NEUTRON MONITOR AT LOMNICKÝ ŠTÍT: BRIEF DESCRIPTION AND REVISED DATA FOR 12/1981-12/1999

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043 53 KOŠICE, SLOVAKIA

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1. INTRODUCTION.

This report includes a short description (chap. 2, p.3-7) of the device 8 NM 64 working at Lomnický štít from December 1981 until present and the plots of the following data: monthly averages over the whole period (p. 8), daily averages in each year (p. 9-13) and hourly values for each month separately (p 14-67). The data in digital form can be obtained at ultra.upjs.sk in pub/incoming/archiv/archivkk/LOMSTITARCHIV.

Lomnický štít Neutron Super Monitor of the Department of Space Physics, Institute of Experimental Physics, Slovak Academy of Sciences, Košice is continually in operation from December 1981 when it replaced the older 4 NM 64 one. In part 3 the plots of the revised pressure corrected data for the period 12/1981-12/1999 are presented. The revision with respect to our earlier reports (September 1993, May 1999) is due to two reasons. First is the change of barometric correction coefficient (the correct one already included in May 1999 report). Second is due to the checking of long term drift of the count rate of the sections A and B significant especially after July 1, 1993. This effect is now corrected by using sections C and D of the monitor.

The percentages are here normalized to 100 % level reached in September 1986 and representing 1,745.200 counts per hour. Data are obtained as sums of four sections including the linear drift corrections of sections A and B. Gaps in the graphs indicate the missing data.

Main characteristics of Lomnický štít station:

Detector type	SNM-15
Geographic latitude	49.20 N
Geographic longitude	20.22 E
Cutoff rigidity	3.84 GV
Altitude	2634 m
Mean barometric pressure	733.3 mb
Barometric coefficient	0.72 % per mb

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In the following parts a short schematic description of the device (part 2, prepared mainly by Vladimír Kollár) and the graphs of corrected data from Lomnický štít (part 3)are given.

2. DESCRIPTION OF THE NM- 64 COSMIC RAY MONITOR AT LOMNICKÝ ŠTÍT.

The network consists from the three basical parts included in scheme of Fig.1:

