# PRECIPITATION IN THE CENTRAL AMAZON BASIN: – THE ISOTOPIC COMPOSITION OF RAIN AND ATMOSPHERIC MOISTURE AT BELÉM AND MANAUS (*)

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SUMMARY

In order to improve the understanding of the water in the Amazon Basin, samples of rain and moisture were collected daily at Belém and Manaus from August 78 to January 80. All isotope data are presented. The most depleted values, sometimes lower than – 10‰ in $\delta^{18}O$ at Belém or Manaus, were encountered during the rainy season (January-April).

Possible causes of the seasonal differences in the isotope pattern are discussed.

## INTRODUCTION

The survey of the isotopic composition of rainfall in the Amazon Basin by Salati et al. (1979) established the importance of recycled water (i. e. of water returned locally to the atmosphere through transpiration or re-evaporation) in the basin's water balance. The "inland" gradient of depletion of the heavy isotopic species ($^{18}O$ and $^{2}H$) was found to be much less than would be predicted by a "Rayleigh rainout model", when considering the moisture flux advected from the ocean, on the one hand, and on the other hand the rain amounts along the flow path. The data can be explained within the context of such a model only when re-evaporation is taken into account; this restores the atmospheric water content and its iso-

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topic composition to some extent (Dall'ólio, 1976), However, a marked seasonal pattern which affects different regions in the basin to different degrees; – the large scatter in the isotopic content of monthly precipitation data from year to year (IAEA, 1981) which, as shown in Fig. 1, are much larger within the basin than at other coastal stations to the north (Cayenne) or south (Natal) of the region; – the large differences in the isotopic composition of precipitation from rather closely spaced stations during any particular period; – all these suggested a complexity of the system which is not properly accounted in the simple models and not explicitly visualised in the composite monthly samples (which were the data base for the former studies). This then prompted the initiation of a more detailed sampling program, based on daily collection of both rain and atmospheric moisture. Two years of isotopic data are now available from Belém and Manaus and are presented in this paper. Sampling of some rainshowers at 10 minute intervals has been done by Matsui (private communication) and a vertical profile of the deuterium content of water vapour in the lower atmosphere is available for a couple of days at Belém.

## MATERIALS AND METHODS

Rain sampling was conducted through the use of standard W. M. O. raingauges, usually for a period of one day starting at 8: 00 AM.

Moisture samples were collected by drawing the ambient air through a trap, cooled by a dry ice – ethanol mixture, as shown in Fig. 2. The airflow was adjusted by means of a capillary to 150 liter/hour and monitored by a flowmeter; placing the capillary within the flowpath also resulted in establishing low pressure (10 torr) in the trap. The trap which was 40 mm in diameter and 250 mm long, was immersed only partially in the dry-ice mixture. As a result the gas cools gradually (from top to bottom) and thus the formation of suspended ice particles is avoided, minimizing the water loss. In a laboratory study it was shown that the system can collect up to 30g of water without loss and without blocking the flow or distorting the isotopic composition.

Collection was carried out from 9: 00 AM to 3: 00 PM (6 hours duration); at the end of the period stopcock No. 1 was closed but pumping was continued for 3 more minutes before closing stopcock No. 2. The sample was then vacuum-transferred into the sample bottle A, by cooling it with a water-ice mixture and leaving trap T at room temperature. The accumulated sample was then poured off into a storage container.

Analysis of the oxigen–18 and deuterium ($^2H$) content was perfomed at the laboratories of CENA using standard methods. Results are expressed in $\delta$ ($^o/_{oo}$) units vs. the

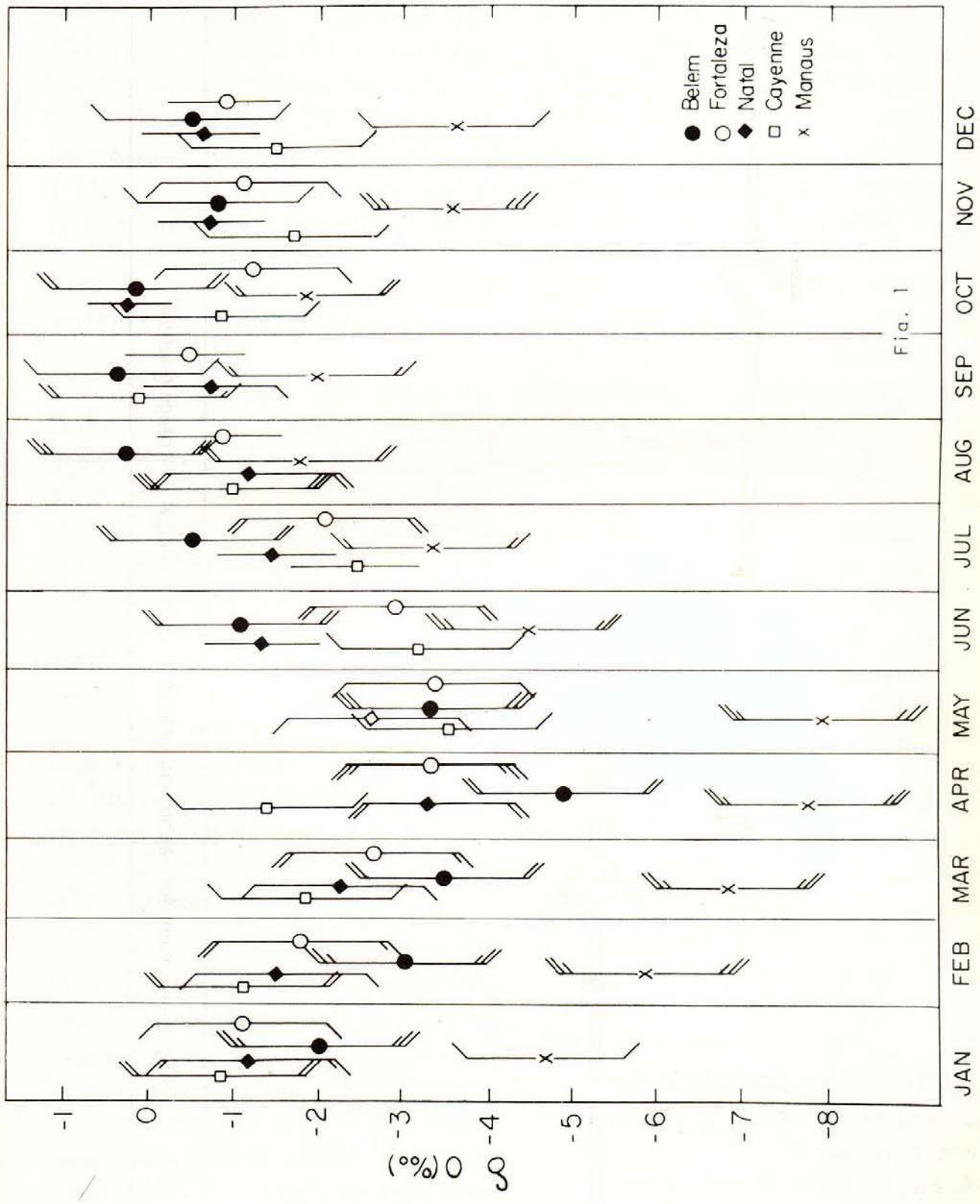


Fig. 1 – Mean monthly isotope composition ($\delta\ ^{18}O$) of the rain at the IAEA network stations of Belém, Fortaleza, Natal, Manaus and Cayenne. Error bar gives reproducibility of the monthly mean value from year to year; flag at end of error bar measures its magnitude in units of °/oo.

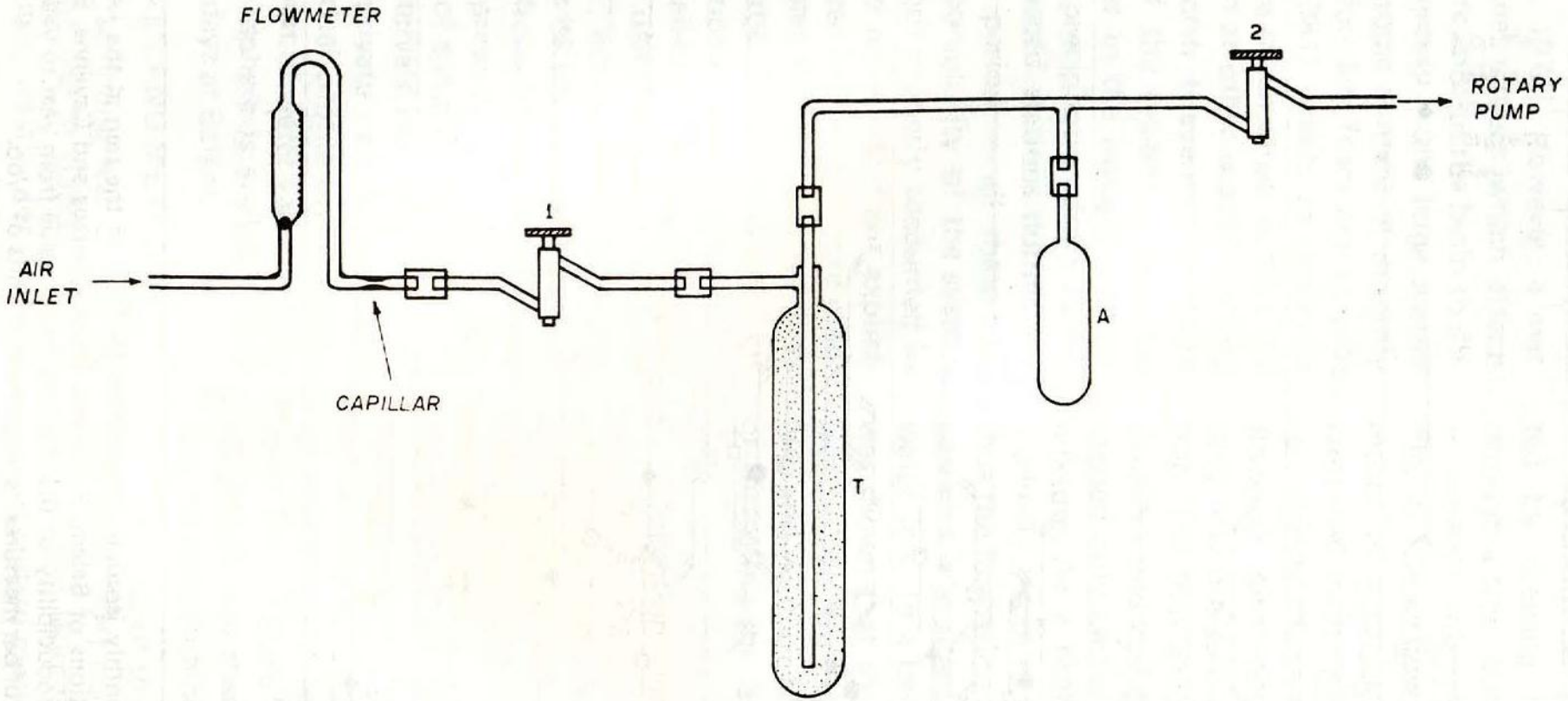


Fig. 2 — System for vapour collection: T — cold trap; A — storage reservoir.

SMOW standard (Gonfiantini, 1981) for $^{18}O$ and $^{2}H$. From these $\delta$ units one calculates the value of the "d" parameter (the deuterium excess parameter) as $d = \delta\,^{2}H - 8 * \delta\,^{18}O$, which is a parameter related to the moisture origin (Gat, 1981).

## THE DAILY RAIN AND VAPOUR SAMPLING PROGRAM

The isotopic data from the daily rain and vapour collection program at Belém and Manaus are given in Table No. 1. and plotted in Figs. 3 and 4. The period covered extends from August 1978 to May 1981 for the rain sampling program and between August 1978 and July 1980 in the case of the vapour collection. The year of 1979 presented an exceptionally dry winter, and this manifests itself in the scarcity of the precipitation data from Manaus for these months.

### a) Precipitation:

The monthly averaged $\delta\,^{18}O$ and "d–excess" data (amount weighted) of the precipitation samples are shown in Figs. 5 and 6; the standard deviation shown is the mesure of the scatter of data for the **individual rain events** which make up each monthly average (again amount weighted). This then has a quite different meaning from the error bar given in Fig. 1, which is a measure of the reproducibility of the mean monthly values from **different rain years;** it is of interest though to note that the seasonal distribution of the variance of the daily samples follows the same trend as established by the monthly IAEA data, namely a larger scatter during the summer (rainy) period; summer is the period of more depleted isotopic values throughout the basin. During the period October 1979 to May 1980 the variance of the data is so large that the inland gradient of isotopic composition between Belém and Manaus appears to be masked by this scatter.

Another notable feature (Fig. 6) is a distinct positive deviation in the value of the "d-excess" parameter at Manaus, expecially during the winter months. At Belém, on the other hand, the fluctuations in "d" are random, with a year round average of close to d = 10°/oo for the period of 1978-80. The long term averages (1965–76), as summarized by the IAEA (1981), are d=5.7°/oo and d = 13.8°/oo, respectively, at Belém and Manaus; in these data one also discerns a seasonal pattern at Manaus, whereas the data from Belém seem to scatter in a random fashion throught the year.

Perusal of the data for the individual daily samples now enables us to understand the structure which pervades these phenomena: At Belém, most of the data range between $\delta\,^{18}O$ = –2°/oo to + 1°/oo throughout the year. However, during the months of January (occasionally even in December) to April (May) there are periods of a few

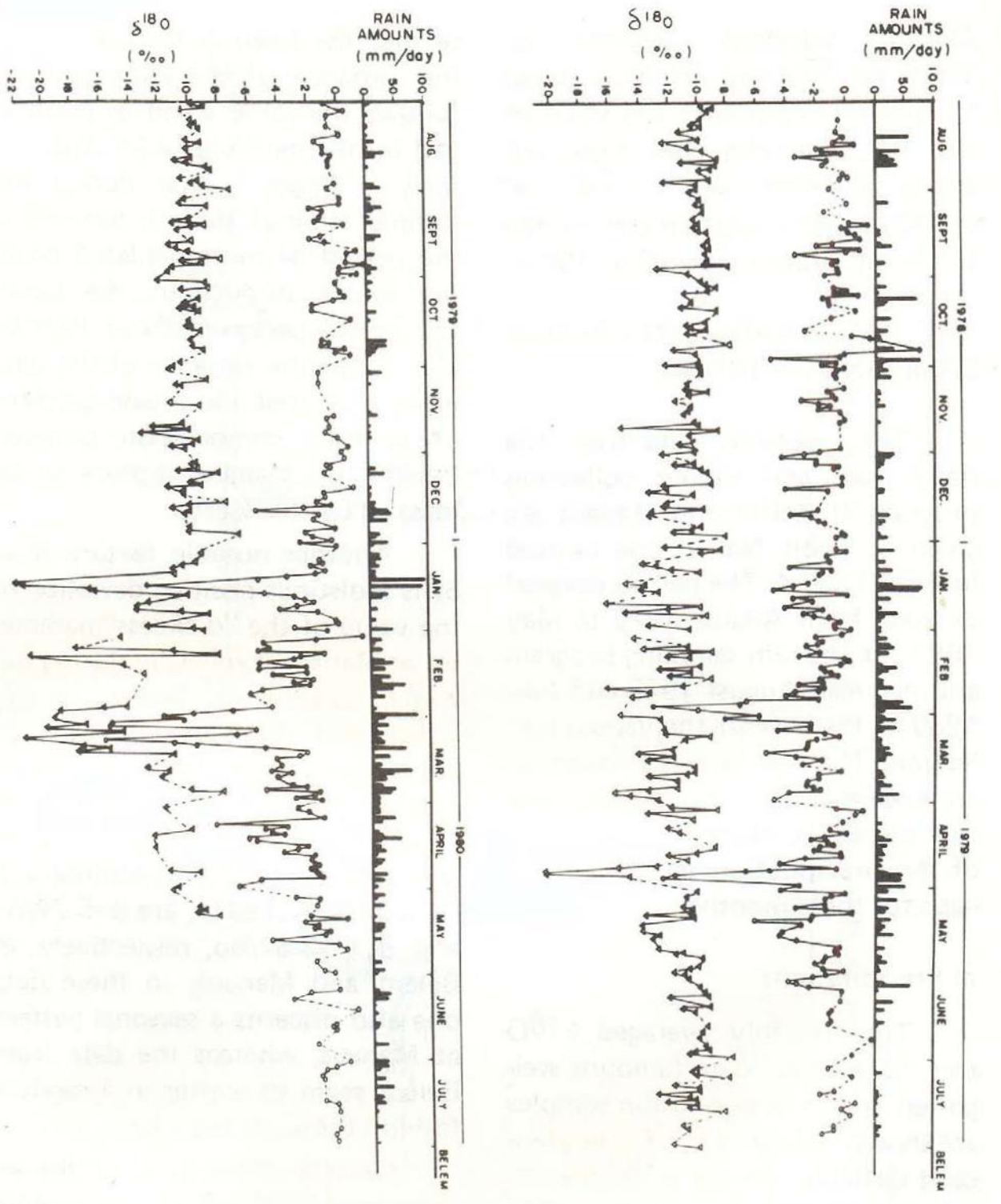


Fig. 3 – $^{18}O$ data of the daily rain (upper curves-circles) and vapour (lower curves-circles) and vapour (lower curves-triangles) collection program at Belém. Rain amounts (mm/day) are shown on top.

days with very depleted isotopic values, extending to values as low as $\delta\,^{18}O = -10‰$. At Manaus, where on the average $\delta\,^{18}O$ values are depleted by 1–2‰ relative to those at Belém, the pattern is even more complicated: negative excursions appear already during the months

of October–December, (vid. especially the 1979 data) which have no analogue in the Belém data; during the rainy period or January to May, on the other hand, the depleted isotopic values at Manaus are recorded in-step with those at Belém, usually with a delay of a couple of days. One notes further, that during March to May the isotopic values in rain at Manaus never revert back to the unperturbed levels but remain depleted relative to these levels.

The pattern described is repeated generally from year tc year. The frequency distribution diagram (Fig. 7) visualizes the data structure at both stations. Evidently the distribution is far from normal during part of the year, and thus the monthly average is then not necessarily a meaningful number.

b) Atmospheric moisture

The data from the moisture collection program at Belém and Manaus have been given in Table No. 1 and are shown on Figs. 3 and 4 (– the lower curves). Monthly averaged data are plotted in Fig. 8.

The following are some noteworthy features of these data:

– In a general way the isotopic precipitation and vapour curves run in parallel. Negative excursions in the rain data have their simultaneous equivalents in the vapour curves.

– The (monthly averaged) vapour data show a similar seasonal pattern as the precipitation data (Fig. 5), however with a reduced amplitude. Most significantly, there is no consistent "inland" (continental) gradient between Belém and Manaus.

