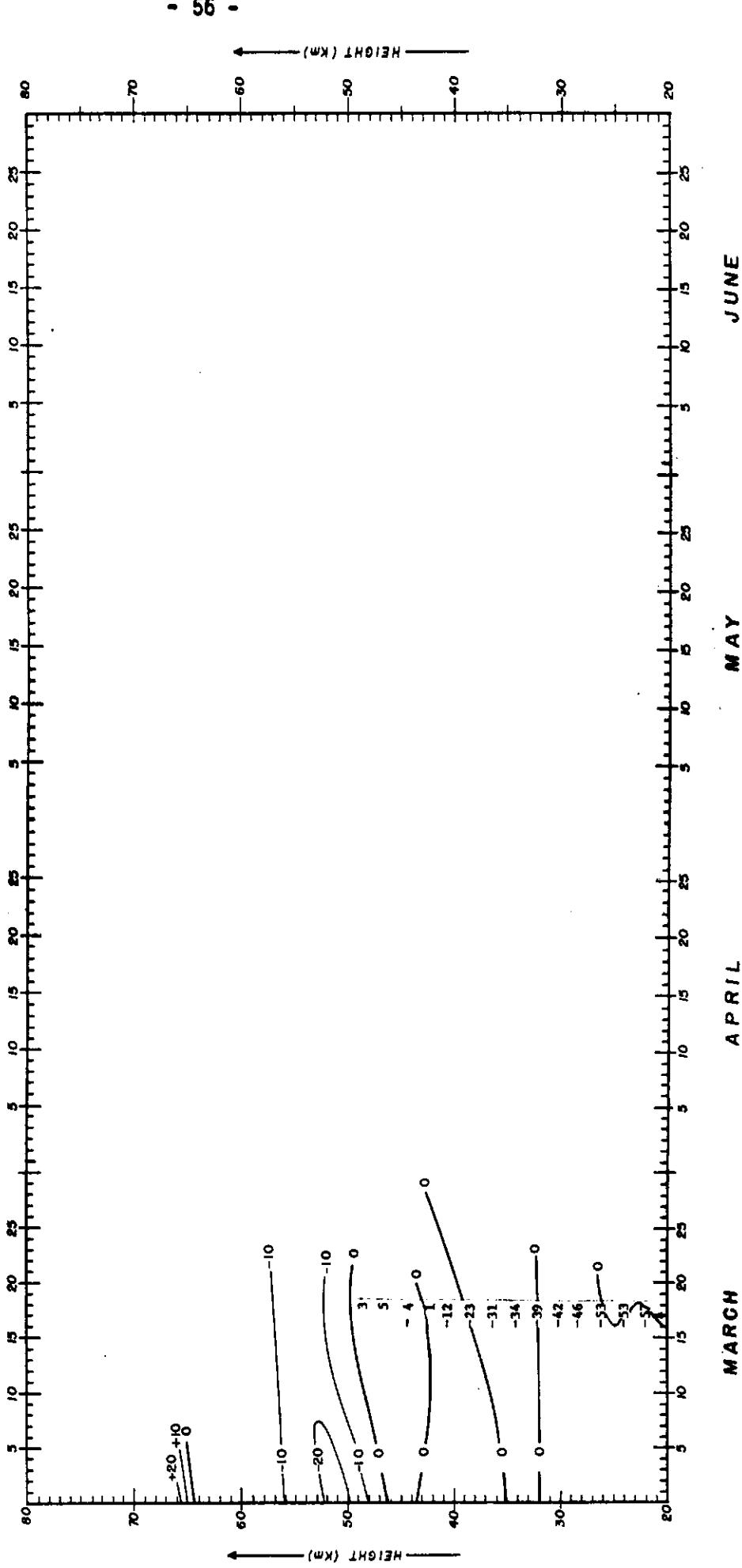
INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1971