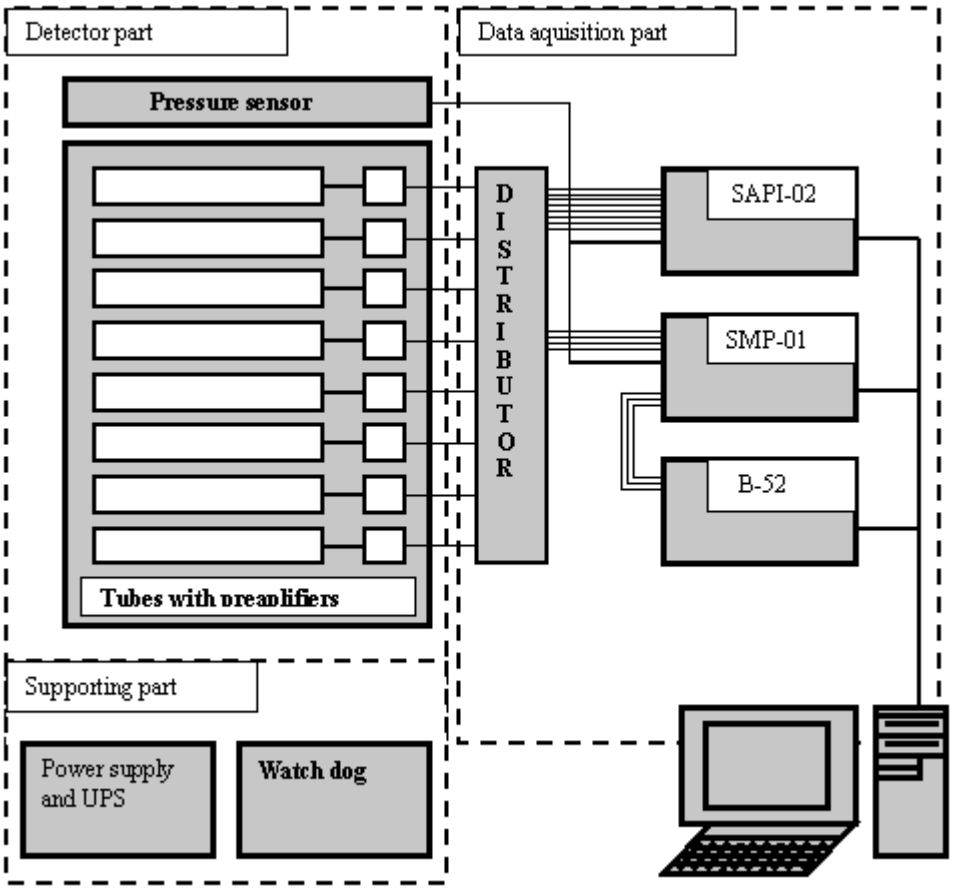


Fig. 1: *The block scheme of NM.*

2.1. THE DETECTOR PART

It consists of the 8 BF_3 neutron counters. The counters are proportional counters filled with boron trifluoride gas in whitch B^{10} isotope has been enriched to >90 per cent of the total boron. The quantity of B^{10} in the effective volume of each counter should be aproximely 2.1 x 10^{23} atoms. We have used former soviet union made type tubes CNM-15 (equivalent of NM-64 tube.) The counters are instaled in polyethylen tube of wall with thickness 2 cm and outside diameters 24 cm. The producer is of lead, of not less than 99.9 per cent purity in the form of cylinders 25 cm internal diameter and 35 cm outside diameter surround each of the counter. The cylinders are spaced apart 50 cm betwen centers. The lenght of each cylinder (solid lead) is 205 cm. The mass of lead is 1608 ± 10kg per counter. The detector unit consists of 8 counters installed in the reflector.
Reflector is a rectangular box, constructed of low-density polyethylene slabs of 7x 37cm.

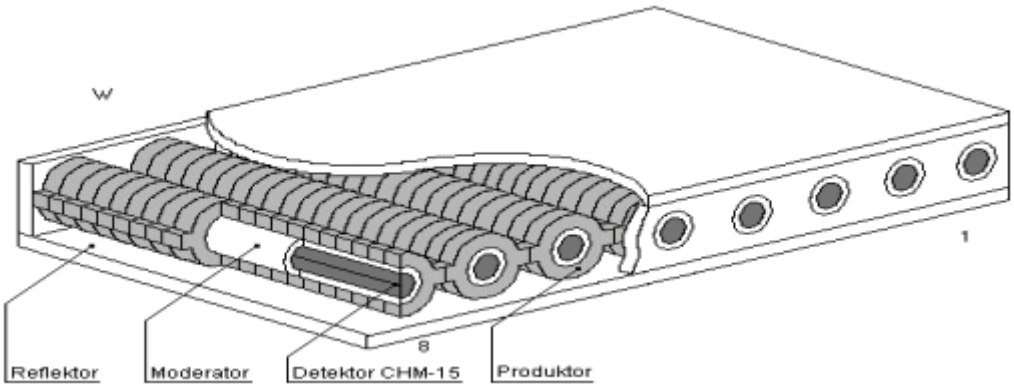


Fig. 2*: The detector composition*.

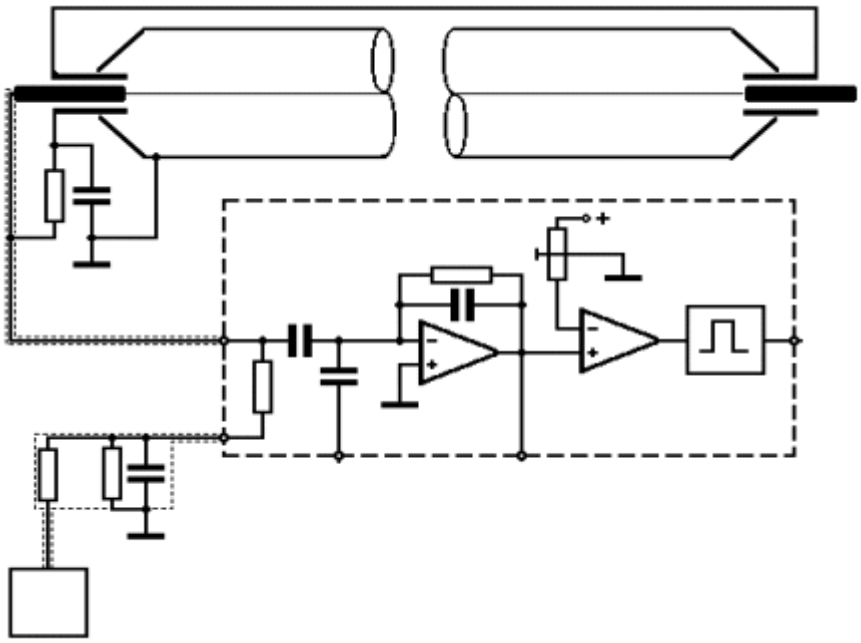


Fig. 3: *Scheme of electronic wiring of a detector tube and of preamlifier*.