– The mean d–excess over the entire period is about 11.26 and 11.76, respectively, at Belém and Manaus; again the difference between these two stations is subdued in the vapour data,when compared to the precipitation. In this respect it is significant that the average difference in the "d" values between rain and vapour on the rain days are .75‰ and 3.6‰ at Belém and Manaus respectively (for the period of Aug. 78–June 79, for which comparable data are available at these two stations). Obviously the Belém data for vapour and rain are in accord one with another, but at Manaus precipitation is characterised by a significant positive deviation in the "d" – parameter.

c) The relationship between vapour and precipitation data

Table No. 2 gives the monthly averaged difference in isotopic values between precipitation and vapour on rain days (the differences between averaged precipitation and monthly average vapour data including nonrain days, are shown in parenthesis). Grosso-modo the precipitation at Belém is close to equilibrium with ambient moisture at a

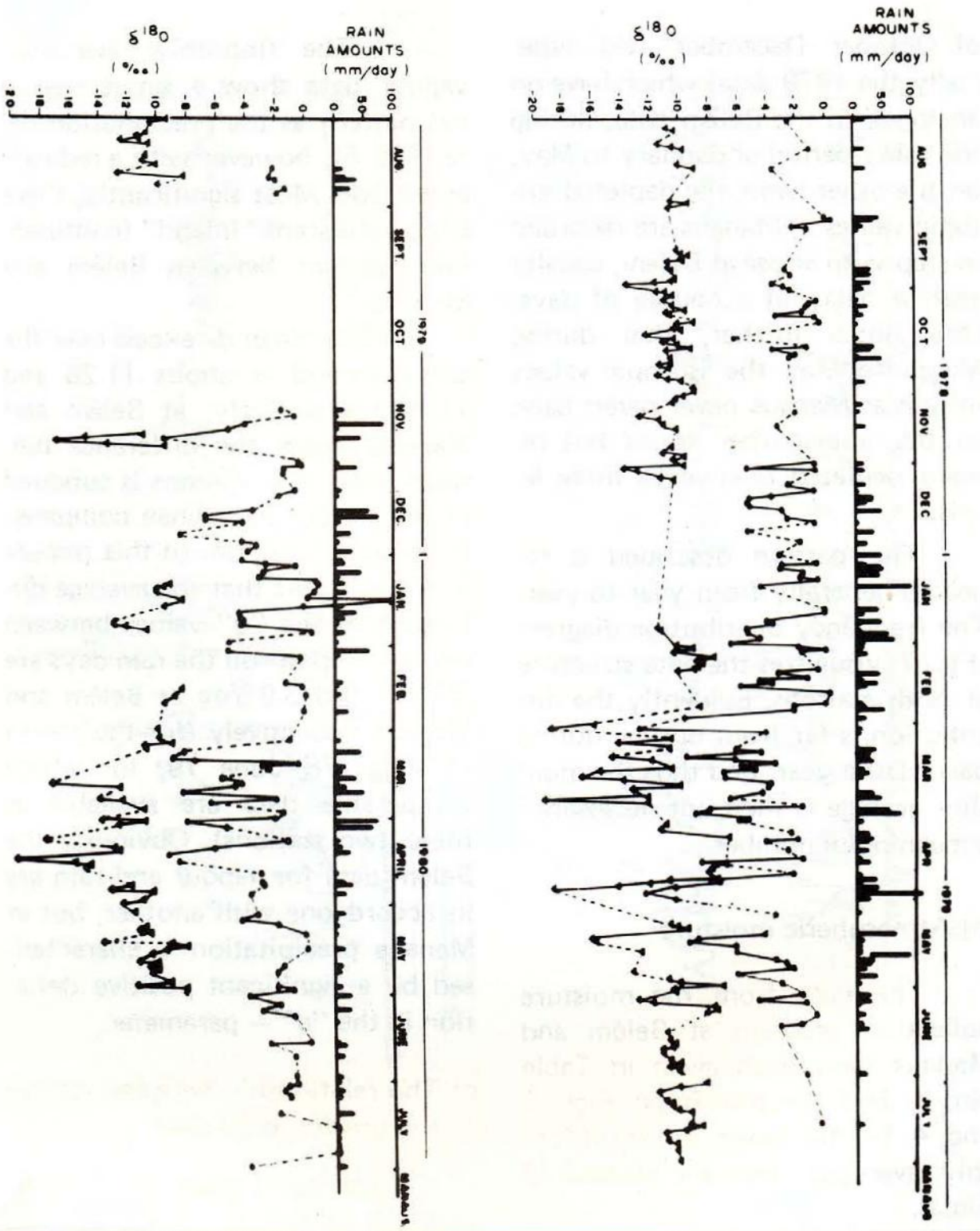


Fig. 4 – $^{18}O$ data of the daily rain (upper curves-circles) and vapour (lower curves-triangles) collection program at Manaus. Rain amounts (mm/day) are shown on top.

temperature of 25°C (using the data of Majoube (1971) for the temperature coefficient of $a^*$,– the isotopic fractionation factor for the liquid water-vapour phase transition), a remarkably close agreement with the ambient temperature value.

TABLE CAPTIONS

TABLE No. 1 – Daily rain and vapour isotopic data at Belém and Manaus.

BV18, MV18 – $\delta^{18}O$ value of the atmospheric moisture at Belém and Manaus respectively.

BV2, MV2 – $\delta^{2}H$ value of the atmospheric moisture at Belém and Manaus respectively.

DVB, DVM – "d" parameter value of the atmospheric moisture samples at Belém and Manaus, respectively.

BP, MP – Precipitation amounts in mms, at Belém and Manaus, respectively.

BP18, MP18 – $\delta^{18}O$ values of daily precipitation samples at Belém and Manaus, respectively.

BP2, MP2 – $\delta^{2}H$ values of daily precipitation samples at Belém and Manaus, respectively.

DPB, PPM – "d" parameter values of daily precipitation samples at Belém and Manaus, respectively.

Monthly mean values of these parameters and their standard deviations are given at the end of each month's data.

For the vapour data the mean values are simple arithmetic averages. Precipitation means are amount weighted.

BELEM DATA : AUGUST 1978

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | -9.2 | -66 | 7.6 | 0 | | | |
| 2 | -9.7 | -63 | 14.6 | 0 | | | |
| 3 | -9 | -60 | 12 | 0 | | | |
| 4 | -9.3 | -63 | 11.4 | 0 | | | |
| 5 | | | | 0 | | | |
| 6 | | | | 0 | | | |
| 7 | -9.7 | -70 | 7.6 | .3 | -.4 | 11 | 14.2 |
| 8 | | | | 0 | | | |
| 9 | -10.4 | -74 | 9.2 | 0 | | | |
| 10 | -9.7 | -62 | 15.6 | 0 | | | |
| 11 | -11.2 | -77 | 12.6 | 1.7 | -.6 | 9 | 13.8 |
| 12 | | | | 0 | | | |
| 13 | | | | 59 | .1 | 15 | 14.2 |
| 14 | -9.9 | -67 | 12.2 | 0 | | | |
| 15 | -12.4 | -89 | 10.2 | 4.3 | -.8 | 3 | 9.4 |
| 16 | -10.7 | -70 | 15.6 | 3.3 | .7 | 16 | 10.4 |
| 17 | -10.6 | -73 | 11.8 | 3.1 | -1.9 | -7 | 8.2 |
| 18 | -9.6 | -64 | 12.8 | 40.8 | -1.5 | 3 | 15 |
| 19 | | | | 10.1 | -.2 | 9 | 10.6 |
| 20 | | | | 23.7 | -3.4 | -15 | 12.2 |
| 21 | -8.6 | -56 | 12.8 | 32.2 | -1.2 | 8 | 17.6 |
| 22 | -11 | -81 | 7 | 0 | | | |
| 23 | -8.7 | -56 | 13.6 | 38.8 | -1.5 | 3 | 15 |
| 24 | -9 | -59 | 13 | 0 | | | |
| 25 | -9.8 | -66 | 12.4 | 0 | | | |
| 26 | | | | 1.3 | -.1 | 12 | 12.8 |
| 27 | | | | 3.4 | .2 | 12 | 10.4 |
| 28 | -9.2 | -60 | 13.6 | .3 | -.4 | 11 | 14.2 |
| 29 | -12.3 | -95 | 3.4 | 0 | | | |
| 30 | -9.9 | -65 | 14.2 | 0 | | | |
| 31 | -10.1 | -70 | 10.8 | .7 | -1.1 | 2 | 10.8 |

TOTAL PRECIPITATION = 223 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******** | ******* | ******** | ******* |
| -10 | -63.4 | 11.5 | -1.09 | 14.2 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ********* | ******** |
| 1.03 | 10.0 | 3.0 | 1.06 | 2.0 |

MANAUS DATA : AUGUST 1978

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | | | | 17 | -2.5 | -7 | 13 |
| 2 | | | | 0 | | | |
| 3 | | | | 0 | | | |
| 4 | -10.9 | -80 | 7.2 | 0 | | | |
| 5 | -10.4 | -73 | 10.2 | 0 | | | |
| 6 | | | | 0 | | | |
| 7 | | | | 0 | | | |
| 8 | | | | 0 | | | |
| 9 | | | | 0 | | | |
| 10 | -11.6 | -76 | 16.8 | 0 | | | |
| 11 | -10.5 | -74 | 10 | 0 | | | |
| 12 | -9.7 | -70 | 7.6 | 16.6 | -1.1 | 4 | 12.8 |
| 13 | | | | 0 | | | |
| 14 | | | | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | | | | 0 | | | |
| 17 | -10.1 | -72 | 8.8 | 0 | | | |
| 18 | | | | 0 | | | |
| 19 | -9 | -60 | 12 | 17 | -3.6 | -10 | 18.8 |
| 20 | | | | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | | | | 0 | | | |
| 23 | | | | 0 | | | |
| 24 | | | | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | | | | 0 | | | |
| 28 | | | | 0 | | | |
| 29 | | | | 0 | | | |
| 30 | -10.6 | -65 | 19.8 | 0 | | | |
| 31 | -9.3 | -63 | 11.4 | 0 | | | |

TOTAL PRECIPITATION IS 50.6 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -10.23 | -70.3 | 11.53 | -2.41 | 14.88 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******* |
| .80 | 6.5 | 4.21 | 1.03 | 2.81 |

BELEM DATA : SEPTEMBER 1978

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | ***** | ***** |
| 1 | -10.6 | -69 | 15.8 | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | | | | 0 | | | |
| 4 | -9.9 | -63 | 16.2 | 0 | | | |
| 5 | -10.1 | -65 | 15.8 | 23.6 | .1 | 5 | 4.2 |
| 6 | -9.6 | -63 | 13.8 | 0 | | | |
| 7 | | | | 0 | | | |
| 8 | -9.6 | -64 | 12.8 | 1.8 | -1.4 | 2 | 13.2 |
| 9 | | | | 0 | | | |
| 10 | | | | 0 | | | |
| 11 | -10.3 | -69 | 13.4 | 0 | | | |
| 12 | -10 | -67 | 13 | 3.2 | .2 | 12 | 10.4 |
| 13 | -10.1 | -70 | 10.8 | .9 | 1.5 | 13 | 1 |
| 14 | -9.9 | -66 | 13.2 | 7.6 | -.2 | 13 | 14.6 |
| 15 | -9.4 | -62 | 13.2 | 7.3 | .1 | 3 | 2.2 |
| 16 | | | | 7.4 | .7 | 21 | 15.4 |
| 17 | | | | .5 | 1 | 15 | 7 |
| 18 | -9.2 | -65 | 8.6 | 0 | | | |
| 19 | -9.5 | -69 | 7 | 7.4 | -.9 | 9 | 16.2 |
| 20 | -9.1 | -65 | 7.8 | 23.1 | -1.9 | -9 | 6.2 |
| 21 | | | | .7 | 1 | 13 | 10 |
| 22 | -9.4 | -64 | 11.2 | .9 | .1 | 11 | 10.2 |
| 23 | | | | 1.2 | -3.4 | -12 | 15.2 |
| 24 | | | | 0 | | | |
| 25 | -9.3 | -63 | 6.4 | 8.4 | -.5 | -3 | 1 |
| 26 | -9.5 | -64 | 12 | 17.8 | -.9 | 5 | 12.2 |
| 27 | -7.9 | -52 | 11.2 | 0 | | | |
| 28 | -12.7 | -95 | 6.6 | 1.2 | -.5 | .1 | 4.1 |
| 29 | -10.6 | -78 | 6.8 | .1 | -.4 | 4 | 7.2 |
| 30 | | | | 4.5 | -1.4 | 5 | 16.2 |

TOTAL PRECIPITATION = 117.6 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -9.82 | -67.2 | 11.3 | -.63 | 8.5 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| .92 | 8.3 | 3.2 | .89 | 5.1 |

MANAUS DATA : SEPTEMBER 1978

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | **** | *** | ***** |
| 1 | -10.7 | -72 | 13.6 | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | | | | 0 | | | |
| 4 | | | | 0 | | | |
| 5 | | | | 39 | -.1 | 15 | 15.8 |
| 6 | | | | 29.6 | .4 | 18 | 14.8 |
| 7 | | | | 0 | | | |
| 8 | | | | 13 | -2.4 | -5 | 14.2 |
| 9 | | | | 2.8 | -1.2 | 5 | 14.6 |
| 10 | | | | | | | |
| 11 | | | | 0 | | | |
| 12 | | | | 0 | | | |
| 13 | | | | 0 | | | |
| 14 | | | | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | -10.2 | -64 | 17.6 | 0 | | | |
| 17 | -9.8 | -64 | 14.4 | 0 | | | |
| 18 | -9.4 | -66 | 9.2 | 0 | | | |
| 19 | -9.9 | -65 | 14.2 | 0 | | | |
| 20 | -9.8 | -65 | 13.4 | 0 | | | |
| 21 | -10.8 | -69 | 17.4 | 0 | | | |
| 22 | -10.7 | -73 | 12.6 | 0 | | | |
| 23 | -10.6 | -71 | 13.8 | 24.4 | -2.8 | -9 | 13.4 |
| 24 | | | | 0 | | | |
| 25 | | | | 22.4 | -2.4 | -3 | 16.2 |
| 26 | -10.3 | -66 | 16.4 | 0 | | | |
| 27 | -10.5 | -63 | 16 | 0 | | | |
| 28 | -11.7 | -89 | 4.6 | 22.1 | -3.7 | -15 | 14.6 |
| 29 | -13.7 | -108 | 1.6 | 5.7 | -2.9 | -11 | 12.2 |
| 30 | -11.6 | -85 | 7.8 | 10 | -2.4 | -7 | 12.2 |

TOTAL PRECIPITATION IS 169 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -10.69 | -73.2 | 12.3 | -1.60 | 14.69 |
| **STNDMV18** | **STNDMV2** | **STNDDVM** | **SDAWMP18** | **SDAWDPM** |
| ******** | ******* | ******* | ******** | ******* |
| 1.08 | 12.5 | 4.8 | 1.49 | 1.19 |

BELEM DATA : OCTOBER 1978

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | | | | 0 | | | |
| 2 | -9.7 | -68 | 9.6 | 0 | | | |
| 3 | -9.4 | -67 | 8.2 | 0 | | | |
| 4 | -8.7 | -63 | 6.6 | 16.4 | -.8 | 7 | 13.4 |
| 5 | -9.3 | -66 | 8.4 | 2.4 | .1 | 13 | 12.2 |
| 6 | -10.9 | -77 | 10.2 | 3.9 | -.8 | 5 | 11.4 |
| 7 | | | | .7 | .9 | 7 | -.2 |
| 8 | | | | 64 | -1.5 | 1 | 13 |
| 9 | -10.4 | -73 | 10.2 | 17 | -1.1 | -6 | 2.8 |
| 10 | -10.4 | -72 | 11.2 | 15.9 | -1.1 | 9 | 17.8 |
| 11 | -11.2 | -79 | 10.6 | 0 | | | |
| 12 | -8.7 | -60 | 9.6 | 0 | | | |
| 13 | | | | 1.2 | .7 | 18 | 12.4 |
| 14 | | | | 0 | | | |
| 15 | | | | 23.5 | -1 | 1 | 9 |
| 16 | -9.4 | -67 | 8.2 | 0 | | | |
| 17 | -10.7 | -68 | 17.6 | 0 | | | |
| 18 | -10.4 | -77 | 6.2 | 0 | | | |
| 19 | -9.4 | -66 | 9.2 | 16.8 | -2.7 | -6 | 15.6 |
| 20 | -10.7 | -75 | 10.6 | 0 | | | |
| 21 | | | | 7.9 | .4 | 10 | 6.8 |
| 22 | | | | 10.2 | 1.9 | 2 | -13.2 |
| 23 | | | | 0 | | | |
| 24 | -7.8 | -54 | 8.4 | 0 | | | |
| 25 | | | | 28.2 | 2.8 | -2 | -24.4 |
| 26 | -11.7 | -87 | 6.6 | .3 | 5 | 30 | -10 |
| 27 | -10.1 | -67 | 13.8 | 1.4 | -.1 | 9 | 9.8 |
| 28 | | | | 2.6 | -.4 | 5 | 8.2 |
| 29 | | | | 73.1 | -5 | -20 | 20 |
| 30 | -10 | -74 | 6 | 13.3 | -.6 | 9 | 13.8 |
| 31 | -12.1 | -84 | 12.8 | 10.2 | -1.6 | -4 | 8.8 |

TOTAL PRECIPITATION = 309 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******** | ******** | ******* | ******* |
| **-10.05** | **-70.7** | **9.6** | **-1.62** | **9.5** |
| **STNDBV18** | **STNDBV2** | **STNDDVB** | **STDAWP18** | **STDAWDPB** |
| ******** | ******** | ******* | ******** | ******** |
| **1.07** | **8.** | **2.8** | **2.31** | **12.7** |

MANAUS DATA : OCTOBER 1978

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | ***** | ***** |
| 1 | -11 | -81 | 7 | 0 | | | |
| 2 | -10.5 | -77 | 7 | 0 | | | |
| 3 | -11.2 | -77 | 12.6 | 0 | | | |
| 4 | | | | 3.7 | -.6 | 13 | 17.8 |
| 5 | -10.4 | -73 | 10.2 | 1.4 | -1.1 | -3 | 5 |
| 6 | -10.5 | -70 | 14 | 19.5 | -1.3 | .1 | 10.5 |
| 7 | -9.6 | -67 | 9.8 | 0 | | | |
| 8 | -11 | -80 | 8 | 2.2 | -1.6 | .1 | 12.9 |
| 9 | -10.7 | -77 | 8.6 | 9.5 | -3.4 | -12 | 15.2 |
| 10 | | | | .8 | -.8 | 5 | 11.4 |
| 11 | -9.1 | -73 | -.2 | 0 | | | |
| 12 | -10.3 | -70 | 12.4 | 1.3 | -.4 | 8 | 11.2 |
| 13 | -10.4 | -74 | 9.2 | 0 | | | |
| 14 | -9.9 | -64 | 15.2 | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | -12.4 | -93 | 6.2 | 0 | | | |
| 17 | -10.4 | -75 | 8.2 | 6 | | -5 | |
| 18 | -11.2 | -75 | 14.6 | 0 | | | |
| 19 | -10.2 | -69 | 12.6 | 0 | | | |
| 20 | -9.3 | -64 | 10.4 | 30.8 | -1.4 | 8 | 19.2 |
| 21 | -10.9 | -70 | 17.2 | 23.2 | -3.6 | -17 | 11.8 |
| 22 | | | | 0 | | | |
| 23 | | | | 4 | -2.2 | -9 | 8.6 |
| 24 | -10.6 | -74 | 10.8 | 45 | -2.6 | -6 | 14.8 |
| 25 | -10.6 | -70 | 14.8 | 0 | | | |
| 26 | -11.5 | -78 | 14 | 0 | | | |
| 27 | -10.7 | -68 | 17.6 | 0 | | | |
| 28 | | | | 0 | | | |
| 29 | | | | 0 | | | |
| 30 | -11.6 | -76 | 16.8 | 0 | | | |
| 31 | -10.8 | -71 | 15.4 | 0 | | | |

TOTAL PRECIPITATION IS 147.4 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPA |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -10.61 | -73.5 | 11.3 | -2.41 | 14.4 |
| **STNDMV18** | **STNDMV2** | **STNDDVM** | **SDAWMP18** | **SDAWDPM** |
| ******** | ******* | ******* | ******** | ******* |
| .72 | 6.1 | 4.2 | 1.20 | 3.24 |