NATAL, BRAZIL

5° 55' S ; 35° 15' W



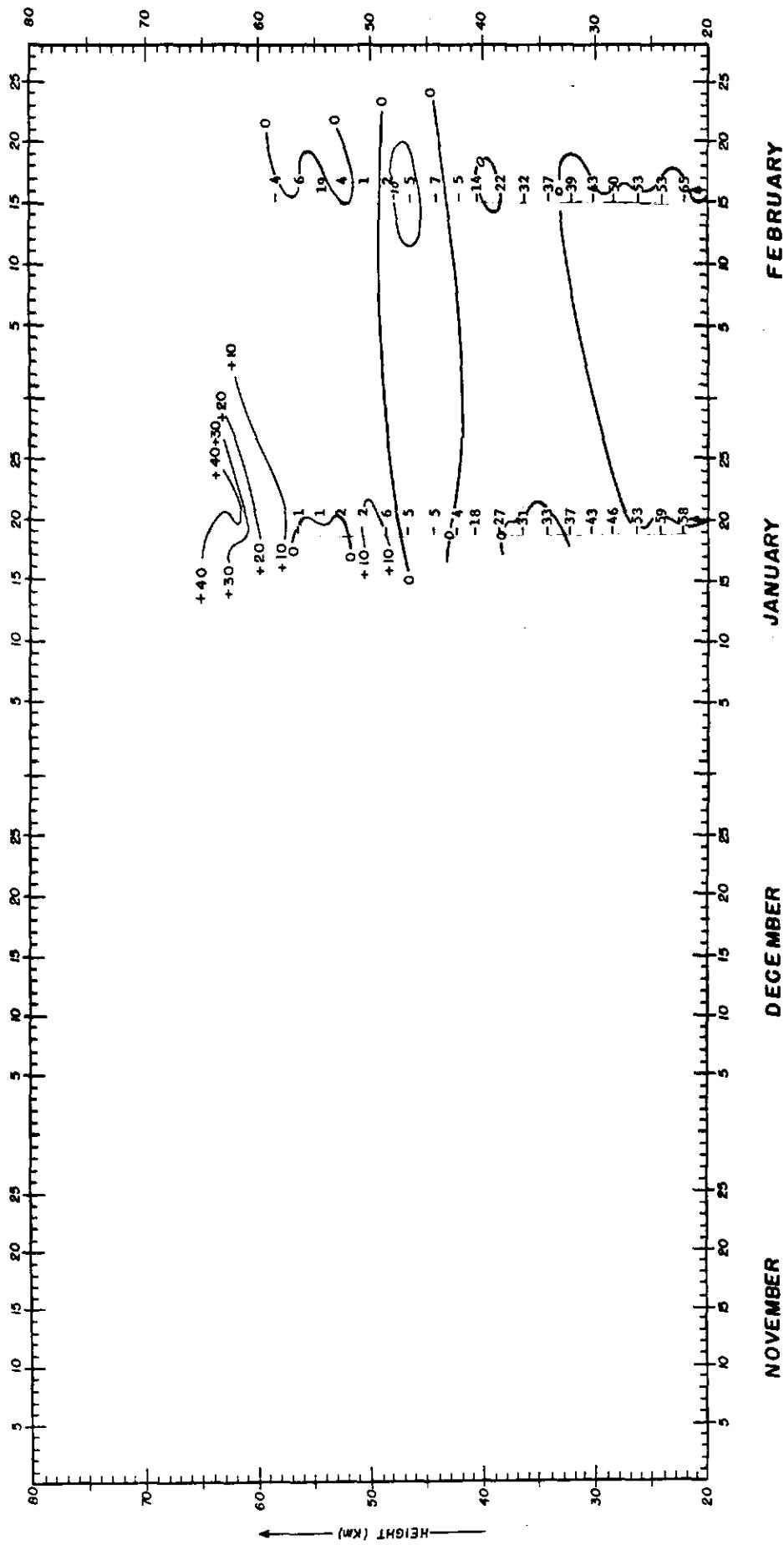
TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1971