The circuit comprising amplifier and discriminator should be attached to each counter as an integral part of the assembly. Level of the discrimination voltage is adjusted individually for each counter, depending on the quality of the counter tube. The next circuit, monostable generator provides impulses of the TTL level. This generator determining death time of full

network and time constant is set on the 14 microseconds.

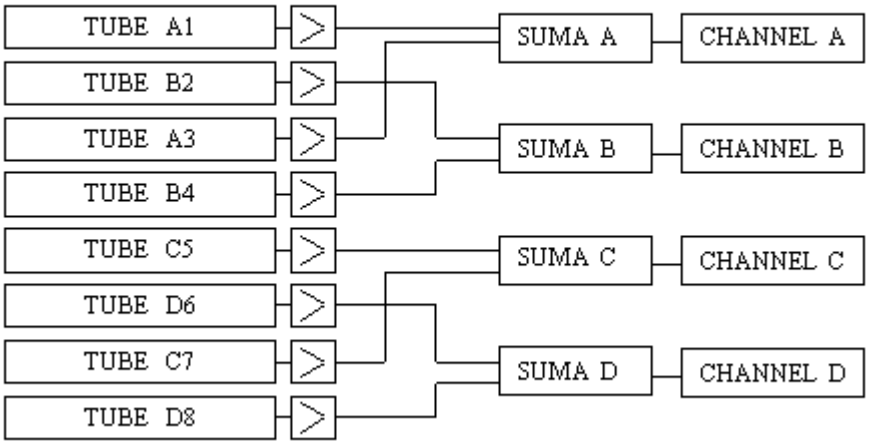


Fig.4: *Original way of connecting tubes into channels for SMP-01*.

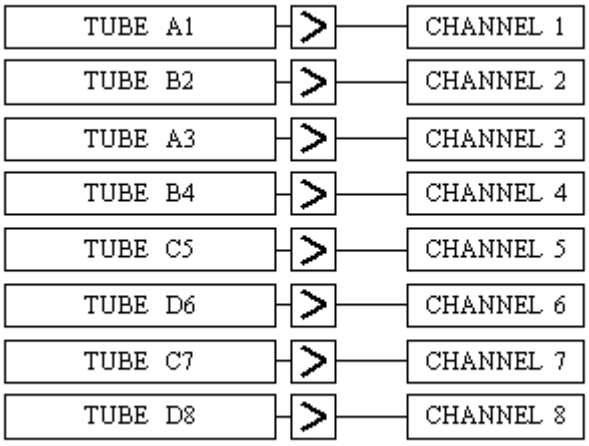


Fig.5: *The newer method of data aquisition for SAPI-02.*

2.2. DATA AQUISITION PART

At this time we are provided duplex system data aquisition. We have used two independent devices for data aquisition. The oldest one, SMP-01, is the logical automat, which is working from 1981 year. The newest, SAPI-02, is asembled on the the base microcomputer SAPI-02.

SMP-01 is independent unit, for continuous aquisition date across four ttl counters, where are recieved impulses from the distributor. It contains the block of counters, the time unit, the program proccesor unit, the air pressure meter, and the block of output interface. The outputs during years are changed from teletype, drive of puncher and latest serial port RS 232

SMP-01 is providing 1min, 5min and hourly data in four chanels.