BELEM DATA : NOVEMBER 1978

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | **** | *** | ***** |
| 1 | -9.8 | -68 | 10.4 | 3.7 | -.1 | 9 | 9.8 |
| 2 | | | | 20.6 | -.6 | 3 | 7.8 |
| 3 | -9.7 | -67 | 10.6 | 5.2 | -.8 | 6 | 12.4 |
| 4 | | | | 23.5 | -.7 | 9 | 14.6 |
| 5 | | | | 0 | | | |
| 6 | -10.7 | -75 | 10.6 | 0 | | | |
| 7 | -10.7 | -76 | 9.6 | 0 | | | |
| 8 | -10.8 | -73 | 13.4 | 1.9 | -.1 | 9 | 9.8 |
| 9 | -9.4 | -65 | 10.2 | 6.4 | -1.3 | -1 | 9.4 |
| 10 | -10.7 | -76 | 9.6 | 7.2 | -.9 | 7 | 14.2 |
| 11 | | | | 0 | | | |
| 12 | | | | 4.1 | -.7 | 7 | 12.6 |
| 13 | -11.5 | -74 | 18 | 2.7 | -3 | -15 | 9 |
| 14 | -10.5 | -75 | 9 | 13.3 | -1.9 | -3 | 12.2 |
| 15 | | | | 1.6 | -1 | -5 | 3 |
| 16 | -10.7 | -75 | 10.6 | 5.7 | -1.9 | -3 | 12.2 |
| 17 | -11 | -74 | 14 | 4.6 | -.3 | 6 | 8.4 |
| 18 | | | | .2 | | | |
| 19 | | | | 5.8 | -.1 | 6 | 6.8 |
| 20 | -10.3 | -63 | 14.4 | 6.4 | .3 | 12 | 9.6 |
| 21 | -10 | -70 | 10 | 0 | | | |
| 22 | -15.2 | -107 | 14.6 | 0 | | | |
| 23 | -8.7 | -60 | 9.6 | 0 | | | |
| 24 | -10.6 | -70 | 14.8 | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | -10.3 | -78 | 4.4 | 0 | | | |
| 28 | -11.2 | -82 | 7.6 | 0 | | | |
| 29 | -10.1 | -78 | 2.8 | 1.1 | .4 | 8 | 4.8 |
| 30 | -10.2 | -78 | 3.6 | 6.3 | -1.9 | -5 | 10.2 |

TOTAL PRECIPITATION = 120.3 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******** | ******* | ******* | ******* |
| **-10.60** | **-74.45** | **10.3** | **- 90** | **10.8** |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******** | ******* | ******** | ******** |
| **1.25** | **9.28** | **3.8** | **.71** | **2.84** |

MANAUS DATA : NOVEMBER 1978

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | -9.9 | -68 | 11.2 | 12.1 | | | |
| 2 | | | | 0 | | | |
| 3 | -9.1 | -64 | 8.8 | 0 | | | |
| 4 | -9 | -88 | -16 | 0 | | | |
| 5 | | | | 0 | | | |
| 6 | -9.8 | -67 | 11.4 | 0 | | | |
| 7 | -10.3 | -65 | 17.4 | 0 | | | |
| 8 | -10.5 | -66 | 18 | 0 | | | |
| 9 | | | | 9.5 | | | |
| 10 | | | | .8 | | | |
| 11 | | | | 4.5 | -2.1 | -3 | 13.8 |
| 12 | | | | | | | |
| 13 | -12.8 | -85 | 17.4 | 0 | | | |
| 14 | -11.5 | -78 | 14 | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | -11.1 | -82 | 6.8 | 11.1 | -3.4 | -13 | 14.2 |
| 17 | | | | | | | |
| 18 | -10.3 | -68 | 14.4 | 0 | | | |
| 19 | | | | 0 | | | |
| 20 | | | | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | | | | 0 | | | |
| 23 | | | | 0 | | | |
| 24 | -10.6 | -73 | 11.8 | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | -9.8 | -68 | 10.4 | 0 | | | |
| 28 | -10.6 | -74 | 10.8 | 0 | | | |
| 29 | | | | | | | |
| 30 | -9.8 | -76 | 2.4 | 9.5 | -.9 | -1 | 6.2 |

TOTAL PRECIPITATION IS 47.5 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -10.36 | -73 | 9.9 | -2.22 | 11.1 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| .98 | 7.79 | 8.60 | 1.15 | 3.90 |

BELEM DATA : DECEMBER 1978

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | **** | *** | ***** |
| 1 | -12.5 | -93 | 7 | 27.8 | -2.8 | -8 | 14.4 |
| 2 | | | | 18.9 | -4.4 | -20 | 15.2 |
| 3 | | | | 10.9 | -2 | -6 | 10 |
| 4 | -10.3 | -75 | 7.4 | 7.1 | -2 | -6 | 10 |
| 5 | -11.6 | -85 | 7.8 | 4.1 | -.5 | 2 | 6 |
| 6 | -9.7 | -70 | 7.6 | 1.1 | -.8 | -5 | 1.4 |
| 7 | -9.4 | -69 | 6.2 | 0 | | | |
| 8 | | | | .1 | | | |
| 9 | | | | 6.8 | -.3 | 2 | 4.4 |
| 10 | | | | 0 | | | |
| 11 | -9.1 | -71 | 1.8 | 0 | | | |
| 12 | -12.4 | -94 | 5.2 | .3 | -.3 | 7 | 9.4 |
| 13 | -12.2 | -95 | 2.6 | 9.2 | -4.1 | -20 | 12.3 |
| 14 | -13.4 | -101 | 6.2 | 9.4 | -1.2 | -4 | 5.6 |
| 15 | -10.4 | -76 | 7.2 | .2 | | | |
| 16 | | | | 0 | | | |
| 17 | | | | 0 | | | |
| 18 | -12.1 | -95 | 1.8 | 0 | | | |
| 19 | -12.2 | -88 | 9.6 | 0 | | | |
| 20 | -9.6 | -66 | 10.8 | .2 | -1.9 | -4 | 11.2 |
| 21 | -13.1 | -92 | 12.8 | 0 | | | |
| 22 | -13.3 | -98 | 8.4 | 15.2 | -3.7 | -15 | 14.6 |
| 23 | | | | 4.8 | -2.4 | -7 | 12.2 |
| 24 | | | | 9.8 | -1.8 | -5 | 9.4 |
| 25 | | | | 6.9 | -1.3 | 4 | 14.4 |
| 26 | -9.8 | -73 | 5.4 | 0 | | | |
| 27 | -10.4 | -82 | 1.2 | 0 | | | |
| 28 | -11.7 | -92 | 1.6 | 4.2 | -.3 | 6 | 8.4 |
| 29 | -8.2 | -67 | -1.4 | 5.7 | -.1 | 7 | 7.8 |
| 30 | | | | 14.3 | -.7 | 2 | 7.6 |
| 31 | | | | 0 | | | |

TOTAL PRECIPITATION = 157 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -11.12 | -83.2 | 5.7 | -2.28 | 11.2 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| 1.57 | 11.8 | 3.6 | 1.38 | 3.6 |

MANAUS DATA : DECEMBER 1978

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | **** | ***** | **** | *** | ***** |
| 1 | -14 | -108 | 4 | 1.4 | -5.5 | -39 | 5 |
| 2 | -13 | -98 | 6 | 12.1 | -.8 | 6 | 12.4 |
| 3 | | | | 0 | | | |
| 4 | -11.4 | -83 | 8.2 | 0 | | | |
| 5 | -10.5 | -77 | 7 | 0 | | | |
| 6 | | | | 0 | | | |
| 7 | | | | 12.5 | -2.7 | -14 | 7.6 |
| 8 | | | | 0 | | | |
| 9 | | | | 5.7 | -.9 | -4 | 3.2 |
| 10 | | | | 0 | | | |
| 11 | | | | 27.5 | -3.8 | -21 | 9.4 |
| 12 | | | | 25 | -5.3 | -33 | 9.4 |
| 13 | | | | 16.7 | -5.4 | -33 | 10.2 |
| 14 | | | | 1 | -5.2 | -30 | 11.6 |
| 15 | | | | 0 | | | |
| 16 | | | | 40.2 | -3.1 | -18 | 6.8 |
| 17 | | | | 0 | | | |
| 18 | | | | 1.2 | -2.7 | -11 | 10.6 |
| 19 | | | | 0 | | | |
| 20 | | | | 2.2 | -.9 | -6 | 1.2 |
| 21 | | | | 0 | | | |
| 22 | | | | 0 | | | |
| 23 | | | | 30 | -5.4 | -33 | 10.2 |
| 24 | | | | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | | | | 13.5 | -1.8 | -4 | 10.4 |
| 28 | | | | 0 | | | |
| 29 | | | | 0 | | | |
| 30 | | | | 0 | | | |
| 31 | | | | 42 | -3.4 | -16 | 11.2 |

TOTAL PRECIPITATION IS 231 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| **-12.22** | **-91.5** | **6.3** | **-3.66** | 9.3 |
| **STNDMV18** | **STNDMV2** | **STNDDVM** | **SDAWMP18** | **SDAWDPM** |
| ******** | ******* | ******* | ******** | ******* |
| **1.57** | **14.1** | **1.7** | **1.39** | 2.08 |

BELEM DATA : JANUARY 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | **** | ***** | ***** |
| 1 | | | | 0 | | | |
| 2 | -12.3 | -96 | 2.4 | 0 | | | |
| 3 | -8.5 | -59 | 9 | 36 | -.7 | 3 | 8.6 |
| 4 | -9.8 | -65 | 13.4 | 0 | 0 | 0 | 0 |
| 5 | | | | .2 | -1.4 | -4 | 7.2 |
| 6 | | | | 0 | | | |
| 7 | | | | 14.8 | -1.1 | 7 | 15.8 |
| 8 | -13.9 | -105 | 6.2 | 0 | | | |
| 9 | -12.9 | -92 | 11.2 | 2.8 | -3.8 | -15 | 15.4 |
| 10 | -11.8 | | | 24 | -1 | 1 | 9 |
| 11 | -9.9 | -71 | 8.2 | 4.1 | -1.6 | -3 | 9.8 |
| 12 | | | | 9.7 | -1.7 | -3 | 10.6 |
| 13 | | | | 0 | | | |
| 14 | | | | 0 | | | |
| 15 | -15 | -101 | 19 | 26.6 | -2.5 | -8 | 12 |
| 16 | -13.7 | | | 77 | -3.5 | -15 | 13 |
| 17 | -13.9 | -95 | 16.2 | 70.8 | -4.9 | -23 | 16.2 |
| 18 | -12.7 | -95 | 6.6 | 0 | | | |
| 19 | | | | 2.6 | .1 | 3 | 2.2 |
| 20 | | | | 22.7 | -3.6 | -15 | 13.8 |
| 21 | | | | .5 | -2.3 | -12 | 6.4 |
| 22 | -16.2 | -119 | 10.6 | 1.4 | | | |
| 23 | -9.9 | -72 | 7.2 | 10.1 | -4.1 | -17 | 15.8 |
| 24 | -12 | -91 | 5 | 2 | -1.6 | -4 | 8.8 |
| 25 | -15 | -103 | 12 | 33.6 | -2.9 | -9 | 14.2 |
| 26 | -9.4 | -68 | 7.2 | 10.8 | -2.2 | -7 | 10.6 |
| 27 | | | | 6.6 | -1.1 | -.2 | 8.6 |
| 28 | | | | 8.1 | -.4 | 4 | 7.2 |
| 29 | -13.4 | -103 | 4.2 | .4 | -.7 | -4 | 1.6 |
| 30 | | | | 6 | -.7 | 7 | 12.6 |
| 31 | -10.6 | -75 | 9.8 | 5 | .4 | 5 | 1.8 |

TOTAL PRECIPITATION = 375.8 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| **-12.27** | **-88.4** | **9.2** | **-2.78** | **12.5** |
| **STNDBV18** | **STNDBV2** | **STNDDVB** | **STDAWP18** | **STDAWDPB** |
| ******** | ******* | ******* | ******** | ******** |
| **2.20** | **17.7** | **4.4** | **1.51** | **3.1** |

MANAUS DATA : JANUARY 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | *** | ***** | **** | *** | ***** |
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | | | | 11 | -.8 | 8 | 14.4 |
| 4 | | | | 38 | -3.1 | -14 | 10.8 |
| 5 | | | | 41 | -3.2 | -10 | 15.6 |
| 6 | | | | 35 | -1.7 | -7 | 6.6 |
| 7 | | | | | | | |
| 8 | | | | 3.1 | -1.9 | -4 | 11.2 |
| 9 | | | | 3.5 | -.6 | 1 | 5.8 |
| 10 | | | | | | | |
| 11 | | | | 90.5 | -4.6 | -17 | 19.8 |
| 12 | | | | | | | |
| 13 | | | | 0 | | | |
| 14 | | | | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | | | | 0 | | | |
| 17 | | | | 0 | | | |
| 18 | | | | 0 | | | |
| 19 | | | | 32 | -.2 | 10 | 11.6 |
| 20 | | | | 12 | -.2 | 11 | 12.6 |
| 21 | | | | - | | | |
| 22 | | | | 0 | | | |
| 23 | | | | 38.7 | -4.1 | -24 | 8.8 |
| 24 | | | | 4.3 | -3.7 | -20 | 9.6 |
| 25 | -11.6 | | | 0 | | | |
| 26 | -11.4 | | | 3.6 | -5.5 | -32 | 12 |
| 27 | | | | 50 | -5.4 | -33 | 10.2 |
| 28 | | | | | | | |
| 29 | | | | 60 | -4.6 | -27 | 9.3 |
| 30 | | | | | | | |
| 31 | | | | 14 | -6.6 | -45 | 7.8 |

TOTAL PRECIPITATION IS 436.7 MM

BELEM DATA : FEBRUARY 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | ***** | ***** | ***** |
| 1 | | | | 12 | -.3 | 1 | 3.4 |
| 2 | -14.4 | -102 | 13.2 | 17.2 | -2.1 | -6 | 10.8 |
| 3 | | | | 4.5 | -1.6 | -4 | 8.8 |
| 4 | | | | 24.1 | -1.9 | -6 | 9.2 |
| 5 | -10.7 | -68 | 17.6 | 29.7 | -2.6 | -8 | 12.8 |
| 6 | -13.8 | -100 | 10.4 | 0 | | | |
| 7 | -9.1 | -64 | 8.8 | 21.7 | -1.8 | -1 | 13.4 |
| 8 | -12.1 | -84 | 12.8 | .4 | -3.2 | -18 | 7.6 |
| 9 | -10.6 | -77 | 7.8 | 1.8 | -.1 | 6 | 6.8 |
| 10 | | | | 4 | .3 | 10 | 7.6 |
| 11 | | | | 3 | -.4 | 2 | 5.2 |
| 12 | -9.9 | -66 | 13.2 | 35.3 | -1.7 | -2 | 11.6 |
| 13 | -12.7 | -81 | 20.6 | 16.8 | -1.5 | -14 | -2 |
| 14 | -10.5 | -74 | 10 | 4.5 | -1.1 | -3 | 5.8 |
| 15 | -12 | -88 | 8 | .4 | -.6 | 5 | 9.8 |
| 16 | -9.2 | -62 | 11.6 | 9.8 | -1.8 | -4 | 10.4 |
| 17 | | | | 7.3 | -1.6 | -.1 | 12.7 |
| 18 | | | | 9.4 | -3.3 | -13 | 13.4 |
| 19 | -11.1 | -77 | 11.8 | 27 | -1.6 | -.1 | 12.7 |
| 20 | -16.2 | -115 | 14.6 | 3.9 | -1.9 | -6 | 9.2 |
| 21 | -13.4 | -92 | 15.2 | .7 | -3.5 | -20 | 8 |
| 22 | -13.3 | -93 | 13.4 | 8.4 | -4.1 | -16 | 16.8 |
| 23 | -14.6 | -104 | 12.8 | 1.9 | -1.9 | -11 | 4.2 |
| 24 | | | | 43.6 | -6.8 | -49 | 5.4 |
| 25 | | | | 37.3 | -7.2 | -45 | 12.6 |
| 26 | | | | 58 | -13.2 | -99 | 6.6 |
| 27 | | | | 13.2 | -10.1 | -63 | 17.8 |
| 28 | | | | 0 | | | |

TOTAL PRECIPITATION = 400.9 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -12.1 | -84.1 | 12.6 | -4.78 | 9.5 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| 2.07 | 15.8 | 3.39 | 4.24 | 4.2 |

MANAUS DATA : FEBRUARY 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | -10.4 | -81 | 2.2 | 6.7 | -2 | -12 | 4 |
| 2 | -9.2 | -60 | 13.6 | 4.2 | .9 | 17 | 9.8 |
| 3 | -10.6 | -82 | 2.8 | 15.7 | -1.8 | -5 | 9.4 |
| 4 | 0 | 0 | 0 | | | | |
| 5 | -7.7 | -50 | 11.6 | 0 | | | |
| 6 | -8.9 | -59 | 12.2 | 0 | | | |
| 7 | -8.5 | -61 | 7 | 0 | | | |
| 8 | -8.8 | -48 | 22.4 | 0 | | | |
| 9 | -9.1 | -64 | 8.8 | 2 | 1.4 | 15 | 3.8 |
| 10 | -10.3 | -68 | 14.4 | 37 | -3.4 | -15 | 12.2 |
| 11 | | | | | | | |
| 12 | | | | 5.5 | -1.4 | -1 | 10.2 |
| 13 | | | | 7.5 | -4.7 | -27 | 10.6 |
| 14 | | | | 29 | -3.8 | -19 | 11.4 |
| 15 | | | | 12.3 | -6 | -39 | 0 |
| 16 | | | | 0 | | | |
| 17 | | | | 3.3 | .2 | 11 | 9.4 |
| 18 | | | | | | | |
| 19 | | | | 0 | | | |
| 20 | | | | 0 | | | |
| 21 | | | | 8.7 | -.1 | -4 | -3.2 |
| 22 | -8.7 | -61 | 8.6 | 12 | -2.3 | -6 | 12.4 |
| 23 | | | | 44 | -2.3 | -14 | 4.4 |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | 14.4 | -9.8 | -67 | 11.4 |
| 27 | | | | | | | |
| 28 | | | | 0 | | | |

TOTAL PRECIPITATION IS 202.3 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -9.22 | -63.4 | 10.36 | -3.25 | 8.70 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| .93 | 11.2 | 5.93 | 2.32 | 4.0 |

BELEM DATA : MARCH 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | **** | *** | ***** |
| 1 | -15.3 | -116 | 6.4 | 13.5 | -5.9 | -34 | 13.2 |
| 2 | -12.5 | -88 | 12 | 31.5 | -8.2 | -56 | 9.6 |
| 3 | -12.6 | -91 | 9.8 | 6.9 | -2.4 | -11 | 8.2 |
| 4 | | | | 0 | | | |
| 5 | | | | 29.5 | -2.5 | -8 | 12 |
| 6 | -12.4 | -85 | 14.2 | 8.5 | -4.7 | -23 | 14.6 |
| 7 | -12.3 | -92 | 6.4 | .5 | -1.4 | -2 | 9.2 |
| 8 | -9.2 | -65 | 8.6 | .7 | -.5 | 3 | 7 |
| 9 | -10.9 | -78 | 9.2 | 6.1 | -2 | -3 | 13 |
| 10 | | | | 7.1 | -2.6 | -12 | 8.8 |
| 11 | | | | 3.8 | -2.7 | -11 | 10.6 |
| 12 | | | | 21.9 | -2.7 | -9 | 12.6 |
| 13 | -11.8 | | | 11.3 | | | |
| 14 | -14.1 | -106 | 6.8 | 25.3 | -5.5 | -26 | 13 |
| 15 | -11.7 | -35 | 8.6 | 15.7 | -3.4 | -18 | 9.2 |
| 16 | -13.5 | -97 | 11 | 14.7 | -1.7 | -5 | 8.6 |
| 17 | | | | .5 | -3 | -12 | 12 |
| 18 | | | | 0 | | | |
| 19 | -10.3 | -71 | 11.4 | 0 | | | |
| 20 | -10.3 | -69 | 13.4 | 6.6 | -.4 | 3 | 6.2 |
| 21 | -10.8 | -75 | 11.4 | 7.9 | -1.9 | -4 | 11.2 |
| 22 | -13.4 | -97 | 10.2 | 11.6 | -1.9 | -1 | 14.2 |
| 23 | -11.4 | -79 | 12.2 | 0 | | | |
| 24 | | | | 7.8 | -2.6 | -8 | 12.8 |
| 25 | | | | 23.2 | -2.7 | -12 | 9.6 |
| 26 | -11.5 | -80 | 12 | 2.3 | -2.3 | -9 | 9.4 |
| 27 | -13.4 | -100 | 7.2 | 2.2 | -1.7 | -4 | 9.6 |
| 28 | -15.7 | -112 | 13.6 | 35.2 | -3.9 | -26 | 5.2 |
| 29 | -14.7 | -106 | 11.6 | 0 | | | |
| 30 | -12.8 | -86 | 16.4 | 12.1 | -4.9 | -33 | 6.2 |
| 31 | | | | 0 | | | |