## TIME HEIGHT SECTION

— 1 —

INSTITUTO DE PESQUISAS ESPACIAIS

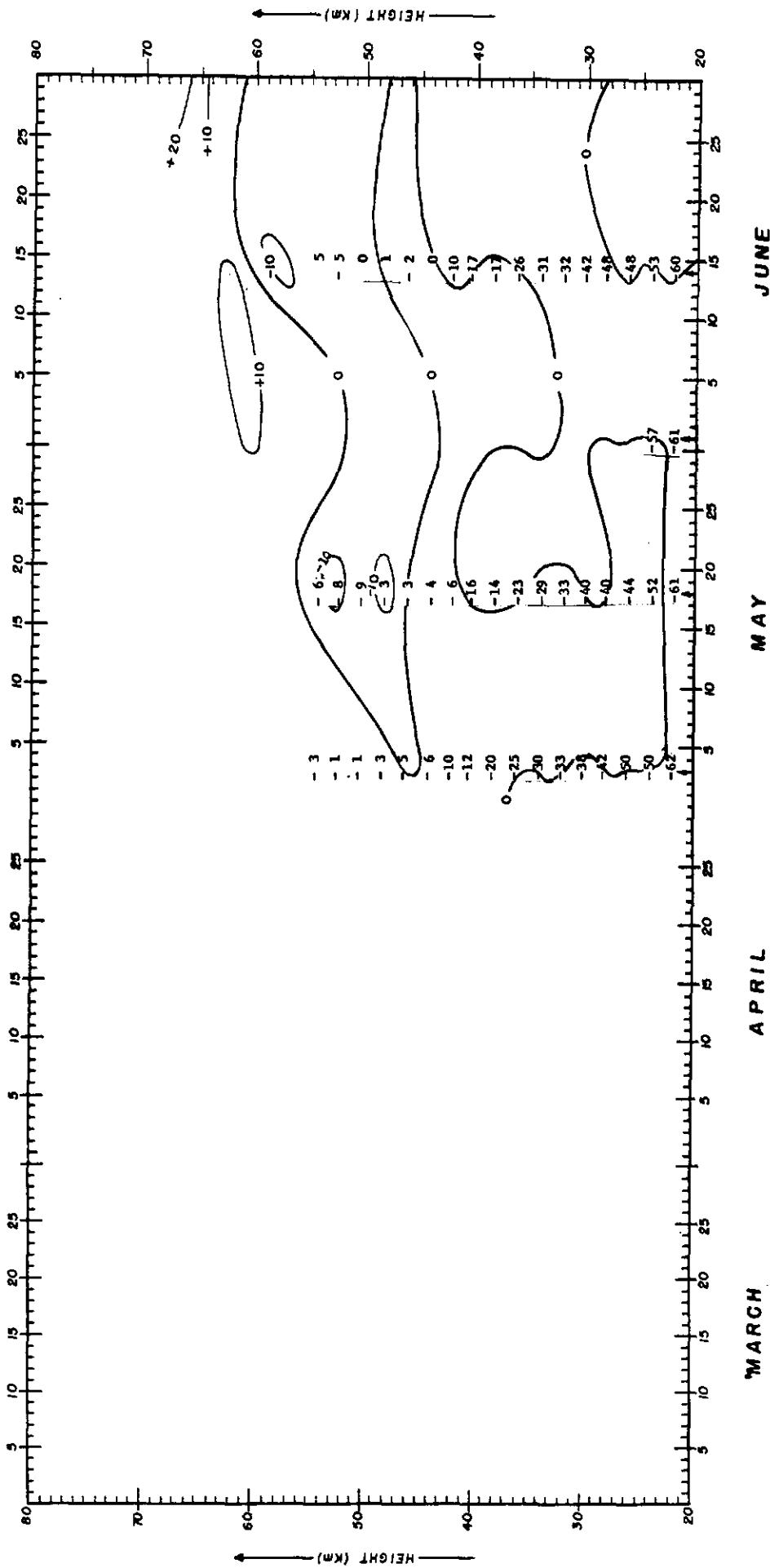
PROJECT MESA / EXAMETNET

1972