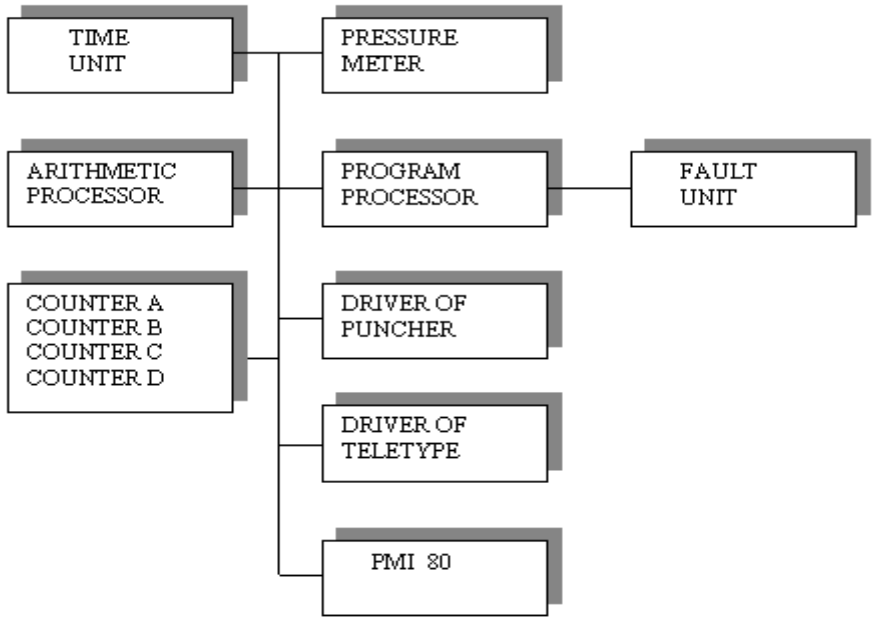


Fig.6: *The block scheme of SMP-01.*

SAPI-02 is an industrial microcomputer providing single data from each tube. This system is able to provide continuously the data to same as the SMP-01 and to give the information about each tube for diagnostic apparatus in time.

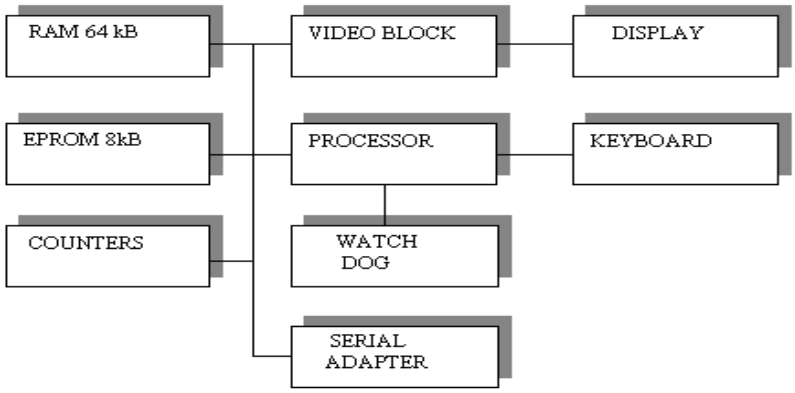


Fig.7. *The block scheme of SAPI-02*

2.3. PRESSURE MEASUREMENTS

Electronic pressure meter working on the principe distuning oscilator, where tuning is providing by pressure sensor. Pressure sensor is on the base aneroid boxes.

Stability of pressure meter depend from air temperature. Therefore pressure meter is located in thermoisolated box with thermostat.