TOTAL PRECIPITATION = 311.4 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -12.41 | -88.9 | 10.62 | -3.76 | 10.6 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| 1.69 | 14.3 | 2.75 | 1.98 | 3.4 |

MANAUS DATA : MARCH 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | -16 | -121 | 7 | 0 | | | |
| 2 | -19 | -144 | 8 | 4.7 | -12.9 | -90 | 13.2 |
| 3 | | | | 2.8 | -4.2 | -30 | 3.6 |
| 4 | | | | | | | |
| 5 | | | | 0 | | | |
| 6 | -10.7 | -87 | -1.4 | 0 | | | |
| 7 | -14.3 | -113 | 1.4 | 0 | | | |
| 8 | | | | .5 | | | |
| 9 | -10.8 | -82 | 4.4 | 27.6 | -6.2 | -36 | 13.6 |
| 10 | | | | 21.6 | -4.5 | -27 | 9 |
| 11 | | | | | | | |
| 12 | -14.8 | -105 | 13.4 | 21 | -9.6 | -66 | 10.8 |
| 13 | -12 | -96 | 0 | 26.3 | -6.3 | -40 | 10.4 |
| 14 | | | | 1.7 | -3.5 | -22 | 6 |
| 15 | | | | 1 | -5.9 | -35 | 12.2 |
| 16 | -10.6 | -73 | 11.8 | 8 | -4.9 | -33 | 6.2 |
| 17 | -15.6 | -117 | 7.8 | 18.5 | -7.1 | -42 | 14.8 |
| 18 | | | | | | | |
| 19 | -16.9 | -132 | 3.2 | 9.5 | -7 | -50 | 6 |
| 20 | -13.9 | -101 | 10.2 | 0 | | | |
| 21 | | | | 1 | -3.9 | -23 | 8.2 |
| 22 | -10.1 | -85 | -4.2 | 3 | -4 | -25 | 7 |
| 23 | -13.3 | -102 | 4.4 | 0 | | | |
| 24 | | | | 27.5 | -4.5 | -27 | 9 |
| 25 | | | | | | | |
| 26 | -12.3 | -90 | 8.4 | 37 | -6.6 | -41 | 11.8 |
| 27 | -19.4 | -143 | 12.2 | 0 | | | |
| 28 | -12.3 | -90 | 3.4 | .5 | | | |
| 29 | | | | 1.2 | -1.8 | -12 | 2.4 |
| 30 | | | | 52 | -8 | -53 | 11 |
| 31 | | | | 68.2 | -9.1 | -59 | 13.8 |

TOTAL PRECIPITATION IS 333.6 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -13.87 | -105.06 | 6.3 | -7.15 | 11.34 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 2.91 | 21.58 | 5.0 | 1.85 | 2.43 |

BELEM DATA : APRIL 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | ***** | *** | ***** |
| 1 | | | | | | | |
| 2 | -11.9 | -82 | 13.2 | 2.3 | -.7 | 3 | 8.6 |
| 3 | -8.7 | -65 | 4.6 | .5 | 1.1 | 9 | .2 |
| 4 | -13.5 | -99 | 9 | .9 | .6 | 10 | 5.2 |
| 5 | | | | 0 | | | |
| 6 | -10.3 | -72 | 10.4 | 0 | | | |
| 7 | | | | 10.6 | -.2 | -6 | -4.4 |
| 8 | | | | 0 | | | |
| 9 | -12.1 | -86 | 10.8 | .6 | | | |
| 10 | | | | 5.7 | -1.1 | | |
| 11 | -11.3 | -76 | 14.4 | 0 | 0 | | |
| 12 | | | | 8.6 | -1.5 | -6 | 6 |
| 13 | | | | 24.2 | -2.4 | | |
| 14 | | | | 3.9 | -1.3 | 2 | 12.4 |
| 15 | | | | 17.4 | -.8 | -3 | 3.4 |
| 16 | -8.9 | | | 10.7 | -1.8 | -5 | 9.4 |
| 17 | | | | 10.2 | -2.1 | -1 | 15.8 |
| 18 | -10.2 | -69 | 12.6 | 13.8 | -.4 | 7 | 10.2 |
| 19 | -12.1 | -82 | 14.8 | 3 | -.3 | | |
| 20 | -10.8 | -72 | 14.4 | 12 | -2.8 | -12 | 10.4 |
| 21 | | | | 0 | | | |
| 22 | | | | 9.3 | -4.5 | -24 | 12 |
| 23 | -12.9 | -99 | 4.2 | 1 | -.7 | -1 | 4.6 |
| 24 | -15.5 | -119 | 5 | 20.2 | -5.2 | -33 | 8.6 |
| 25 | -20.4 | -160 | 3.2 | 45.4 | -6.8 | -39 | 15.4 |
| 26 | -20.4 | -151 | 12.2 | 43.8 | -11.6 | -80 | 12.8 |
| 27 | -14.7 | -116 | 1.6 | 44 | -12.4 | -86 | 13.2 |
| 28 | | | | 0 | | | |
| 29 | | | | 48.3 | -3.1 | -12 | 12.8 |
| 30 | | | | 0 | | | |

TOTAL PRECIPITATION = 336.9 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******** | ******* | ******* | ******* |
| -12.91 | -96.28 | 9.31 | -5.47 | 11.27 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******** | ******* | ******** | ******** |
| 3.58 | 30.12 | 4.66 | 4.31 | 4.32 |

MANAUS DATA : APRIL 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | 3.2 | -5.4 | -34 | 9.2 |
| 3 | | | | 7.3 | -6 | -33 | 15 |
| 4 | -11.1 | -31 | 7.8 | 0 | | | |
| 5 | | | | .5 | | | |
| 6 | -11.4 | -81 | 10.2 | 0 | | | |
| 7 | | | | 17.8 | -2.5 | -5 | 15 |
| 8 | | | | | | | |
| 9 | -6.7 | | | 24.5 | -2.1 | -3 | 13.8 |
| 10 | | | | 18.2 | -4.2 | -21 | 12.6 |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | 15.2 | -2.8 | -8 | 14.4 |
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | 4.7 | -1.7 | -5 | 8.6 |
| 17 | | | | 20 | -3.6 | -55 | 13.8 |
| 18 | -7 | -50 | 6 | 0 | | | |
| 19 | -7.9 | -62 | 1.2 | 0 | | | |
| 20 | -8.1 | -59 | 5.8 | 0 | | | |
| 21 | | | | 3.4 | -2.4 | -6 | 13.2 |
| 22 | | | | | | | |
| 23 | -7.5 | -52 | 8 | 29 | -8 | -49 | 15 |
| 24 | -10.9 | -86 | 1.2 | 4.5 | -7.4 | -41 | 18.2 |
| 25 | -12.1 | -90 | 6.8 | 0 | | | |
| 26 | -14.3 | -91 | 23.4 | 32 | -10.4 | -74 | 9.2 |
| 27 | -18.6 | -138 | 10.8 | | | | |
| 28 | | | | 112.5 | -12.5 | -35 | 15 |
| 29 | | | | | | | |
| 30 | | | | 17.5 | -10.4 | | |

TOTAL PRECIPITATION IS 310.3 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -10.50 | -79 | 8.12 | -8.55 | 13.8 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 3.63 | 25.95 | 6.25 | 3.97 | 2.05 |

BELEM DATA : MAY 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | **** | *** | ***** |
| 1 | | | | 19.4 | -4.4 | -30 | 5.2 |
| 2 | -10.1 | -71 | 9.8 | 0 | 0 | 0 | 0 |
| 3 | -10.6 | -71 | 13.8 | 2.4 | -1 | 2 | 10 |
| 4 | -10.8 | -73 | 13.4 | 38.4 | -1.4 | -2 | 9.2 |
| 5 | | | | 0 | | | |
| 6 | | | | 4 | -1.4 | 1 | 12.2 |
| 7 | -11 | -77 | 11 | 18.9 | -3.4 | -17 | 10.2 |
| 8 | -10.3 | -70 | 12.4 | 15.2 | -1.3 | 4 | 14.4 |
| 9 | -10.5 | -75 | 9 | .5 | .4 | 12 | 8.8 |
| 10 | -13.6 | -97 | 11.8 | 3.3 | -2.3 | -9 | 9.4 |
| 11 | -10.3 | -69 | 13.4 | 27.3 | -2.3 | -10 | 8.4 |
| 12 | | | | 8.4 | -6.2 | -41 | 8.6 |
| 13 | | | | 14 | -3 | -12 | 12 |
| 14 | -13.8 | -97 | 13.4 | 10.9 | | | |
| 15 | -13.7 | -101 | 8.6 | 0 | | | |
| 16 | -13.9 | -100 | 11.2 | 29.8 | -4.3 | -22 | 12.4 |
| 17 | -12.6 | -88 | 12.8 | 1.5 | -4.5 | -40 | -4 |
| 18 | -13.1 | -98 | 6.8 | 0 | | | |
| 19 | | | | 3.5 | -3.3 | -16 | 10.4 |
| 20 | | | | 0 | | | |
| 21 | | | | 16.7 | -.4 | 6 | 9.2 |
| 22 | -12.7 | -90 | 11.6 | .4 | -.7 | 9 | 14.6 |
| 23 | -11 | -78 | 10 | .3 | -.5 | 14 | 18 |
| 24 | -11.6 | -84 | 8.8 | 12.7 | -1.4 | 2 | 13.2 |
| 25 | -9.7 | -68 | 9.6 | 4.5 | -1.5 | 1 | 13 |
| 26 | | | | 19.9 | -2.1 | -10 | 6.8 |
| 27 | | | | 0 | | | |
| 28 | -10 | -74 | 6 | 6.6 | -1.5 | 4 | 16 |
| 29 | -10.5 | -74 | 10 | 9 | -.1 | 8 | 8.8 |
| 30 | -11.7 | -88 | 5.6 | 3.1 | -1.3 | 2 | 12.4 |
| 31 | -10.9 | -82 | 5.2 | 6.3 | -2.2 | -12 | 5.6 |

TOTAL PRECIPITATION = 277 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| **-11.54** | **-82.14** | **10.2** | **-2.42** | **9.87** |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| **1.41** | **11.35** | **2.67** | **1.44** | **2.87** |

MANAUS DATA : MAY 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | **** | *** | ***** |
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | | | | 0 | | | |
| 4 | | | | | | | |
| 5 | | | | 5 | -3.6 | -12 | 16.8 |
| 6 | | | | | | | |
| 7 | | | | 0 | | | |
| 8 | | | | 0 | | | |
| 9 | -10.8 | -70 | 16.4 | 0 | | | |
| 10 | -10.3 | -69 | 13.4 | 0 | | | |
| 11 | -9.5 | -55 | 21 | | | | |
| 12 | | | | 63 | -4.3 | -18 | 16.4 |
| 13 | | | | | | | |
| 14 | -16.1 | -113 | 15.8 | 7.6 | -8.8 | -57 | 13.4 |
| 15 | -15.8 | -117 | 9.4 | 1.8 | -9.5 | -62 | 14 |
| 16 | | | | 7.7 | -6.3 | -42 | 8.4 |
| 17 | | | | 0 | | | |
| 18 | -12.7 | -98 | 3.6 | | | | |
| 19 | | | | 89 | -6.2 | -34 | 15.6 |
| 20 | | | | | | | |
| 21 | | | | 26 | -3.6 | -14 | 14.8 |
| 22 | | | | 23 | -2.8 | 4 | 26.4 |
| 23 | | | | 0 | | | |
| 24 | | | | 12.5 | -2.4 | -5 | 14.2 |
| 25 | -13.4 | -71 | 36.2 | | | | |
| 26 | | | | 29.5 | -6.2 | -32 | 17.6 |
| 27 | | | | | | | |
| 28 | -10.9 | -74 | 13.2 | 0 | | | |
| 29 | -10.1 | | | 3.7 | -3.2 | -9 | 16.6 |
| 30 | -7.1 | | | 0 | | | |
| 31 | -10.6 | -71 | 13.8 | 0 | | | |

TOTAL PRECIPITATION IS 268.8 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -11.57 | -82 | 15.86 | -5.04 | 16.54 |

| STNDVM18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| 2.70 | 21.76 | 9.01 | 1.53 | 3.39 |

BELEM DATA : JUNE 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| 1 | -10.7 | -79 | 6.6 | | | | |
| 2 | | | | 16.1 | -4 | -18 | 14 |
| 3 | | | | 60.3 | -3.3 | -16 | 10.4 |
| 4 | -9.8 | -69 | 9.4 | 1.7 | -2.5 | -16 | 4 |
| 5 | -10 | -67 | 13 | 4.8 | -.2 | 13 | 14.6 |
| 6 | -9.6 | -65 | 11.8 | 0 | | | |
| 7 | -9.3 | -68 | 6.4 | 0 | | | |
| 8 | -12 | -87 | 9 | 0 | | | |
| 9 | | | | 30.7 | -.4 | 5 | 8.2 |
| 10 | | | | 1.8 | | | |
| 11 | -9.2 | -73 | .6 | 0 | | | |
| 12 | -11.1 | -79 | 9.8 | 16.9 | -.9 | .1 | 7.3 |
| 13 | -10.3 | -74 | 8.4 | 4 | -1 | 4 | 12 |
| 14 | | | | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | | | | 14.2 | -.9 | -1 | 6.2 |
| 17 | | | | 5.6 | -1.1 | 1 | 9.8 |
| 18 | -9.4 | -69 | 6.2 | 0 | | | |
| 19 | -9.4 | -63 | 12.2 | 0 | | | |
| 20 | -9.7 | -72 | 5.6 | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | -10 | -66 | 14 | 0 | | | |
| 23 | | | | 1.3 | 1.8 | 26 | 11.6 |
| 24 | | | | 0 | | | |
| 25 | -9.5 | -62 | 14 | 0 | | | |
| 26 | -9.3 | -61 | 13.4 | 0 | | | |
| 27 | -10.2 | -70 | 11.6 | 0 | | | |
| 28 | -10.6 | -71 | 13.8 | .4 | .5 | 17 | 13 |
| 29 | -7.7 | -50 | 11.6 | 0 | | | |
| 30 | | | | 0 | | | |

TOTAL PRECIPITATION = 157.8 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| -9.87 | -69.16 | 9.85 | -2.02 | 9.71 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| .91 | 8.11 | 3.68 | 1.45 | 2.36 |

MANAUS DATA : JUNE 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | -10.5 | -46 | 38 | | | | |
| 2 | | | | 19.5 | -1.8 | -10 | 4.4 |
| 3 | | | | | | | |
| 4 | -13 | -79 | 25 | 22.7 | -4.7 | -22 | 15.6 |
| 5 | -12 | -84 | 12 | 1.5 | -1.5 | 8 | 20 |
| 6 | -7.7 | -51 | 10.6 | 0 | | | |
| 7 | -7.6 | -45 | 15.8 | 0 | | | |
| 8 | -8.2 | -42 | 23.6 | | | | |
| 9 | | | | 12.6 | -.7 | 4 | 9.6 |
| 10 | | | | | | | |
| 11 | | | | 0 | | | |
| 12 | | | | 8.2 | -1.9 | .2 | 15.4 |
| 13 | | | | 17.5 | -3.3 | 2 | 28.4 |
| 14 | | | | | | | |
| 15 | -11.1 | -69 | 19.8 | 0 | | | |
| 16 | | | | 0 | | | |
| 17 | | | | 0 | | | |
| 18 | -10.8 | -65 | 21.4 | 0 | | | |
| 19 | -10.5 | -60 | 24 | 0 | | | |
| 20 | -10.7 | -70 | 15.6 | 0 | | | |
| 21 | -11.2 | -69 | 20.6 | 0 | | | |
| 22 | -11.3 | -72 | 18.4 | 0 | | | |
| 23 | | | | 0 | | | |
| 24 | | | | 0 | | | |
| 25 | -10.8 | -72 | 14.4 | 0 | | | |
| 26 | -10.1 | -64 | 16.8 | 0 | | | |
| 27 | -10.9 | -71 | 16.2 | 0 | | | |
| 28 | -10.2 | -67 | 14.6 | 0 | | | |
| 29 | -10.2 | -69 | 12.6 | | | | |
| 30 | | | | 14.6 | -1.5 | 5 | 17 |

TOTAL PRECIPITATION IS 96.6 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -10.4 | -64.41 | 18.78 | -2.56 | 15.13 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 1.41 | 11.92 | 6.55 | 1.41 | 7.79 |

BELEM DATA : JULY 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | -10.2 | -69 | 12.6 | 4.8 | -1.1 | 1 | 9.8 |
| 4 | -10.4 | -72 | 11.2 | 11.9 | | | |
| 5 | -10.1 | -67 | 13.8 | 0 | | | |
| 6 | -7.9 | -52 | 11.2 | 2.6 | .5 | 20 | 16 |
| 7 | | | | 0 | | | |
| 8 | | | | 0 | | | |
| 9 | -11.7 | -84 | 9.6 | 0 | | | |
| 10 | -9.9 | -64 | 15.2 | 0 | | | |
| 11 | -9.9 | -69 | 10.2 | 5 | -.7 | 9 | 14.6 |
| 12 | -12.7 | -84 | 17.6 | 11.1 | -1.7 | 4 | 17.6 |
| 13 | -10.6 | -75 | 9.8 | 5.5 | | | |
| 14 | | | | .2 | | | |
| 15 | | | | 6.1 | .8 | 15 | 8.6 |
| 16 | -10.2 | -68 | 13.6 | 0 | | | |
| 17 | -12.1 | -81 | 15.8 | 2.4 | -.2 | 7 | 8.6 |
| 18 | -10.1 | -67 | 13.8 | 0 | 0 | | |
| 19 | -10.6 | -76 | 8.8 | 7.8 | .4 | | |
| 20 | -8.2 | -56 | 9.6 | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | | | | 0 | | | |
| 23 | -11.1 | -75 | 13.8 | 13.2 | -.7 | 2 | 7.6 |
| 24 | -10.7 | -72 | 13.6 | 7.2 | -.7 | 9 | 14.6 |
| 25 | -10.7 | -73 | 12.6 | 0 | | | |
| 26 | | | | 9.1 | -1.6 | 5 | 17.8 |
| 27 | | | | .6 | | | |
| 28 | | | | .4 | | | |
| 29 | | | | 0 | | | |
| 30 | -11.7 | -75 | 18.6 | 0 | | | |
| 31 | -9.9 | -66 | 13.2 | 0 | | | |

TOTAL PRECIPITATION = 87.9 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -10.45 | -70.78 | 12.87 | -.68 | 12.96 |
| **STNDBV18** | **STNDBV2** | **STNDDVB** | **STDAWP18** | **STDAWDPB** |
| ******** | ******* | ******* | ******** | ******** |
| 1.16 | 8.25 | 2.72 | .82 | 4.25 |