NATAL, BRAZIL

5.55, S : 35° 15' W

- 58 -



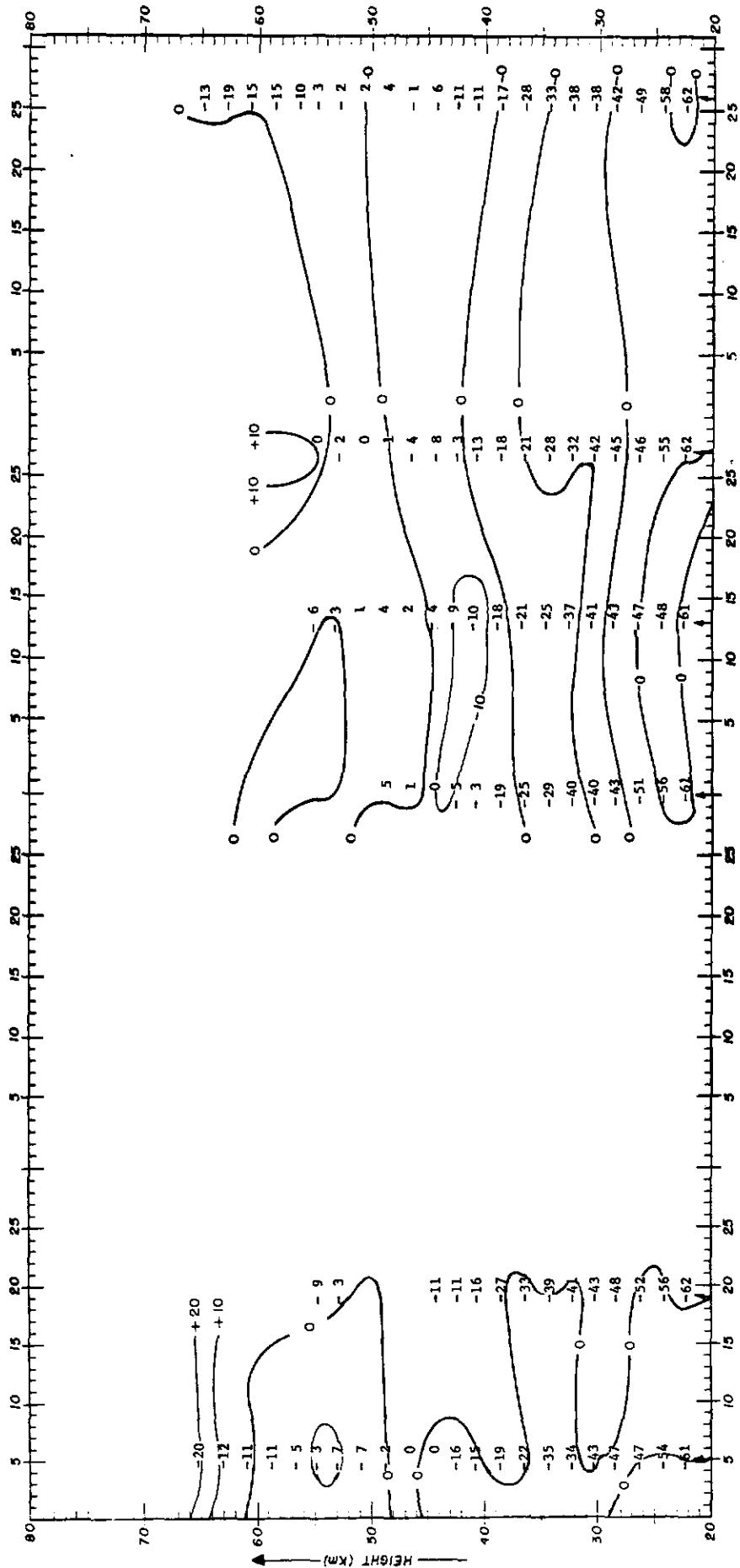
TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1972