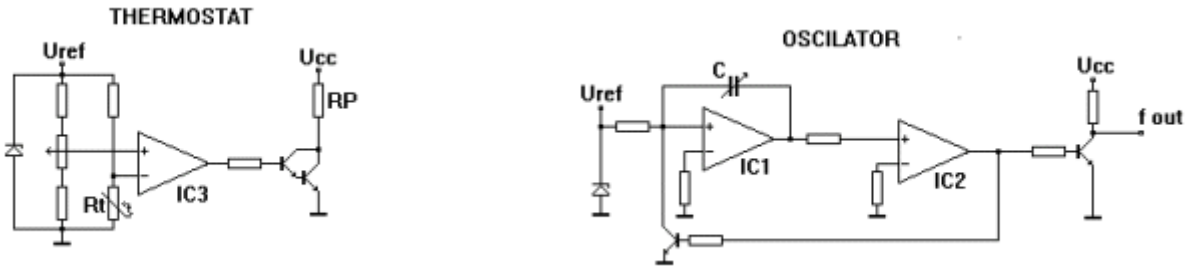


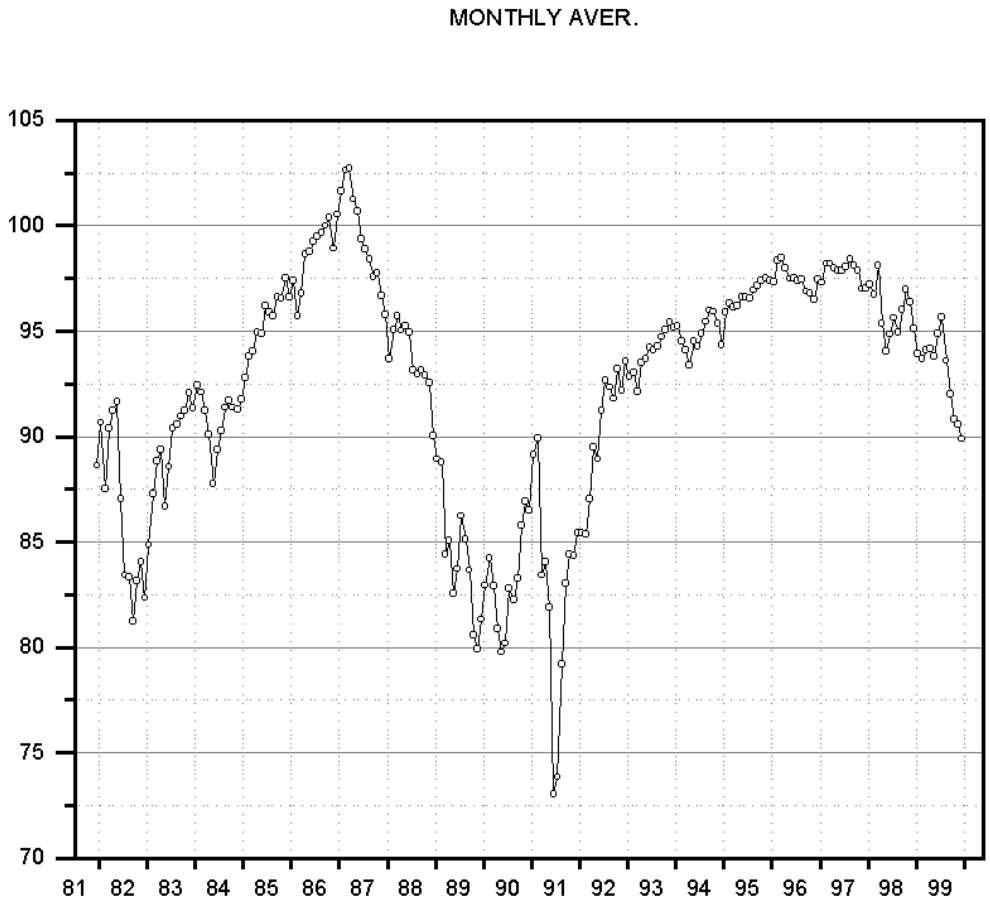
Fig.8: *Principial scheme of electronic pressure meter.*

2.4. SUPPORT PART.

For continuely meassurement is nessesery have sofistic power supply. The apparature is powerred from UPS 24V/250Ah. For all error of works of apparature electronic circuits have possibility made acustical allarm.

3. PLOTS OF PRESSURE CORRECTED COSMIC RAY INTENSITY.

3.1. MONTHLY AVERAGES.



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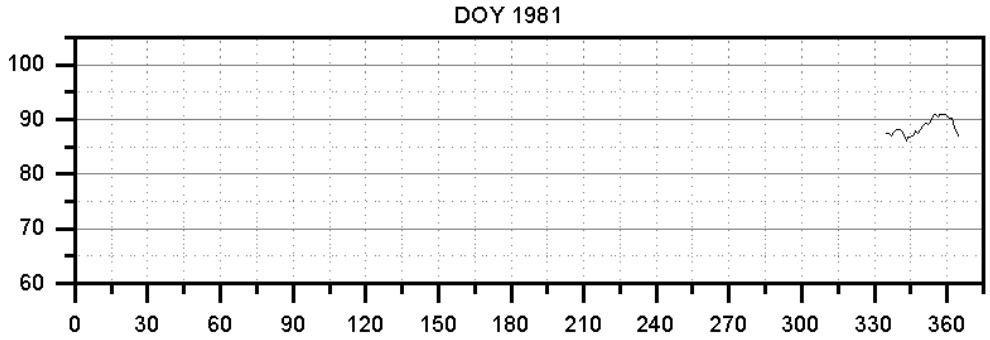