MANAUS DATA : JULY 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | **** | **** | *** | ***** |
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | -8.2 | -69 | -3.4 | 0 | | | |
| 4 | -10.2 | -72 | 9.6 | 0 | | | |
| 5 | -0- | -67 | -0- | 0 | | | |
| 6 | -11.5 | -52 | 40 | 0 | | | |
| 7 | | | | 0 | | | |
| 8 | | | | 0 | | | |
| 9 | -11.1 | -84 | 4.8 | 0 | | | |
| 10 | -10.7 | -64 | 21.6 | 0 | | | |
| 11 | -10.6 | -69 | 15.8 | 0 | | | |
| 12 | -10.3 | -84 | -1.6 | 0 | | | |
| 13 | -9.4 | -75 | .2 | 0 | | | |
| 14 | | | | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | | -63 | | 0 | | | |
| 17 | -9.5 | -84 | -8 | 8.8 | -.4 | 13 | 16.2 |
| 18 | -8.6 | -67 | 1.8 | 0 | | | |
| 19 | -9.8 | -76 | 2.4 | 0 | | | |
| 20 | -11.1 | -56 | 32.8 | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | | | | 0 | | | |
| 23 | -11 | -75 | 13 | 0 | | | |
| 24 | -10.4 | -72 | 11.2 | 0 | | | |
| 25 | -10.4 | -73 | 10.2 | 0 | | | |
| 26 | -10.3 | | | 0 | | | |
| 27 | | | | 0 | | | |
| 28 | | | | 0 | | | |
| 29 | | | | 0 | | | |
| 30 | -10.1 | -75 | 5.8 | 0 | | | |
| 31 | | -66 | | 0 | | | |

TOTAL PRECIPITATION IS 8.8 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| ******** | ******** | ******** | ******* | ****** |
| -10.18 | -70.94 | 9.76 | -.4 | 16.2 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ********** | ********** |
| .87 | 8.43 | 12.91 | | |

BELEM DATA : AUGUST 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| 1 | -9.9 | -73 | 6.2 | 6.9 | -.9 | 3 | 10.2 |
| 2 | -8.9 | | | 0 | | | |
| 3 | -10.5 | -75 | 9 | 1.1 | .6 | 15 | 10.2 |
| 4 | | | | 0 | | | |
| 5 | | | | 5.4 | -.6 | 6 | 10.8 |
| 6 | | | | 0 | | | |
| 7 | -9.8 | | | 0 | | | |
| 8 | -9.5 | -65 | 11 | 0 | | | |
| 9 | -9.8 | -67 | 11.4 | 3.3 | -.6 | 10 | 14.8 |
| 10 | -9.2 | -67 | 6.6 | 0 | | | |
| 11 | | | | 0 | | | |
| 12 | | | | 4.6 | .3 | | |
| 13 | | | | 0 | | | |
| 14 | -10.1 | -70 | 10.8 | 18.8 | -1.5 | 1 | 13 |
| 15 | -9.2 | -71 | 2.6 | 0 | | | |
| 16 | -10.1 | -70 | 10.8 | 6.2 | -.9 | 1 | 8.2 |
| 17 | -10.2 | -72 | 9.6 | 0 | | | |
| 18 | | | | 31.1 | -.9 | | |
| 19 | | | | 17 | -.4 | 7 | 10.2 |
| 20 | -9.9 | -69 | 10.2 | .2 | -.5 | 0 | 0 |
| 21 | -10.9 | -80 | 7.2 | .6 | -.5 | 8 | 12 |
| 22 | -10.2 | -77 | 4.6 | 0 | | | |
| 23 | -8.8 | -61 | 9.4 | 5 | -.5 | 10 | 14 |
| 24 | -8.5 | -61 | 7 | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | -10.6 | -77 | 7.8 | 0 | | | |
| 28 | -9.5 | -73 | 3 | 0 | | | |
| 29 | -9.9 | -71 | 8.2 | 11.8 | -.1 | 10 | 10.8 |
| 30 | -9 | -69 | 3 | 24.8 | -.6 | 3 | 7.8 |
| 31 | -7.3 | -55 | 3.4 | 0 | | | |

TOTAL PRECIPITATION = 136.8 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| -9.60 | -69.6 | 7.46 | -.70 | 10.46 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| .81 | 6.13 | 2.98 | .44 | 2.14 |

MANAUS DATA : AUGUST 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | -9.3 | -65 | 9.4 | 0 | | | |
| 2 | -10.4 | -68 | 15.2 | 0 | | | |
| 3 | | | | 0 | | | |
| 4 | | | | 0 | | | |
| 5 | | | | 0 | | | |
| 6 | -10.7 | -74 | 11.6 | 0 | | | |
| 7 | -11.4 | -70 | 21.2 | 0 | | | |
| 8 | -11.2 | -73 | 16.6 | 0 | | | |
| 9 | -12.4 | -81 | 18.2 | 0 | | | |
| 10 | -10.5 | -62 | 22 | 0 | | | |
| 11 | | | | 0 | | | |
| 12 | | | | 0 | | | |
| 13 | | | | 0 | | | |
| 14 | -10.8 | -66 | 20.4 | 0 | | | |
| 15 | -10.9 | -69 | 18.2 | 0 | | | |
| 16 | -11 | -72 | 16 | 0 | | | |
| 17 | -10 | | | | | | |
| 18 | | | | 14.5 | -2.1 | | |
| 19 | | | | | | | |
| 20 | -12.7 | | | 0 | | | |
| 21 | -8.2 | | | 19.4 | -2.4 | -11 | 8.2 |
| 22 | | | | 38.6 | -1.9 | -4 | 11.2 |
| 23 | | | | 0 | | | |
| 24 | -9.9 | | | | | | |
| 25 | | | | 25.5 | -1.3 | -.4 | 10 |
| 26 | | | | | | | |
| 27 | | | | 3.3 | -1.8 | | |
| 28 | | | | 0 | | | |
| 29 | | | | 0 | | | |
| 30 | | | | 0 | | | |
| 31 | | | | 0 | | | |

TOTAL PRECIPITATION IS 101.3 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -10.67 | -70 | 16.88 | -1.87 | 10.13 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 1.15 | 5.37 | 4.05 | .38 | 1.19 |

BELEM DATA : SEPTEMBER 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | -10.3 | -75 | 7.4 | 7.8 | .2 | 15 | 13.4 |
| 4 | -10.3 | -73 | 9.4 | 0 | 0 | 0 | 0 |
| 5 | -10.6 | -82 | 2.8 | 4.4 | .2 | 11 | 9.4 |
| 6 | -8.9 | -59 | 12.2 | 24.2 | -2 | -3 | 13 |
| 7 | | | | 10.8 | -.9 | 5 | 12.2 |
| 8 | | | | 0 | | | |
| 9 | | | | 5.1 | -1.1 | 4 | 12.8 |
| 10 | -10 | -71 | 9 | 0 | | | |
| 11 | -11.1 | -76 | 12.8 | 11.2 | -1.5 | -15 | -3 |
| 12 | -9 | -63 | 9 | .9 | .4 | 5 | 1.8 |
| 13 | -9.9 | -66 | 13.2 | 0 | | | |
| 14 | -10.8 | -76 | 10.4 | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | | | | 21.6 | -1.1 | 3 | 11.8 |
| 17 | | | | 14.4 | -1.9 | 0 | 0 |
| 18 | -9.9 | -65 | 14.2 | 1.7 | -.8 | 3 | 9.4 |
| 19 | -11.4 | -80 | 11.2 | 0 | | | |
| 20 | -10.8 | -74 | 12.4 | 0 | | | |
| 21 | -10.1 | -72 | 8.8 | .7 | 1.3 | 17 | 6.6 |
| 22 | | | | 12.6 | .6 | 13 | 8.2 |
| 23 | | | | 0 | | | |
| 24 | -7.9 | -54 | 9.2 | 0 | | | |
| 25 | -10.5 | -73 | 11 | 3.4 | .5 | 16 | 12 |
| 26 | -9 | -60 | 12 | 5.4 | 2 | 17 | 1 |
| 27 | -11.2 | -78 | 11.6 | 14.9 | .1 | 20 | 19.2 |
| 28 | -11.4 | -78 | 13.2 | 8.6 | .1 | 13 | 12.2 |
| 29 | | | | 7.7 | 1.4 | 19 | 7.8 |
| 30 | | | | 0 | | | |

TOTAL PRECIPITATION = 155.4 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| -10.17 | -70.83 | 10.54 | -.618 | 10.65 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| .96 | 7.90 | 2.69 | 1.14 | 5.48 |

BELEM DATA : OCTOBER 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | -12.2 | -84 | 13.6 | 0 | | | |
| 2 | -8.9 | -62 | 9.2 | 8.3 | -.2 | 11 | 12.6 |
| 3 | -9 | -61 | 11 | 0 | | | |
| 4 | -8.7 | -62 | 7.6 | 0 | | | |
| 5 | -10.6 | -78 | 6.8 | 5.9 | .2 | 9 | 7.4 |
| 6 | | | | 0 | | | |
| 7 | | | | 3.9 | .5 | 12 | 8 |
| 8 | -9.4 | -69 | 6.2 | 1.9 | -.3 | 13 | 15.4 |
| 9 | -10.4 | -72 | 11.2 | 0 | | | |
| 10 | -9.7 | -69 | 8.6 | .1 | -1.7 | -16 | -2.4 |
| 11 | -10.7 | -80 | 5.6 | 0 | | | |
| 12 | -9.4 | -65 | 10.2 | 15.2 | -1.7 | 2 | 15.6 |
| 13 | | | | 0 | | | |
| 14 | | | | 0 | | | |
| 15 | | | | 4.4 | .9 | 1 | -6.2 |
| 16 | -10.2 | -72 | 9.6 | 0 | | | |
| 17 | -10.3 | -71 | 11.4 | 0 | | | |
| 18 | -9.9 | -67 | 12.2 | .2 | | | |
| 19 | -9.3 | -62 | 12.4 | 0 | | | |
| 20 | | | | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | -10 | -71 | 9 | 32.6 | -1.1 | -1 | 7.8 |
| 23 | -9.7 | -67 | 10.6 | 7.3 | -.6 | 7 | 11.8 |
| 24 | -9.8 | -70 | 8.4 | 29.3 | -1.2 | -7 | 2.6 |
| 25 | -9.1 | -62 | 10.8 | 14.6 | .4 | 14 | 10.8 |
| 26 | -9.2 | -68 | 5.6 | 11.4 | -.2 | 11 | 12.6 |
| 27 | | | | 3.9 | .8 | 18 | 11.6 |
| 28 | | | | 0 | | | |
| 29 | | | | 0 | | | |
| 30 | -10.6 | -77 | 7.8 | 0 | | | |
| 31 | -11.1 | -80 | 8.8 | 0 | | | |

TOTAL PRECIPITATION = 139 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ****** |
| -9.91 | -69.95 | 9.36 | -.64 | 8.51 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| .84 | 6.72 | 2.26 | .76 | 4.95 |

BELEM DATA : NOVEMBER 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| 1 | -11.5 | | | .2 | | | |
| 2 | | | | 23.2 | -1.4 | | |
| 3 | | | | .1 | | | |
| 4 | | | | 0 | | | |
| 5 | -8.9 | | | 0 | | | |
| 6 | -11 | -70 | 18 | 5.4 | -1.4 | | |
| 7 | -10.6 | -69 | 15.8 | .5 | | | |
| 8 | | | | 0 | | | |
| 9 | | | | 0 | | | |
| 10 | | | | 0 | | | |
| 11 | | | | 0 | | | |
| 12 | | | | 0 | | | |
| 13 | -11.4 | -78 | 13.2 | 0 | | | |
| 14 | -9.4 | -62 | 13.2 | 0 | | | |
| 15 | | | | 0 | | | |
| 16 | | | | 4.3 | | | |
| 17 | | | | 14.4 | -.4 | - | |
| 18 | | | | 2.5 | -.8 | 4 | 10.4 |
| 19 | | | | 0 | | | |
| 20 | -10.6 | -89 | -4.2 | 1.7 | | | |
| 21 | -12.6 | -87 | 13.8 | 3.1 | -.6 | | |
| 22 | -10.2 | -73 | 8.6 | .6 | -.8 | | |
| 23 | -13.4 | | | 4.6 | -.9 | | |
| 24 | | | | 0 | | | |
| 25 | | | | 4 | -.1 | | |
| 26 | -9.5 | -62 | 14 | 0 | | | |
| 27 | -9.9 | -68 | 11.2 | 0 | | | |
| 28 | -11.4 | -80 | 11.2 | 1.4 | .7 | | |
| 29 | -10.3 | | | .5 | 2.1 | | |
| 30 | | | | 3.5 | .3 | | |

TOTAL PRECIPITATION = 70 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| -10.76 | -73.8 | 11.48 | -.81 | 10.4 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| 1.24 | 9.49 | 6.08 | .65 | |

MANAUS DATA : NOVEMBER 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | | | | 0 | | | |
| 4 | | | | 0 | | | |
| 5 | | | | 0 | | | |
| 6 | | | | 0 | | | |
| 7 | | | | 0 | | | |
| 8 | | | | 0 | | | |
| 9 | | | | | | | |
| 10 | | | | 13.4 | -1.7 | -11 | 2.6 |
| 11 | | | | | | | |
| 12 | | | | 1.5 | -.8 | 3 | 9.4 |
| 13 | | | | 0 | | | |
| 14 | | | | | | | |
| 15 | | | | 80.8 | -4 | -20 | 12 |
| 16 | | | | | | | |
| 17 | | | | 4 | -5.2 | -39 | 2.6 |
| 18 | | | | 0 | | | |
| 19 | -10.9 | -76 | 11.2 | 0 | | | |
| 20 | -14.8 | -106 | 12.4 | 39.5 | -9.5 | -66 | 10 |
| 21 | -16.8 | -120 | 14.4 | 0 | | | |
| 22 | -13.3 | -94 | 12.4 | 0 | | | |
| 23 | -9.4 | -67 | 8.2 | 0 | | | |
| 24 | | | | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | | | | 0 | | | |
| 28 | | | | 2 | -.5 | -1 | 3 |
| 29 | | | | 3.2 | -.3 | 2 | 4.4 |
| 30 | | | | 35 | -1.5 | -5 | 7 |

TOTAL PRECIPITATION IS 179.4 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -13.04 | -92.6 | 11.72 | -4.44 | 9.41 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 2.96 | 21.53 | 2.27 | 2.93 | 3.11 |

BELEM DATA : DECEMBER 1979

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| 1 | | | | 1 | | | |
| 2 | | | | .7 | .4 | | |
| 3 | -9.7 | -64 | 13.6 | .2 | | | |
| 4 | -10 | | | 2.2 | -.8 | | |
| 5 | -9.5 | -67 | 9 | 10.3 | -.6 | 1 | 5.8 |
| 6 | -11 | -77 | 11 | 0 | | | |
| 7 | -8.2 | -66 | -.4 | 27.7 | -1.1 | | |
| 8 | | | | 0 | | | |
| 9 | | | | 0 | | | |
| 10 | -10.1 | -70 | 10 8 | 0 | | | |
| 11 | -9.4 | -64 | 11.2 | 0 | | | |
| 12 | -11.6 | -82 | 10.8 | 3.4 | 1 | | |
| 13 | -10.5 | -73 | 11 | 0 | | | |
| 14 | -10.6 | -75 | 9.8 | 4.3 | -1 | | |
| 15 | | | | 4.4 | -1 | | |
| 16 | | | | .2 | | | |
| 17 | -7 7 | -58 | 3.6 | 8.6 | -1.6 | -7 | 5.8 |
| 18 | -10.2 | -72 | 9 6 | 4.5 | -.6 | | |
| 19 | -11.3 | -79 | 11 4 | 9.5 | -2.4 | -4 | 15.2 |
| 20 | -10.2. | -76 | 5.6 | 35.4 | -5.6 | -36 | 8.8 |
| 21 | -10.5 | | | 38.2 | -1.3 | -6 | 4.4 |
| 22 | | | | 6 | -1 5 | -7 | 5 |
| 23 | | | | 29.5 | -1.8 | | |
| 24 | | | | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | -10.2 | -75 | 6.6 | 1.6 | -.3 | | |
| 27 | -10.2 | -76 | 5.6 | .2 | | | |
| 28 | -6.8 | -41 | 13.4 | 17 | -2.3 | | |
| 29 | | | | 10.2 | -1.8 | | |
| 30 | | | | 3.8 | -.5 | -5 | -1 |
| 31 | | | | 31.2 | -2.7 | | |

TOTAL PRECIPITATION = 250.1 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| -9.87 | -69.68 | 8.9 | -2.16 | 6.79 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| 1.22 | 9.96 | 3.7 | 1.56 | 3 42 |

MANAUS DATA DECEMBER 1979

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | | | | 0 | | | |
| 2 | | | | 8 | -1.5 | -5 | 7 |
| 3 | | | | 0 | | | |
| 4 | | | | 0 | | | |
| 5 | | | | 0 | | | |
| 6 | | | | 0 | | | |
| 7 | | | | 0 | | | |
| 8 | | | | 7 4 | -.6 | 1 | 5.8 |
| 9 | | | | 0 | | | |
| 10 | | | | 3.8 | -1.8 | 1 | 15.4 |
| 11 | | | | 0 | | | |
| 12 | | | | 0 | | | |
| 13 | | | | 0 | | | |
| 14 | | | | 0 | | | |
| 15 | | | | 57 | -3.5 | -21 | 7 |
| 16 | | | | 0 | | | |
| 17 | | | | 73 | -6.7 | -36 | 17.6 |
| 18 | | | | .3 | - 6.7 | -49 | 4.6 |
| 19 | | | | 7 | -4.2 | -25 | 8.6 |
| 20 | | | | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | | | | 0 | | | |
| 23 | | | | 25.7 | - 8.4 | -55 | 12.2 |
| 24 | | | | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 4.8 | -4.3 | -32 | 2.4 |
| 27 | | | | 5.5 | -3.4 | -17 | 10.2 |
| 28 | | | | 0 | | | |
| 29 | | | | 27 5 | -3.9 | -17 | 14.2 |
| 30 | | | | 0 | | | |
| 31 | | | | 0 | | | |

TOTAL PRECIPITATION IS 220 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| | | | -5.02 | 12.15 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| | | | 2.10 | 4.74 |

BELEM DATA : JANUARY 1980

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | **** | ***** | ***** | ***** | **** | ***** |
| 1 | | | | 9 | .2 | | |
| 2 | | | | 0 | | | |
| 3 | -9.3 | -66 | 8.4 | 0 | | | |
| 4 | -9.4 | -61 | 14.2 | 17.6 | | | |
| 5 | | | | 5.5 | | | |
| 6 | | | | 17.1 | -1.4 | | |
| 7 | -9 8 | -66 | 12.4 | 8.3 | -1.1 | | |
| 8 | -10.6 | -73 | 11.8 | 20.9 | -2 | -7 | 9 |
| 9 | -11.4 | -80 | 11.2 | 0 | | | |
| 10 | | | | 8.1 | -1 | | |
| 11 | -11.2 | -76 | 13.6 | 10.7 | -1.7 | | |
| 12 | | | | 8.2 | -3.6 | | |
| 13 | | | | 93.2 | -5.5 | -35 | 9 |
| 14 | -22 5 | -163 | 17 | .9 | | | |
| 15 | -21.7 | -158 | 15.6 | 89.8 | -13.1 | -100 | 4.8 |
| 16 | -17.3 | -125 | 13.4 | 0 | | | |
| 17 | -16.7 | -118 | 15.6 | 0 | | | |
| 18 | -10.4 | -67 | 16.2 | 31.5 | -5.1 | | |
| 19 | | | | 21.6 | -3.2 | | |
| 20 | | | | .2 | -2.4 | | |
| 21 | -13 | -95 | 9 | .6 | -1.7 | | |
| 22 | -13.8 | -96 | 14.4 | 1.6 | -2.9 | -12 | 11.2 |
| 23 | -14 | -101 | 11 | 14.2 | -4.1 | | |
| 24 | -10.8 | -74 | 12.4 | 1.9 | -1.5 | | |
| 25 | -8 9 | -62 | 9.2 | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | | | | 11.7 | -.2 | | |
| 28 | | | | 4.3 | -.1 | | |
| 29 | -13.1 | -87 | 17.8 | 0 | | | |
| 30 | -10.9 | | | 41.2 | -3.2 | -17 | 8.6 |
| | -9.4 | | | 3.1 | -.9 | | |