JULY AUGUST SEPTEMBER OCTOBER

1972

OCTOBER

TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

— INPE —

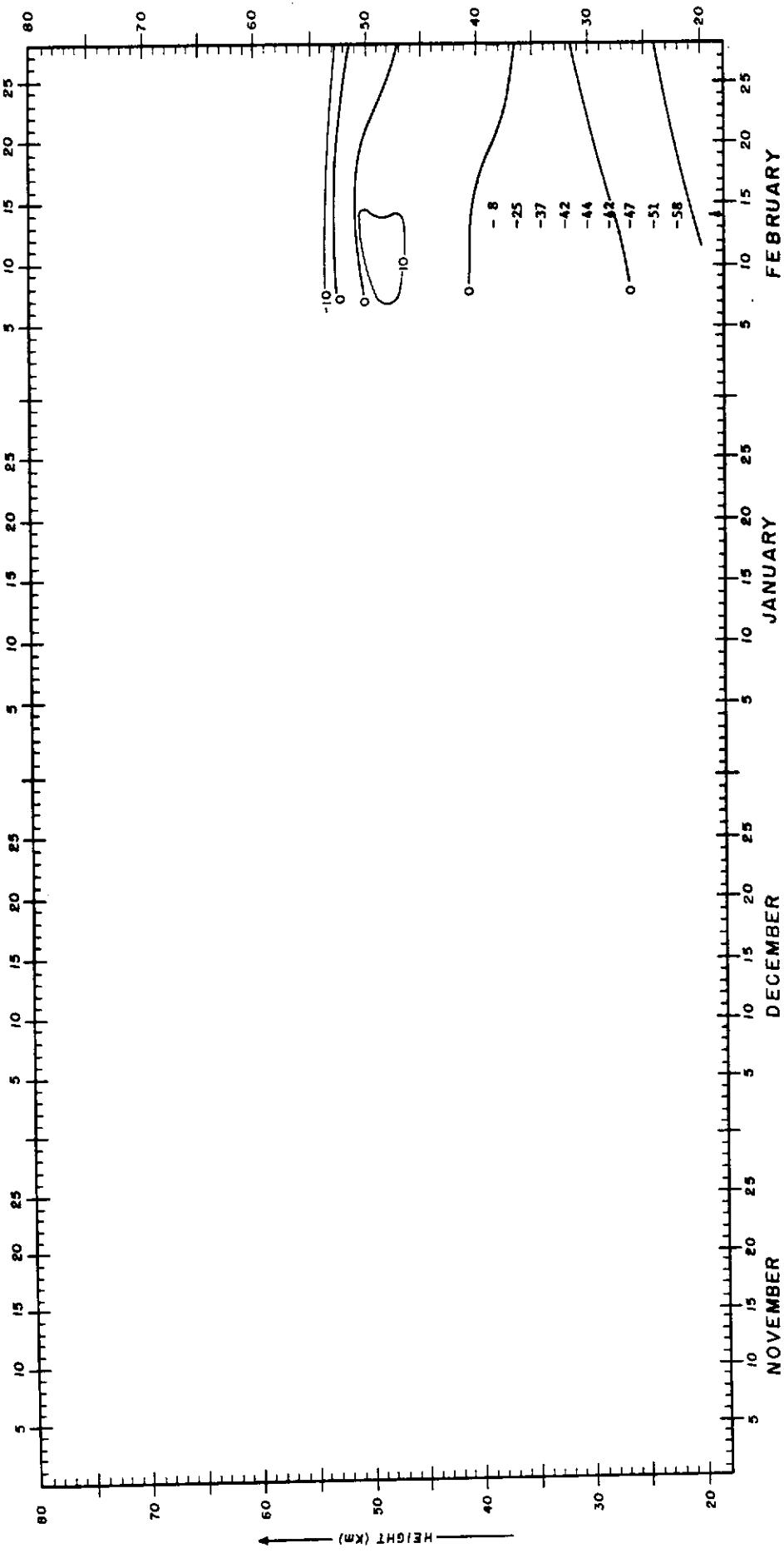
INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