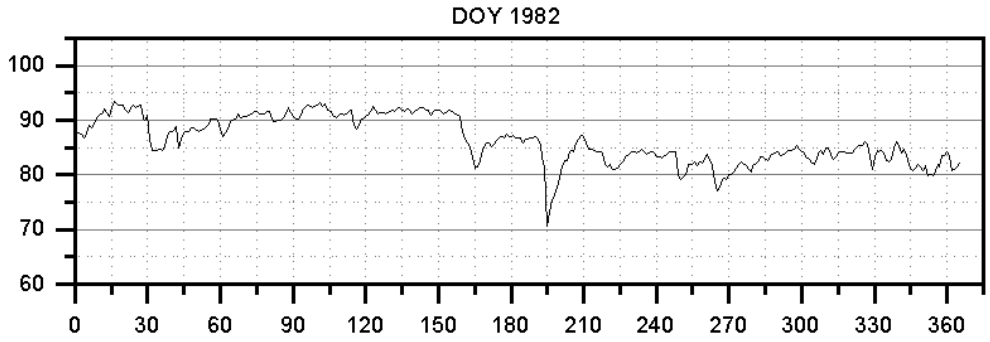

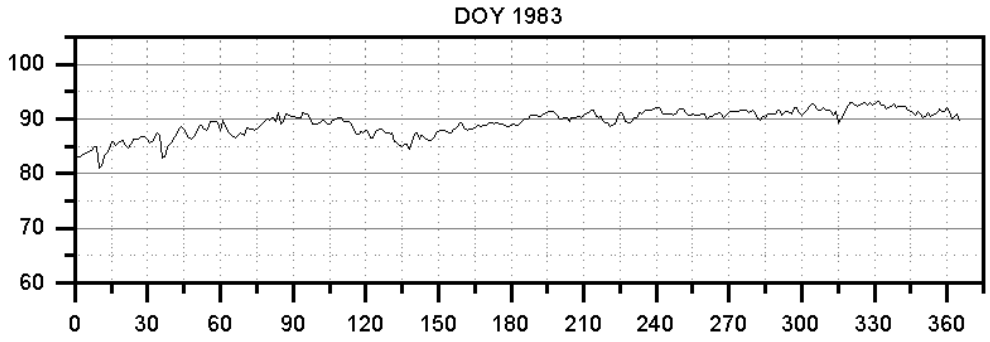

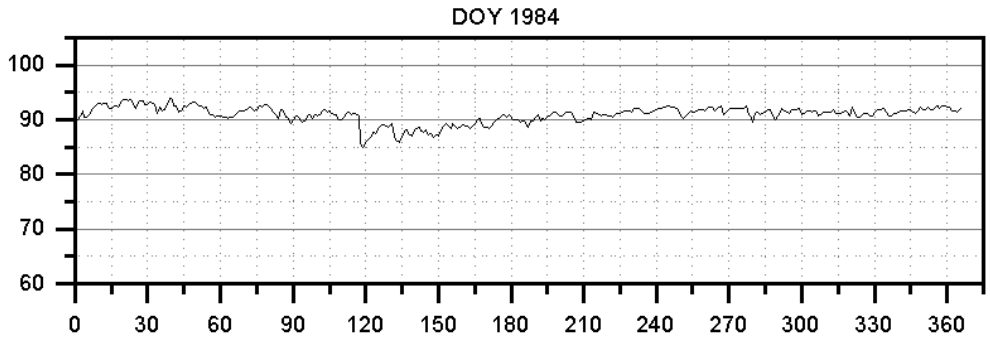

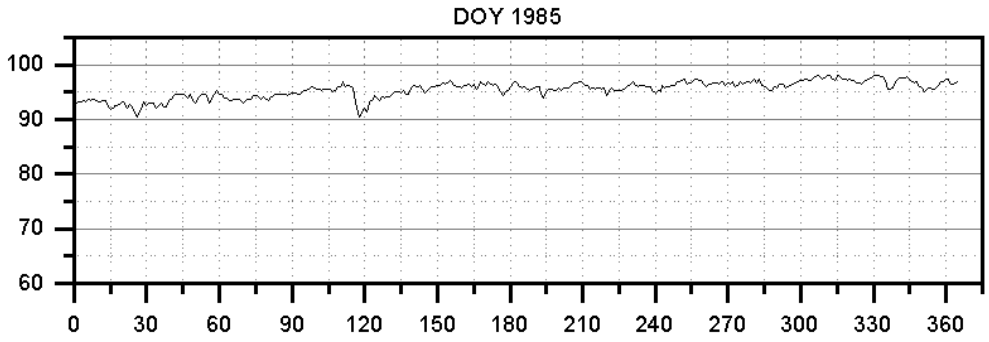
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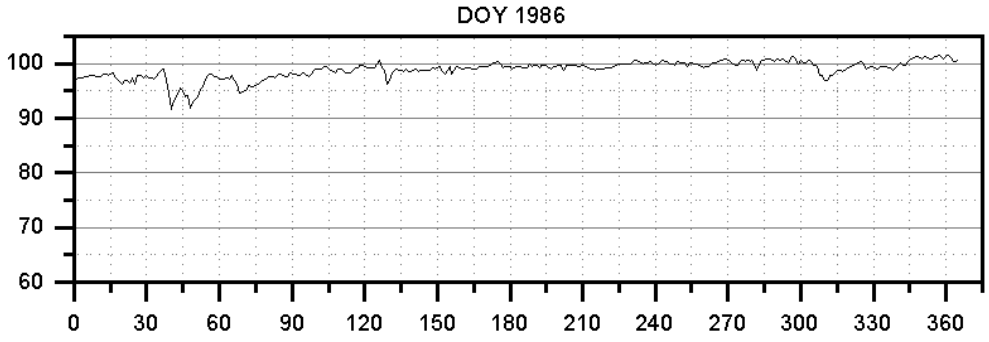