TOTAL PRECIPITATION = 421.2 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -12.85 | -92.23 | 13.12 | -5.67 | 7.41 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| 4.03 | 31.83 | 2.82 | 4.32 | 1.99 |

MANAUS DATA : JANUARY 1980

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | | | | 7.5 | -4.2 | -21 | 12.6 |
| 2 | | | | 13.5 | -2.7 | | |
| 3 | | | | 1.2 | -.6 | | |
| 4 | | | | 0 | | | |
| 5 | | | | 41 | -2.8 | | |
| 6 | | | | 0 | | | |
| 7 | | | | 5.1 | -3.1 | -9 | 15.8 |
| 8 | -9.1 | -61 | 11.8 | .3 | .7 | | |
| 9 | -9.4 | -62 | 13.2 | 12 | .8 | | |
| 10 | -9.9 | -66 | 13.2 | 0 | | | |
| 11 | -10 | -68 | 12 | 0 | | | |
| 12 | | | | 14.5 | .7 | | |
| 13 | | | | 0 | | | |
| 14 | | | | 2 | .1 | | |
| 15 | -8.3 | -57 | 9.4 | 1.4 | 5.8 | | |
| 16 | | | | 0 | | | |
| 17 | -9.5 | -59 | 17 | 12.5 | -.1 | 7 | 7.8 |
| 18 | | | | 0 | | | |
| 19 | | | | 31.5 | -4.5 | | |
| 20 | | | | 0 | | | |
| 21 | | | | 8.5 | -4.3 | -23 | 11.4 |
| 22 | -12.9 | | | 1.5 | -4.2 | | |
| 23 | -12.9 | -74 | 29.2 | 5 | -4.3 | | |
| 24 | -12 | -89 | 7 | 0 | | | |
| 25 | -10.6 | -73 | 11.8 | 0 | | | |
| 26 | | | | 12.1 | .4 | 10 | 6.8 |
| 27 | | | | 0 | | | |
| 28 | | | | 0 | | | |
| 29 | | | | 2.2 | -5.1 | | |
| 30 | | | | 0 | | | |
| | | | | 0 | | | |

TOTAL PRECIPITATION IS 171.8 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -10.46 | 67.66 | 13.84 | -2.23 | 9.88 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******* |
| 1.61 | 9.94 | 6.37 | 2.13 | 3.07 |

BELEM DATA : FEBRUARY 1980

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| 1 | -15 | -108 | 12 | .3 | 1.6 | | |
| 2 | | | | 20.3 | -1.6 | | |
| 3 | | | | 9.1 | -5 2 | | |
| 4 | | | | 0 | | | |
| 5 | -18.1 | | | 22 | -4 8 | -31 | 7.4 |
| 6 | -11.4 | -77 | 14.2 | 3.2 | -5.6 | | |
| 7 | -8.3 | | | 2.7 | -1 | | |
| 8 | 21,2 | -144 | 25 6 | 3.2 | -2.7 | | |
| 9 | | | | 23.1 | -3.2 | | |
| 10 | | | | 40 | -5 5 | -31 | 13 |
| 11 | -14 8 | -105 | 13.4 | 119.5 | -2.3 | | |
| 12 | | | | 27.8 | -5.5 | | |
| 13 | | | | 63 5 | -2.3 | | |
| 14 | -13.4 | -93 | 14 2 | 3.3 | 4 7 | | |
| 15 | | | | 37.5 | -4.6 | -23 | 13 8 |
| 16 | | | | 20.8 | -1.9 | | |
| 17 | | | | 7.5 | -3.2 | | |
| 18 | | | | 60.8 | -2.1 | | |
| 19 | | | | 41.8 | | | |
| 20 | | | | 8 1 | -5.4 | | |
| 21 | | | | 7.9 | -6 3 | -39 | 11.4 |
| 22 | | | | 24 | | | |
| 23 | | | | 2.4 | | | |
| 24 | | | | 0 | | | |
| 25 | -14 6 | -109 | 7.8 | 0 | | | |
| 26 | -16 2 | -111 | 18.6 | 12 5 | -4.6 | | |
| 27 | -19.3 | -134 | 20.4 | 5.9 | -7.4 | | |
| 28 | -19 3 | | | 82.6 | -10 | | |
| 29 | -19.6 | -140 | 16.8 | 23.2 | -12 1 | | |

TOTAL PRECIPITATION = 673 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| -15.9 | -113.44 | 15.8 | 4.56 | 12.0 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| 3.78 | 22.17 | 5.1 | 3.05 | 2.4 |

MANAUS DATA : FEBRUARY 1980

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| *** | **** | *** | ***** | ***** | **** | *** | ***** |
| 1 | | | | 0 | | | |
| 2 | | | | 57 | -5.1 | | |
| 3 | | | | 0 | | | |
| 4 | | | | 6.5 | -.3 | | |
| 5 | | | | 0 | | | |
| 6 | | | | 0 | | | |
| 7 | | | | 0 | | | |
| 8 | | | | 0 | | | |
| 9 | | | | 0 | | | |
| 10 | | | | 0 | | | |
| 11 | | | | .5 | | | |
| 12 | | | | 0 | | | |
| 13 | | | | 9.5 | -1.3 | | |
| 14 | | | | 4.2 | -.2 | | |
| 15 | -8 2 | -50 | 15.6 | 0 | | | |
| 16 | | | | 0 | | | |
| 17 | | | | 8.2 | .1 | 13 | 12.2 |
| 18 | -8.7 | -60 | 9.6 | 0 | | | |
| 19 | | | | 0 | | | |
| 20 | -9.4 | -60 | 15.2 | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | | | | 0 | | | |
| 23 | | | | 23 | -.1 | | |
| 24 | | | | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | | | | 0 | | | |
| 27 | | | | 0 | | | |
| 28 | | | | 0 | | | |
| 29 | -9 8 | -61 | 17.4 | 0 | | | |

TOTAL PRECIPITATION IS 108.9 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ****** |
| -9.02 | -57.75 | 14.45 | 2.83 | 12.2 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ********** |
| .71 | 5.18 | 3.37 | 2.41 | |

BELEM DATA : MARCH 1980

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| 1 | - | | | 14.8 | -10.7 | -74 | 11.6 |
| 2 | | | | 8.3 | -15.6 | -113 | 11.8 |
| 3 | -17.5 | -120 | 20 | 29.7 | -15.7 | | |
| 4 | -20.2 | | | 4.5 | 0 | | |
| 5 | -14.9 | -101 | 18.2 | 8.3 | -5.8 | | |
| 6 | | | | 19 | -7.1 | | |
| 7 | -21.8 | -153 | 21.4 | 2.5 | 0 | | |
| 8 | | | | 17.7 | -16.1 | -121 | 7.8 |
| 9 | | | | 26.2 | -11.4 | | |
| 10 | -17.7 | -122 | 19.6 | 7 | -9.9 | | |
| 11 | -15.9 | -99 | 28.2 | 58 | -5.2 | | |
| 12 | -18 | -125 | 19 | 0 | 0 | | |
| 13 | -11.4 | -68 | 23.2 | 5.5 | -2.3 | | |
| 14 | | | | 33.6 | -2.8 | -13 | 9.4 |
| 15 | | | | 3 | -4.5 | | |
| 16 | | | | .4 | 0 | | |
| 17 | | | | 21 | -4 | | |
| 18 | -13.3 | -90 | 16.4 | 2 | 0 | | |
| 19 | -11.7 | -73 | 20.6 | 70.1 | -4.8 | | |
| 20 | | | | 41.4 | -3.3 | | |
| 21 | -12.2 | -84 | 13.6 | 26.1 | -4.4 | -30 | 5.2 |
| 22 | | | | 28.6 | 0 | | |
| 23 | | | | 0 | 0 | | |
| 24 | | | | 19.9 | -3.3 | | |
| 25 | | | | 26.5 | -2.3 | | |
| 26 | -10.3 | -68 | 14.4 | 41.5 | -5.1 | | |
| 27 | -8 | -54 | 10 | 34.8 | -1.5 | | |
| 28 | | | | 8.1 | -1.7 | -1 | 12.6 |
| 29 | | | | 15.7 | -3.1 | | |
| 30 | | | | 15.7 | -1.3 | | |
| 31 | | | | 14.3 | 0 | | |

TOTAL PRECIPITATION = 604.2 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| -14.83 | -96.41 | 18.7 | -5.72 | 8.85 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| 4.10 | 29.25 | 4.7 | 4.13 | 2.5 |

MANAUS DATA : MARCH 1980

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | -9.8 | -61 | 17.4 | 0 | | | |
| 4 | | | | 8.5 | -1 | | |
| 5 | -8.8 | | | 0 | | | |
| 6 | -10.7 | -67 | 18.6 | 0 | | | |
| 7 | -10.6 | -91 | -6.2 | 0 | | | |
| 8 | | | | 41 | -8.1 | | |
| 9 | | | | 0 | | | |
| 10 | | | | 2.2 | -8.9 | -73 | -1.8 |
| 11 | | | | 1.9 | -7.3 | | |
| 12 | | | | 1 | -.4 | | |
| 13 | | | | 17 | -2.8 | | |
| 14 | | | | 0 | | | |
| 15 | | | | 13 | -2.4 | | |
| 16 | | | | 0 | | | |
| 17 | | | | 35 | -5.6 | -28 | 16.8 |
| 18 | | | | 0 | | | |
| 19 | -17 | -151 | -15 | 5.7 | -4.1 | | |
| 20 | -12.4 | -114 | -14.8 | 20 | -4.6 | | |
| 21 | | | | 0 | | | |
| 22 | | | | 50.3 | -8.2 | | |
| 23 | | | | 0 | | | |
| 24 | -13.7 | -96 | 13.6 | 0 | | | |
| 25 | -12.2 | -82 | 15.6 | 3.5 | -1.9 | | |
| 26 | | -61 | | 33.2 | -6.3 | -41 | 9.4 |
| 27 | | | | .5 | | | |
| 28 | -10.7 | | | 0 | | | |
| 29 | | | | 8 | -1.4 | | |
| 30 | | | | 0 | | | |
| 31 | -13.7 | -96 | 13.6 | 3 | -2 | | |

TOTAL PRECIPITATION IS 243.8 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -11.96 | -91 | 5.35 | -5.79 | 12.7 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 2.38 | 28.8 | 14.71 | 2.37 | 4.5 |

BELEM DATA : APRIL 1980

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | ***** | *** | ***** | ***** | **** | *** | ***** |
| 1 | -12 | -77 | 19 | 0 | | | |
| 2 | | | | 14.2 | -2 9 | | |
| 3 | | | | 15 3 | -2.2 | | |
| 4 | | | | 0 | | | |
| 5 | | | | 40.3 | -1.1 | -11 | -2.2 |
| 6 | | | | 20.4 | | | |
| 7 | | | | 3.3 | -8.5 | | |
| 8 | | | | 6.2 | -3.7 | | |
| 9 | -10.3 | -68 | 14.4 | 7.1 | -5.2 | 34 | 7.6 |
| 10 | | | | 11.6 | -4.8 | | |
| 11 | -12.7 | -84 | 17.6 | 21 | -3.9 | -17 | 14.2 |
| 12 | | | | 51 | -6.3 | | |
| 13 | | | | 17.7 | -5 7 | | |
| 14 | | | | 0 | | | |
| 15 | -12.6 | -77 | 23.8 | 18 | -2.2 | | |
| 16 | | | | .6 | -3 | | |
| 17 | | | | 23.6 | -3.9 | -18 | 13.2 |
| 18 | | | | 9.4 | -1.8 | | |
| 19 | | | | 4.8 | | | |
| 20 | | | | 17.6 | -2 | | |
| 21 | | | | 14.5 | -1.8 | | |
| 22 | | | | 10.1 | -1 6 | | |
| 23 | -11.6 | -74 | 18.8 | 1.5 | -2.1 | -5 | 11.8 |
| 24 | -9.6 | -59 | 17.8 | 6.7 | -1.7 | | |
| 25 | | | | 26.8 | -1.5 | | |
| 26 | | | | 2.4 | -1.3 | | |
| 27 | | | | 20.3 | -5.4 | | |
| 28 | | | | 1 | | | |
| 29 | -11.1 | -73 | 15 8 | 8.8 | - 7 | -9 | -3.4 |
| 30 | -11.5 | | | 0 | | | |

TOTAL PRECIPITATION = 374.2 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ******* |
| -11.42 | -73.14 | 18.1 | -3.35 | 5.5 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| 1.07 | 7.90 | 2.9 | 1.95 | 7.8 |

MANAUS DATA APRIL 1930

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | -10.6 | -70 | 14.8 | 70 | -7.9 | | |
| 2 | 12.4 | -89 | 10.2 | 0 | | | |
| 3 | | | | 62.2 | -5.2 | | |
| 4 | | | | 0 | | | |
| 5 | | | | 0 | | | |
| 6 | | | | 0 | | | |
| 7 | -17.4 | -122 | 17.2 | 0 | | | |
| 8 | | | | 8 | 1.1 | -2 | 6.8 |
| 9 | | | | 0 | | | |
| 10 | -12 6 | -91 | 9.8 | 10 | -6 | | |
| 11 | -12.3 | | | 0 | | | |
| 12 | | | | 24 | -9 1 | -60 | 12.8 |
| 13 | | | | 0 | | | |
| 14 | 19.3 | -135 | 19.4 | 0 | | | |
| 15 | -15.4 | -109 | 14.2 | 2.4 | -8.3 | | |
| 16 | -14 3 | -99 | 15.4 | 0 | | | |
| 17 | -14.7 | -101 | 16 6 | 0 | | | |
| 18 | | | | 0 | | | |
| 19 | | | | 5.2 | -2.9 | | |
| 20 | | | | 0 | | | |
| 21 | | | | 0 | | | |
| 22 | | | | 15 | -2.8 | | |
| 23 | -11.6 | | | 28 | -2.7 | | |
| 24 | -13 | -88 | 16 | 0 | | | |
| 25 | -10.1 | | | 0 | | | |
| 26 | | | | 18 | -3.7 | | |
| 27 | | | | 0 | | | |
| 28 | -10.8 | | | 0 | | | |
| 29 | -12.2 | | | 0 | | | |
| 30 | | | | 0 | | | |

TOTAL PRECIPITATION IS 242 8 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -13.33 | -100.44 | 14.8 | -5.69 | 11.3 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 2.63 | 19.48 | 3.1 | 2.32 | 2.6 |

BELEM DATA MAY 1980

| DAY | BV18 | BV2 | DVB | BP | BP18 | BP2 | DPB |
|---|---|---|---|---|---|---|---|
| *** | **** | *** | ***** | ***** | **** | *** | **** |
| 1 | | | | 0 | | | |
| 2 | | | | 0 | | | |
| 3 | | | | 21.6 | -3.2 | | |
| 4 | | | | 8.6 | -1.5 | | |
| 5 | | | | .7 | | | |
| 6 | -9.8 | -63 | 15.4 | 20.2 | -1 7 | | |
| 7 | -9.3 | -60 | 14.4 | 4.3 | | | |
| 8 | -9.9 | -63 | 16.2 | 0 | | | |
| 9 | -8..2 | | | 0 | | | |
| 10 | | | | 7.6 | -2 1 | | |
| 11 | | | | 2.9 | .4 | | |
| 12 | | | | 3.8 | -2.5 | | |
| 13 | | | | 21.4 | -1 7 | | |
| 14 | | | | 19 | -1 9 | | |
| 15 | | | | 14.2 | -.8 | | |
| 16 | | | | 4.8 | -1.1 | | |
| 17 | | | | .8 | | | |
| 18 | | | | 14.3 | -4.8 | | |
| 19 | | | | 0 | | | |
| 20 | | | | 1 | -.2 | | |
| 21 | | | | .3 | | | |
| 22 | | | | 1.7 | .4 | | |
| 23 | | | | 0 | | | |
| 24 | | | | 0 | | | |
| 25 | | | | .1 | | | |
| 26 | | | | 15.8 | -1.8 | | |
| 27 | | | | 0 | | | |
| 28 | | | | .3 | | | |
| 29 | | | | 16 | -1 2 | -2 | 7.6 |
| 30 | | | | 10.6 | - 6 | | |
| 31 | | | | .6 | | | |

TOTAL PRECIPITATION = 190.6 MM

| MEANBV18 | MEANBV2 | MEANDVB | AWMBP18 | AWMDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******* | ****** |
| -9.3 | -62 | 15.3 | -1.9 | 7.6 |

| STNDBV18 | STNDBV2 | STNDDVB | STDAWP18 | STDAWDPB |
|---|---|---|---|---|
| ******** | ******* | ******* | ******** | ******** |
| .77 | 1.7 | .90 | 1.13 | 0 |

MANAUS DATA : MAY 1980

| DAY | MV18 | MV2 | DVM | MP | MP18 | MP2 | DPM |
|---|---|---|---|---|---|---|---|
| 1 | | | | 0 | | | |
| 2 | -11.4 | -74 | 17.2 | 0 | | | |
| 3 | | | | 15.6 | -3.1 | | |
| 4 | | | | 0 | | | |
| 5 | | | | 3.5 | -4.3 | | |
| 6 | | | | 0 | | | |
| 7 | -10.6 | -72 | 12.8 | 5.4 | -1.8 | -3 | 11.4 |
| 8 | -11.1 | -74 | 14.8 | 0 | | | |
| 9 | -10.3 | -67 | 15.4 | 0 | | | |
| 10 | | | | 3 | .1 | | |
| 11 | | | | 0 | | | |
| 12 | -13.5 | -88 | 20 | 0 | | | |
| 13 | -8.9 | -55 | 16.2 | 0 | | | |
| 14 | -7.9 | -51 | 12.2 | .7 | | | |
| 15 | -9.3 | -61 | 13.4 | 13.4 | .2 | | |
| 16 | -10.3 | -66 | 16.4 | 0 | | | |
| 17 | | | | 0 | | | |
| 18 | | | | 0. | | | |
| 19 | -11.1 | -72 | 16.8 | 0 | | | |
| 20 | -9 8 | -67 | 11.4 | 0 | | | |
| 21 | - 10.4 | -67 | 16.2 | 12.2 | -1.4 | | |
| 22 | -9.8 | | | 0 | | | |
| 23 | -10.4 | | | 10 | -1.8 | -7 | 7.4 |
| 24 | | | | 0 | | | |
| 25 | | | | 0 | | | |
| 26 | -9 | -58 | 14 | 0 | | | |
| 27 | -11.3 | -77 | 13.4 | 0 | | | |
| 28 | -7.9 | -48 | 15.2 | 11.5 | -1.9 | | |
| 29 | | | | 3 | -.7 | | |
| 30 | -8 | -54 | 10 | 0 | | | |
| 31 | | | | 28 | -3.8 | | |