NATAL, BRAZIL

5° 55' S : 35° 15' W

1972                    1973



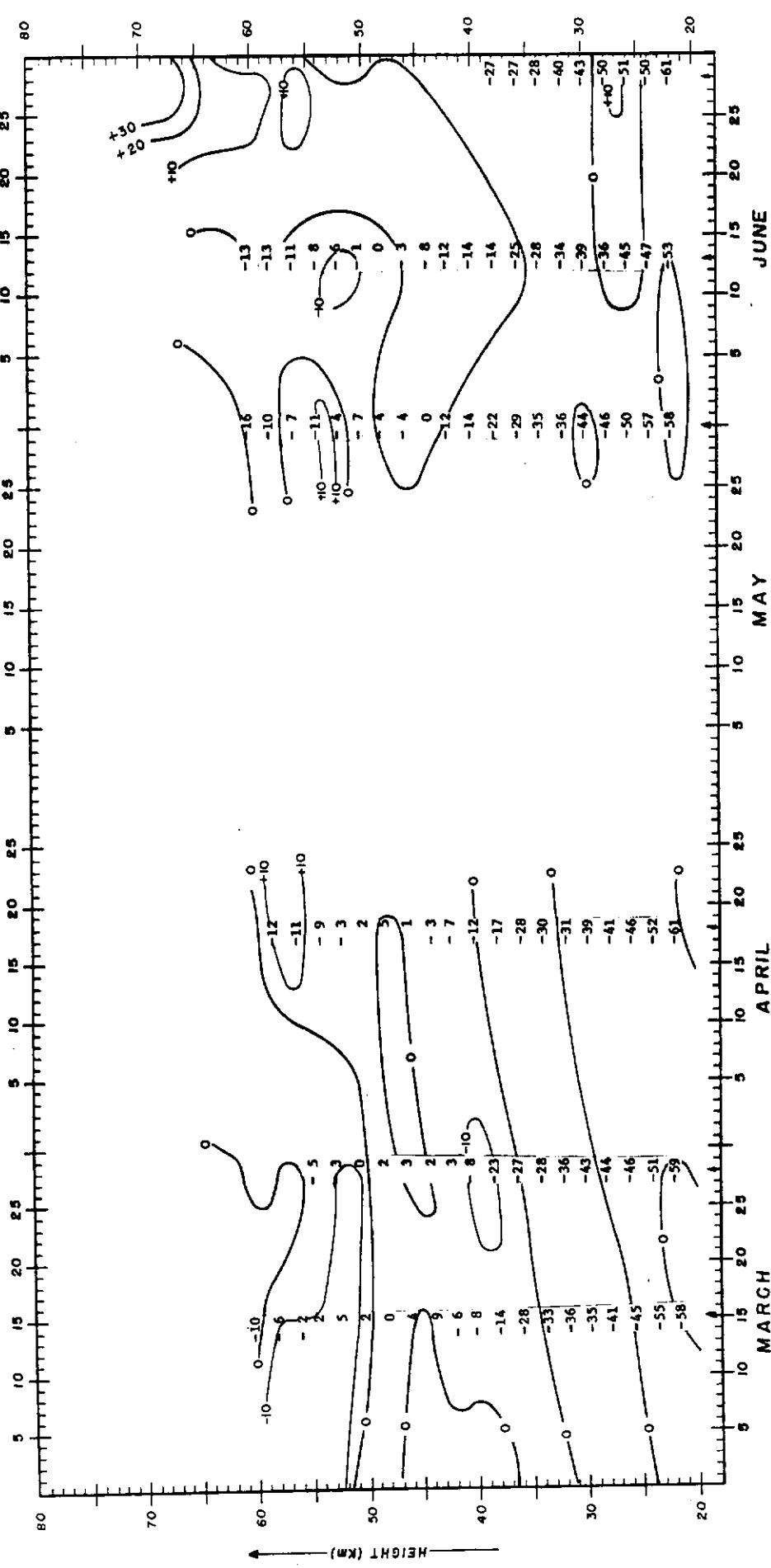
TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA/EXAMETNET

1973



TIME HEIGHT SECTION  
MERIDIONAL COMPONENT

- INPE -

INSTITUTO DE PESQUISAS ESPACIAIS

PROJECT MESA / EXAMETNET

1973

NATAL, BRAZIL

5° 55' S : 35° 15' W

- 62 -