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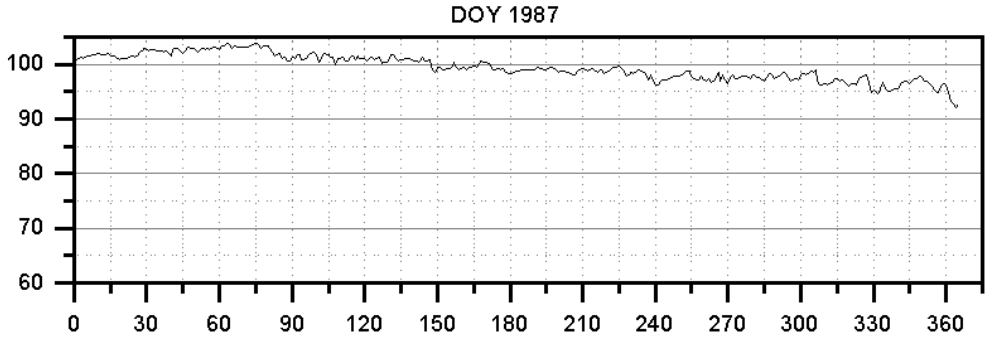
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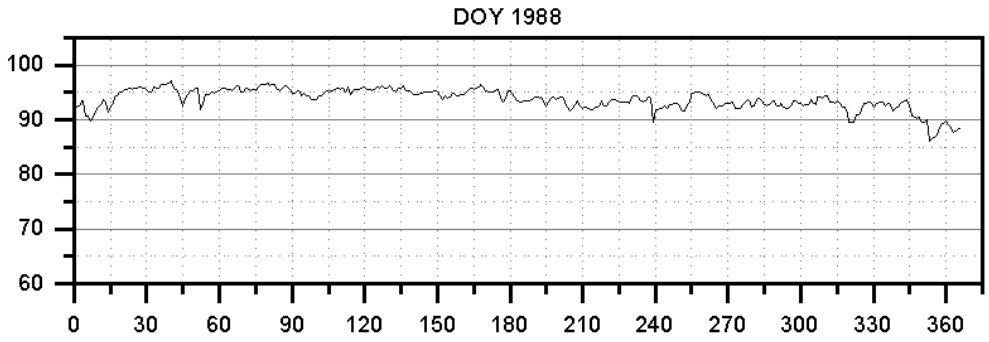
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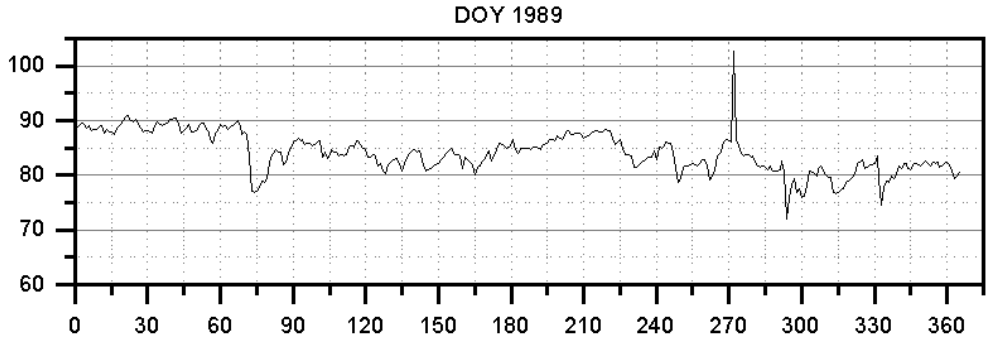