TOTAL PRECIPITATION IS 106.3 MM

| MEANMV18 | MEANMV2 | MEANDVM | AWMMP18 | AWMDPM |
|---|---|---|---|---|
| -10.05 | -65.68 | 14.7 | -2.2309 | 8.80 |

| STNDMV18 | STNDMV2 | STNDDVM | SDAWMP18 | SDAWDPM |
|---|---|---|---|---|
| 1.42 | 10.67 | 2.4 | 1.41 | 1.97 |

PRECIPITATION DATA: JUNE 1980

| | BELEM DATA | | | | MANAUS DATA | | | |
|---|---|---|---|---|---|---|---|---|
| DAY | BP | BP18 | BP2 | DPB | MP | MP18 | MP2 | DPM |
| 1 | 0 | | | | 0 | | | |
| 2 | 0 | | | | 0 | | | |
| 3 | 0 | | | | 2.5 | -1.6 | | |
| 4 | 6 | | | | 0 | | | |
| 5 | 10 9 | .8 | | | 25 | -2.9 | -11 | 12.2 |
| 6 | 30 | -2.2 | | | 0 | | | |
| 7 | 0 | | | | 3 | -.9 | | |
| 8 | 26.3 | -3.4 | | | 0 | | | |
| 9 | 1.1 | | | | 5 | | | |
| 10 | 4.3 | | | | 0 | | | |
| 11 | 3 | | | | 0 | | | |
| 12 | 3.5 | 1 | 13 | 5 | 0 | | | |
| 13 | 7 | | | | 0 | | | |
| 14 | 1 | | | | 0 | | | |
| 15 | 0 | | | | 0 | | | |
| 16 | 2 2 | | | | 6 | .4 | | |
| 17 | 8.7 | -.6 | | | 17 | -2.4 | | |
| 18 | 10.9 | -.7 | | | 0 | | | |
| 19 | .8 | -.5 | | | .5 | | | |
| 20 | 0 | | | | 0 | | | |
| 21 | 1.7 | | | | 12 | -.7 | 14 | 19.6 |
| 22 | 0 | | | | 0 | | | |
| 23 | .6 | | | | 0 | | | |
| 24 | 26.6 | -1.8 | | | 0 | | | |
| 25 | .1 | | | | 0 | | | |
| 26 | 0 | | | | 0 | | | |
| 27 | 0 | | | | 0 | | | |
| 28 | 0 | | | | 9 | 6 | | |
| 29 | .7 | | | | 0 | | | |
| 30 | 25.9 | .4 | 11 | 7.8 | 5 | .6 | 0 | 0 |
| SUM = | 165.9 | | | | 85 | | | |

| AWMBP18 | AWMDPB | AWMMP18 | AWMDPM |
|---|---|---|---|
| -1.47 | 7.46 | -1.69 | 14.6 |

| SDAWBP18 | STDAWDPB | SDAWMP18 | STDAWDPM |
|---|---|---|---|
| 1.31 | .92 | 1.13 | 3.51 |

PRECIPITATION DATA. JULY 1980

| | BELEM DATA | | | | MANAUS DATA | | | |
|---|---|---|---|---|---|---|---|---|
| DAY | BP | BP18 | BP2 | DPB | MP | MP18 | MP2 | DPM |
| *** | ***** | **** | *** | ***** | ***** | **** | *** | ***** |
| 1 | 0 | | | | 1 | -1 1 | | |
| 2 | 24 7 | -.6 | | | 0 | | | |
| 3 | 11.6 | -1.2 | | | 11 | -1.5 | 6 | 18 |
| 4 | 3.5 | | | | 0 | | | |
| 5 | 2 | 1.5 | | | 10 | -1.1 | | |
| 6 | 19.2 | —1.4 | | | 0 | | | |
| 7 | 0 | | | | .5 | | | |
| 8 | 2 4 | | | | 0 | | | |
| 9 | 32.6 | | | | 0 | | | |
| 10 | 0 | | | | 0 | | | |
| 11 | 0 | | | | 27 | -1.8 | | |
| 12 | .1 | | | | 0 | | | |
| 13 | 14 | | | | 0 | | | |
| 14 | 10.7 | -1.3 | 2 | 12.4 | 0 | | | |
| 15 | 16 | -.5 | | | 2.4 | | | |
| 16 | 0 | | | | 1 | +2.1 | 21 | 4.2 |
| 17 | .2 | | | | 0 | | | |
| 18 | 4.2 | -.4 | | | 0 | | | |
| 19 | 0 | | | | 0 | | | |
| 20 | 2.7 | | | | 0 | | | |
| 21 | 0 | | | | 0 | | | |
| 22 | 8 | | | | 0 | | | |
| 23 | 12.6 | | | | 0 | | | |
| 24 | 11.1 | -.4 | | | 0 | | | |
| 25 | .2 | | | | 1 | +2.2 | | |
| 26 | 2.8 | -.7 | | | 0 | | | |
| 27 | 0 | | | | 0 | | | |
| 28 | 0 | | | | 0 | | | |
| 29 | 4 | .5 | 5 | 9 | 12.5 | -3.8 | | |
| 30 | .4 | | | | 0 | | | |
| 31 | 0 | | | | 0 | | | |
| SUM = | 174 | | | | 66.4 | | | |

| AWMBP18 | AWMDPB | AWMMP18 | AWMDPM |
|---|---|---|---|
| ******* | ******* | ******* | ****** |
| -.84 | 11.47 | -1.89 | 16.85 |

| SDAWBP18 | STDAWDPB | SDAWMP18 | STDAWDPM |
|---|---|---|---|
| ******** | ******** | ******** | ******** |
| 40 | 1.56 | 1.17 | 3.98 |

TABLE No. 2 – Mean difference between the "d" parameter and $\delta^{18}O$ of the precipitation and vapour at Belém [ Δ (DPB–DVB) and Δ (BP18–BV18), respectively ] and at Manaus [ Δ (DPM–DVM) and Δ (MP18–MV18)]. Data given are for rain days only, (number of cases averaged "n" is given in brackets). The average difference between the total monthly amount weighted data for precipitation and of the mean monthly vapour samples are given in square brackets

| | BELEM | | MANAUS | |
|---|---|---|---|---|
| Month | Δ(DPB-DVB) ("d" in ‰) | Δ(BP18-BV18) ($\delta^{18}O$ in ‰) | Δ(DPM-DVM) ("d" in ‰) | Δ(MP18-MV18) ($\delta^{18}O$ in ‰) |
| Aug. 1978 | 0.7±3.5 (n=9) | 9.2±1.5 [8.9] | 6.0± 1.1 (n=2) | 7.0±2.2 [7.8] |
| Sept. 1978 | -2.6±5.7 (n=13) | 9.6±1.4 [9.2] | 6.1± 5.2 (n=4) | 8.9±1.4 [9.0] |
| Oct. 1978 | 0.1±7.9 (n=10) | 9.9±2.6 [7.7] | 1.2± 5.0 (n=7) | 8.5±1.0 [8.2] |
| Nov. 1978 | 0.4±4.5 (n=11) | 9.4±1.0 [9.7] | 5.6± 2.5 (n=2) | 8.3±0.8 [8.1] |
| Dec. 1978 | 3.5±5.1 (n=11) | 9.7±1.7 [8.8] | 3.7± 4.0 (n=2) | 10.3±2.6 [8.5] |
| Jan. 1979 | 0.6±5.0 (n=10) | 9.8±2.1 [9.5] | - | - |
| Febr. 1979 | 3.6±6.5 (n=15) | 10.0±2.0 [7.2] | 0.2± 4.6 (n=6) | 8.5±1.6 [5.9] |
| March 1979 | 0.3±5.4 (n=16) | 9.5±1.9 [8.6] | 3.8± 5.6 (n=8) | 6.4±1.7 [6.7] |
| Apr. 1979 | 0.9±6.0 (n=10) | 9.9±3.2 [8.4] | 3.2±16.0 (n=3) | 2.9±2.3 [1.8] |
| May 1979 | 0.3±6.0 (n=15) | 9.5±1.2 [9.0] | 1.1± 5.0 (n=2) | 6.8±0.5 [6.2] |
| June 1979 | 0.7±3.5 (n=5) | 9.5±1.4 [7.9] | 0.7±12.0 (n=2) | 9.4±1.5 [7.7] |
| July 1979 | -1.0±5.2 (n=6) | 10.1±1.2 [8.8] | - | 9.1 [9.8] |
| Aug. 1979 | 2.8±2.4 (n=9) | 9.3±0.8 [8.9] | - | - [8.8] |
| Sept. 1979 | -1.8±7.4 (n=9) | 10.2±1.4 [9.6] | - | - |
| Oct. 1979 | 0.9±6.0 (n=9) | 8.9±0.8 [9.3] | - | - |
| Nov. 1979 | - | 11.3±1.4 [10.0] | -2.4 (n=1) | 5.3 [8.6] |
| Dec. 1979 | 1.5±3.2 (n=4) | 8.3±2.5 | - | - |
| Average | 0.68±1.67 | 9.6±0.6 [8.85±.7] | 2.6± 2.7 | 7.6±2.0 [7.46±2.0] |

At Manaus, (where alas statistics is poorer because of the reduced nember of rain days) there are occasional days where the difference between rain and vapour isotopic composition appears to be significantly less than the equilibrium value for any reasonable temperature. Indeed, the absence of a continental isotope effect in the vapour data, noted before, necessarily will result in such a situation in view of 1–2‰ continental effect found for the isotopic composition of the precipitation between Belém and Manaus.

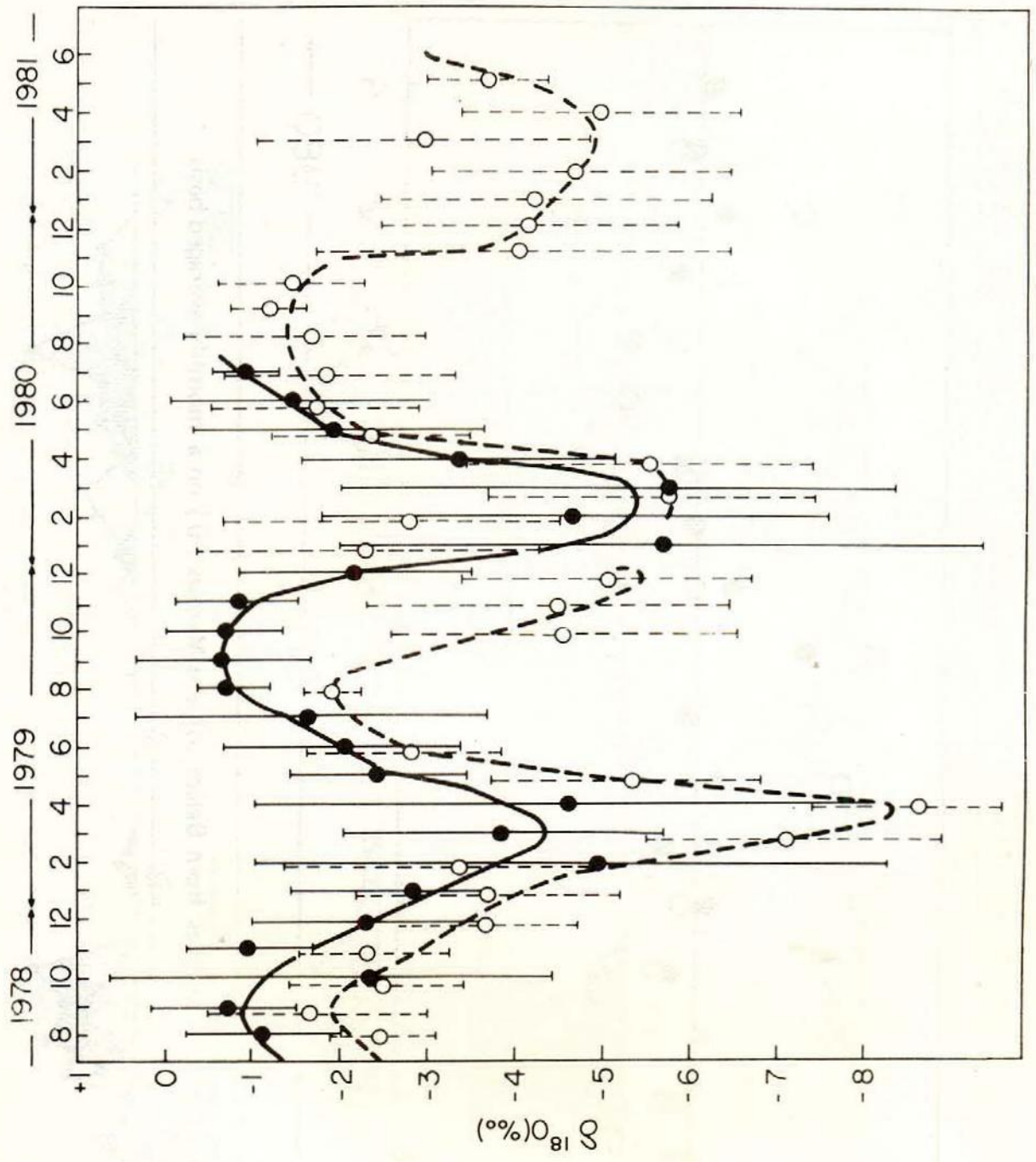


Fig. 5 — Monthly averaged isotopic value ($\delta^{18}O$) of the daily rain samples at Belém (o) and Manaus (O). Error bar signifying a 1 o value of the scatter around the mean.

We cannot completely rule out a sampling artifact in these data: some rain droplets may have found their way into the vapour-sampling orifice. A more reasonable explanation, however, is the incomplete overlap of the sampling periods of the rain and vapour collections. The detailed sampling of rain and vapour at 10 minute intervals, the data for which are given in Fig. 9, (private comm.) has indeed shown

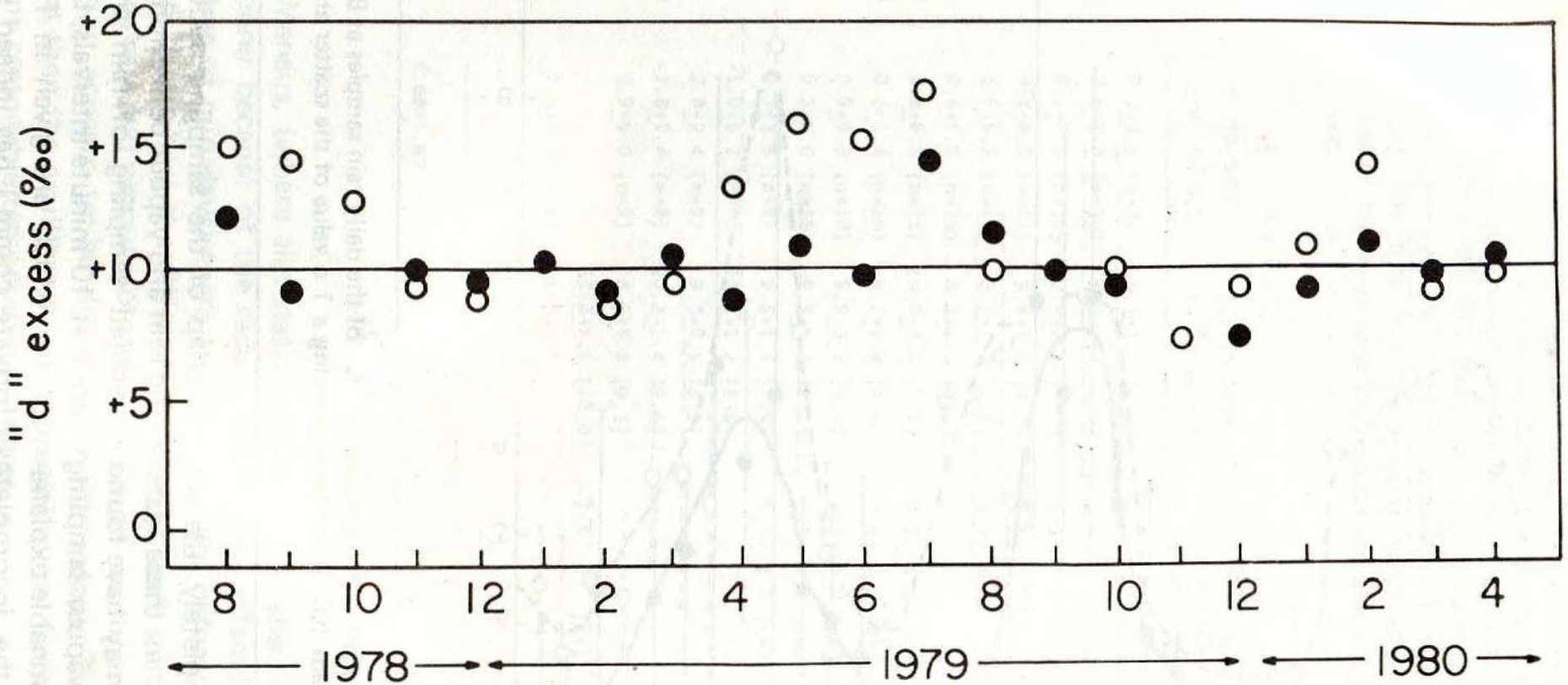


Fig. 6 – "d" – parameter of rain samples from Belém (o) and Manaus ( 0 ) on a monthly averaged basis.

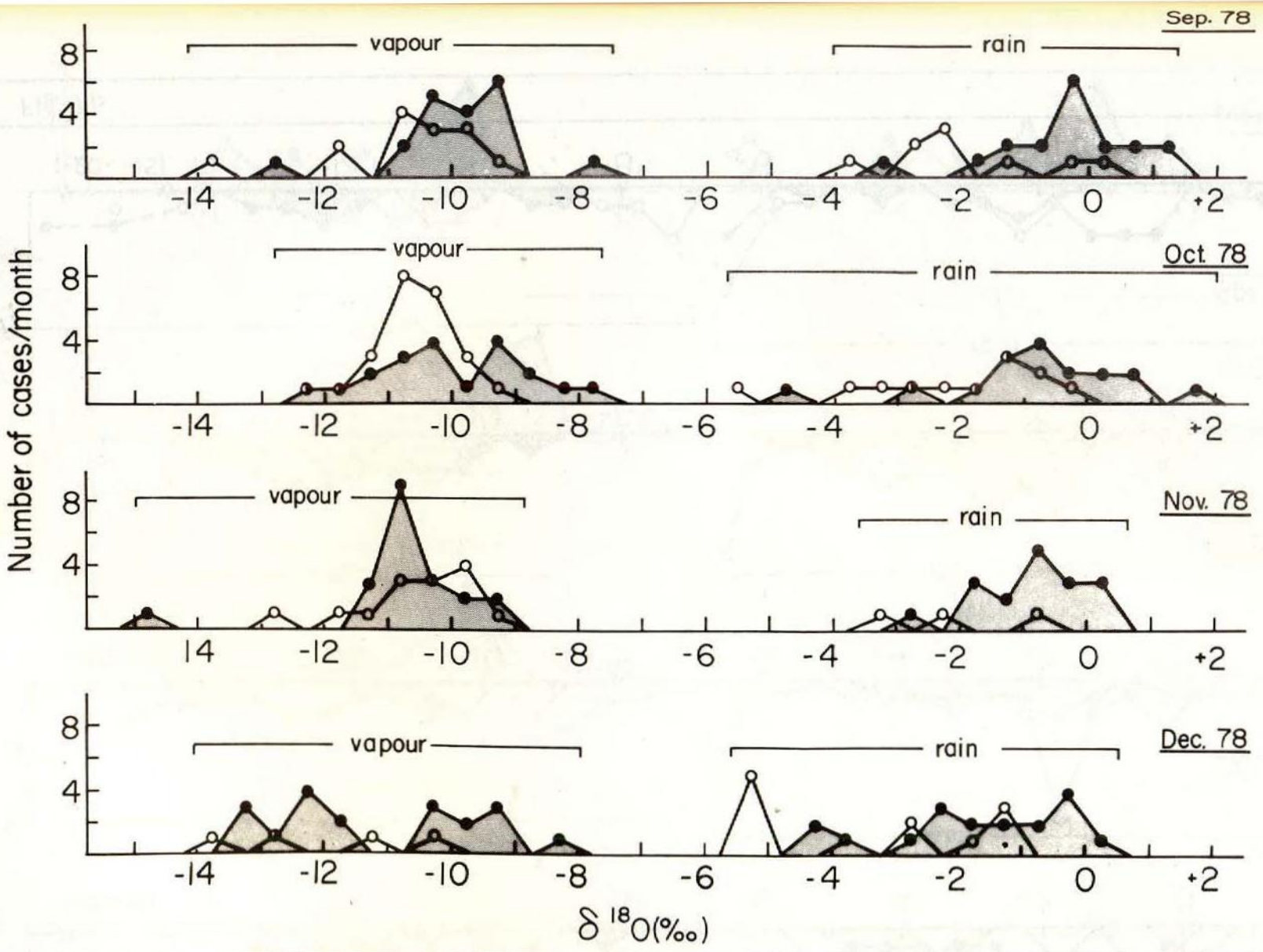


Fig. 7a – Frequency distribution of the isotopic values of rain and vapour samples (0.5‰ intervals): o – Belém data; O – Manaus data.

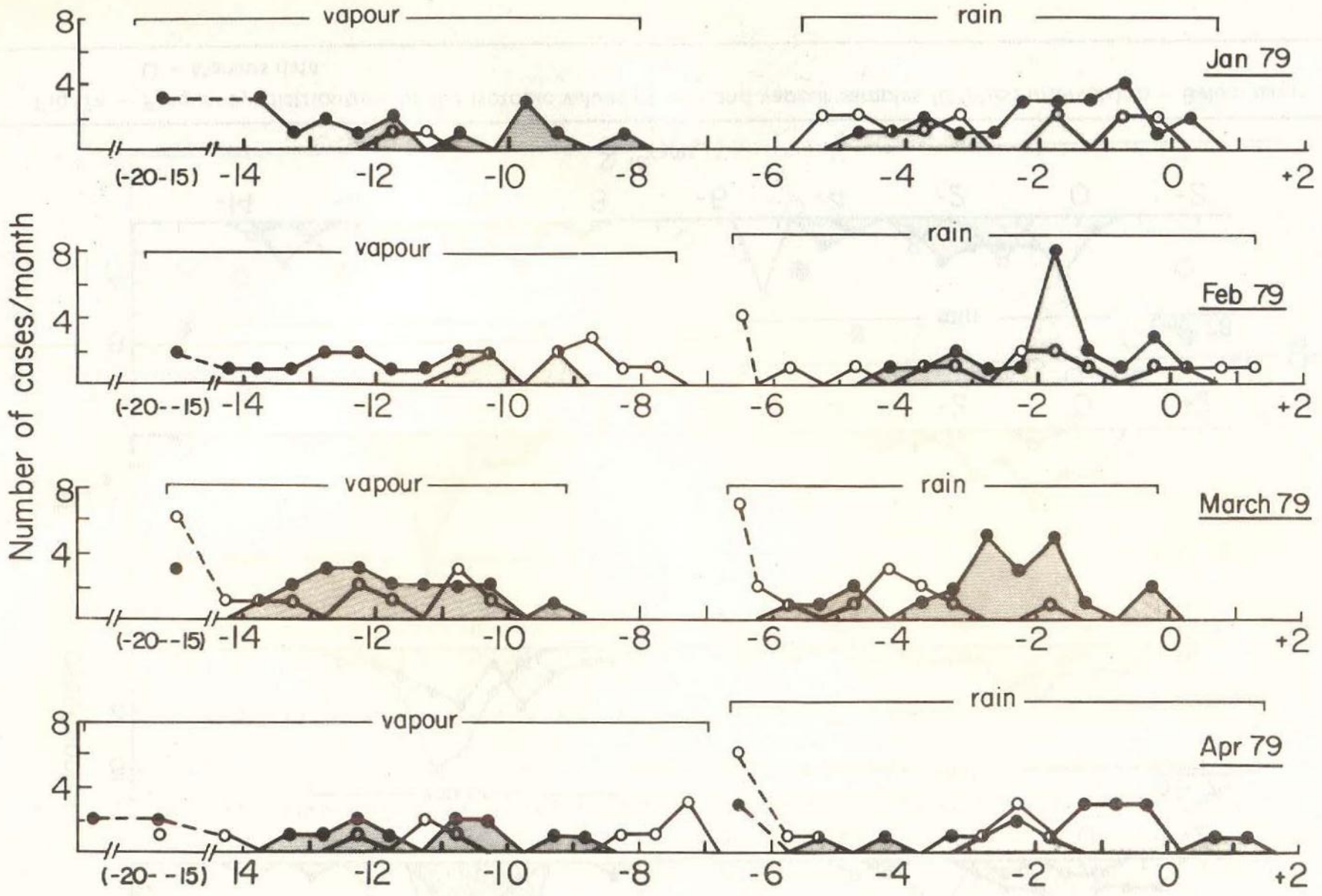
vapour
rain
Jan 79
Feb 79
March 79
Apr 79
Number of cases/month
8
4
(-20-15)
(-20--15)
(-20- -15)
-14
-12
-10
-8
-6
-4
-2
0
+2

Fig. 7 b

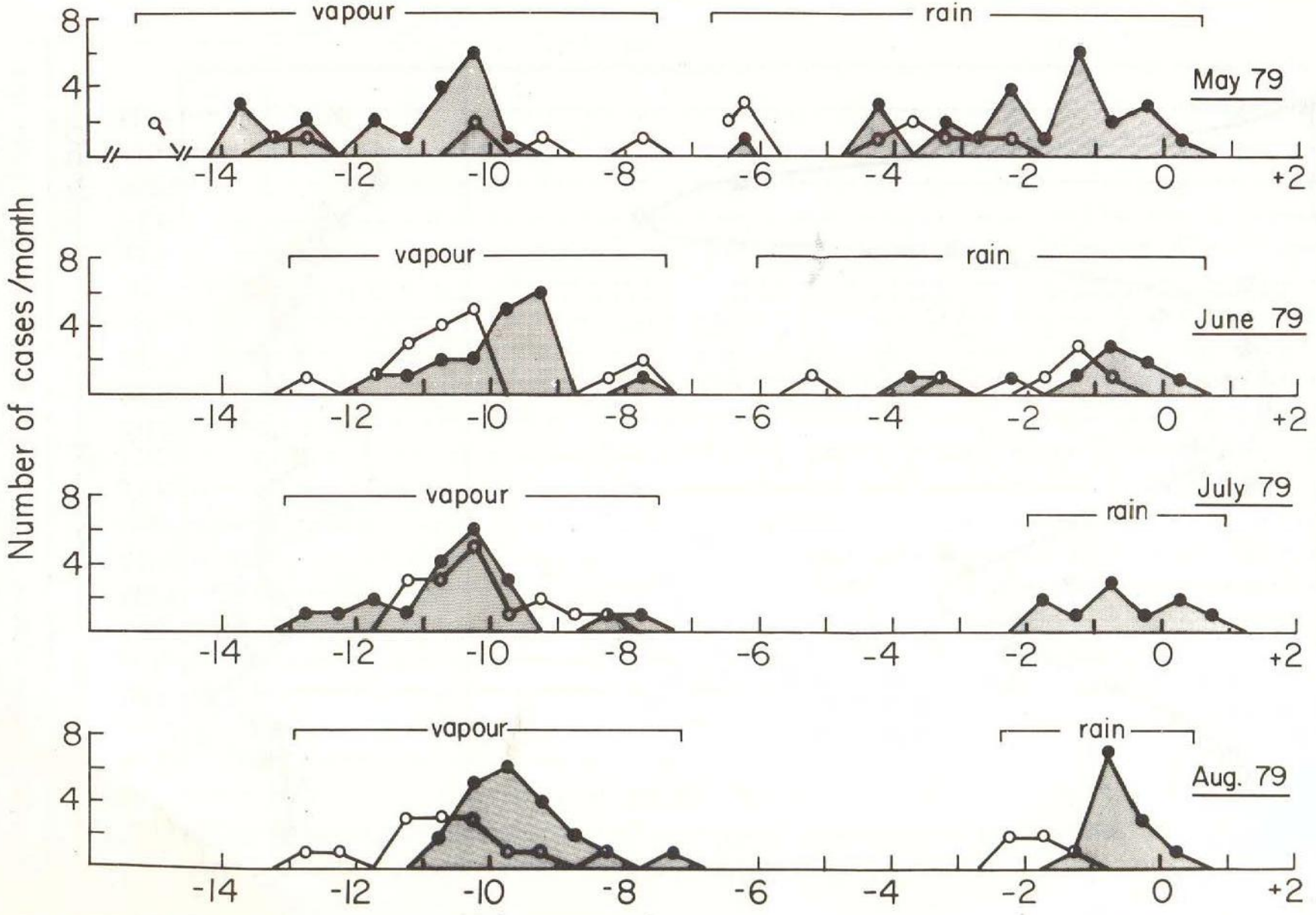
vapour
rain
May 79
June 79
July 79
Aug. 79
Number of cases/month
8
4
-14
-12
-10
-8
-6
-4
-2
0
+2

Fig. 7c

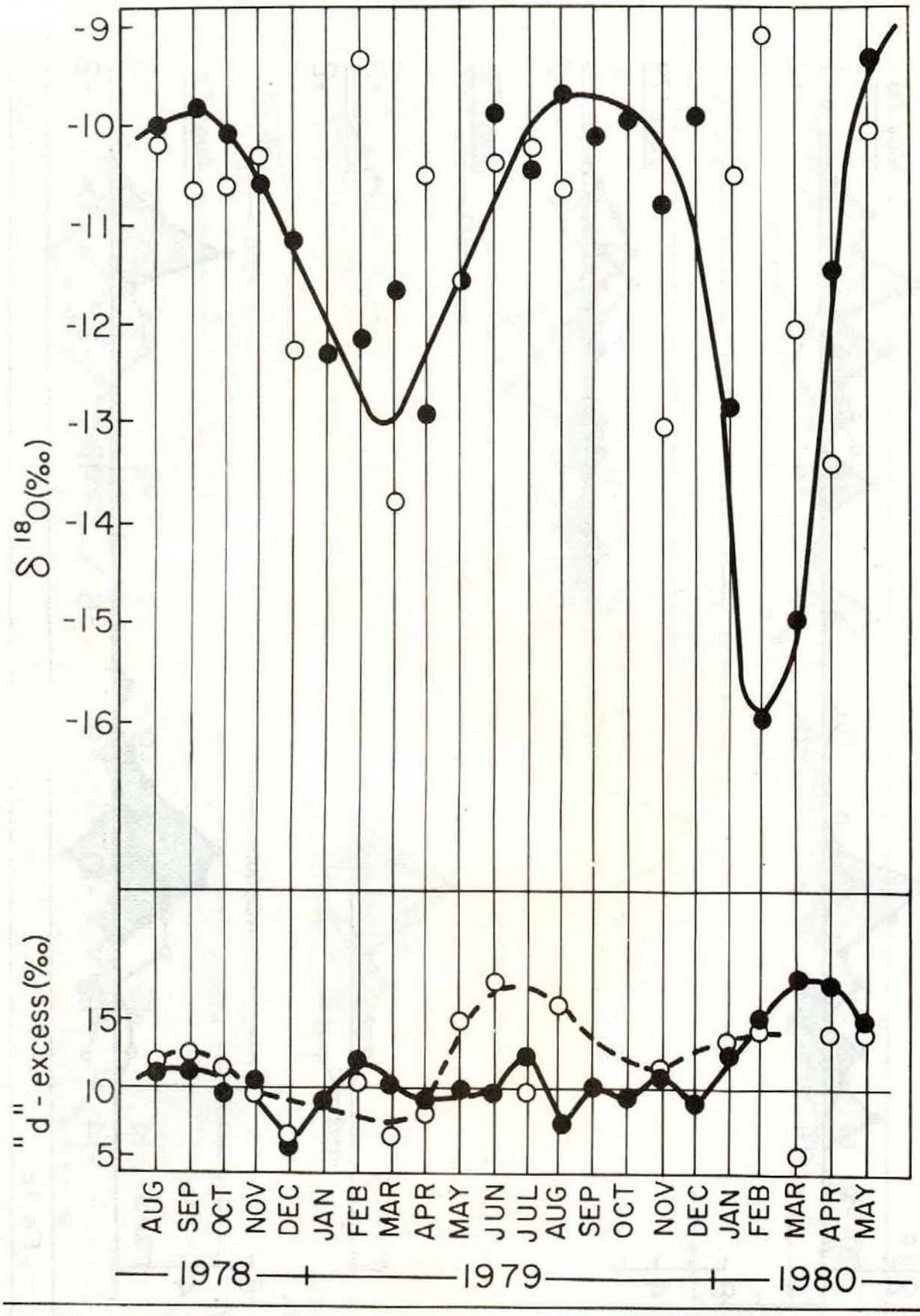


Fig. 8 – Monthly averaged isotopic values of daily vapour samples at Belém and Manaus ($\delta^{18}O$ values in upper curves, "d" – parameter at bottom of the figure). Belém data – o; Manaus data – O.

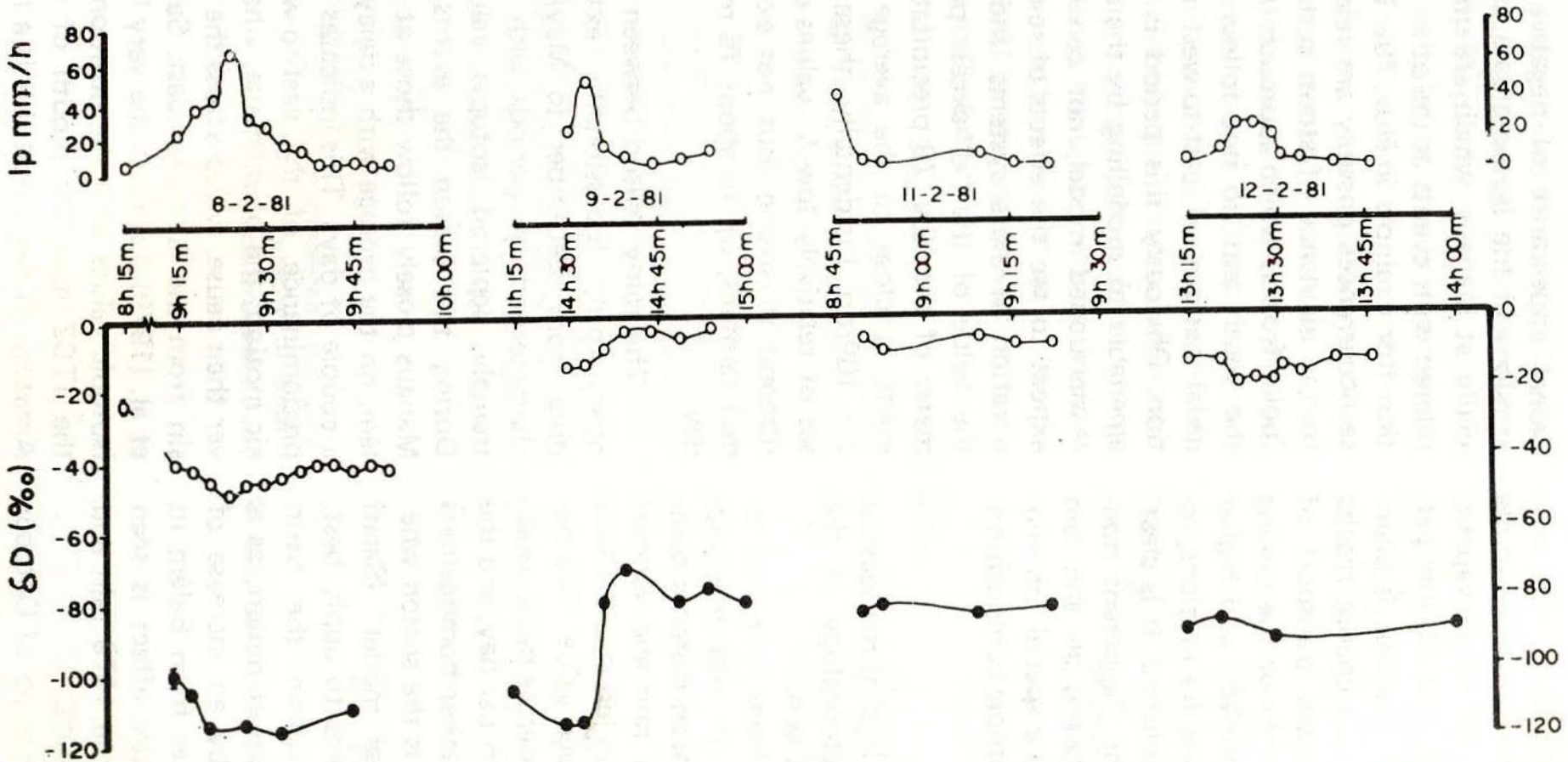


Fig. 9 — Isotope composition of simultaneously collected vapour and rain samples during showers at Manaus (10 minutes sampling intervals).

that the onset of rain is often associated with a marked change in the isotopic composition of the vapour, in such a way that equilibrium between rain and the vapour is maintained. Whether this change results from the downward transport of isotopes by the rain or the mixing effect between surface and higher air layers by convective motions, remains to be established. It is clear, however, that the "apparent non-equilibrium" between air and rain data is related to a spatial inhomogeneity in the isotopic composition.

## DISCUSSION

We note at least three seasons in the hydro-meteorology of the Central Amazon basin.

The period from June until late September is one with few fluctuations in the mean isotopic composition of both rain and vapour; values range within less than ±1°/oo around the average value. The period is one of moderate rains, usually less than 25mm per day, and the data indicate a rather homogenous hydromass. This is the season wherein the "regional model" (Salati et al., 1979) seems to apply best. Re-evaporation within the basin makes up the rainout deficit, as is confirmed also by an increase of the "d" parameter from Belém to Manaus (This latter effect is seen most clearly in the 1979 rain and the 1980 vapour data).

During the period of October to November we witness the occasional appearance of negative excursions in the isotopic data, especially at Manaus, which are uncorrelated with events at the other station (for example in Nov. 79). These occurrences possibly are related to the incidence of storm systems (polar fronts) which approach from the south and do not follow the usual pattern of east-to-west motion. Obviously this period is not amenable to modelling by the afore-mentioned model, nor can one expect to see the effects of re-evaporation in these systems. Indeed the value of the "d"-excess parameter of the Nov. 79 precipitation event is close to the average of d = 10°/oo. Incidentally, these cases of relatively low $\delta$ values correspond to strong (but not extreme) rainfalls, up to about 75 mm/day.

The rainy season between January-April, (ocassionally extending from December to May) is characterised by periods with extremely depleted isotopic values. During this season the events at Manaus closely follow those at Belém, on the average with a delay of a couple of days. This indicates the predominance of the east-to-west air motion; the phenomena, whatever their cause, sweep across the basin from the Atlantic coast. Salati et al. (1979) associate the very low isotopic values with the position of the ITCZ near the mouth of the Amazon. In any event this is a major large scale effect and atmosphe-

ric isotopic levels rarely revert back to the undisturbed marine values during this period.

In spite of the isothermy of the area and lack of clearcut frontal systems, the data suggest that many of the rainy episodes are related to events imposed on the basin from outside and that only the winter period is predominantly influenced by the internal processes within the basin. Presumably then, winter is the season whose precipitation pattern would be most influenced by any deforestation program in the basin.


**Resumo**

No período de agosto de 1978 a janeiro de 1980, foram feitas coletas diárias de amostras de águas de chuva e de vapor d'água do ar em Belém e Manaus, a fim de ampliar os conhecimentos a cerca de parâmetros ligados ao ciclo da água na bacia Amazônica. Estão apresentados os dados isotópicos referentes as amostras. Os valores mais negativos ocorreram durante o período chuvoso (janeiro-abril), atingindo muitas vezes, valores de $\delta^{18}O$ menores do que – 10°/oo. São discutidas as possíveis causas dessas composições.


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