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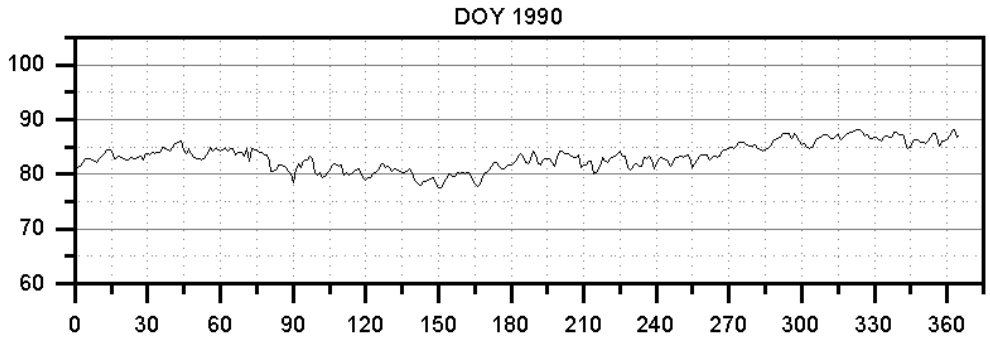
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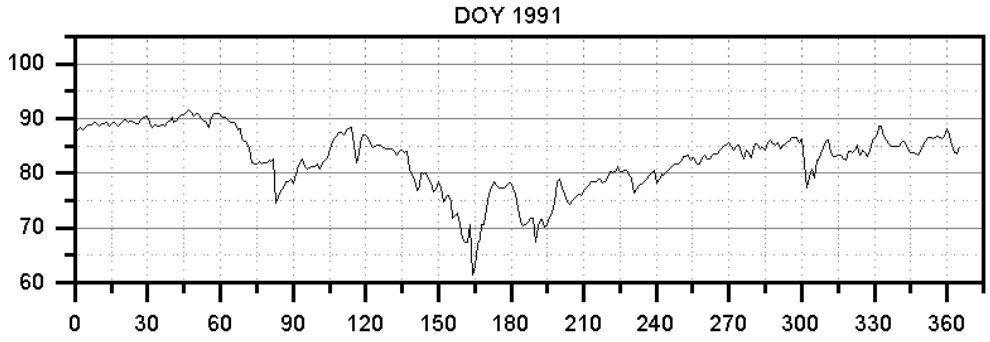
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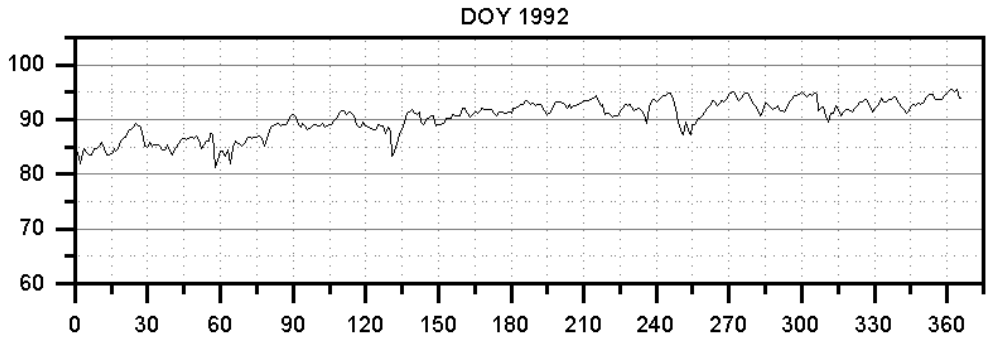
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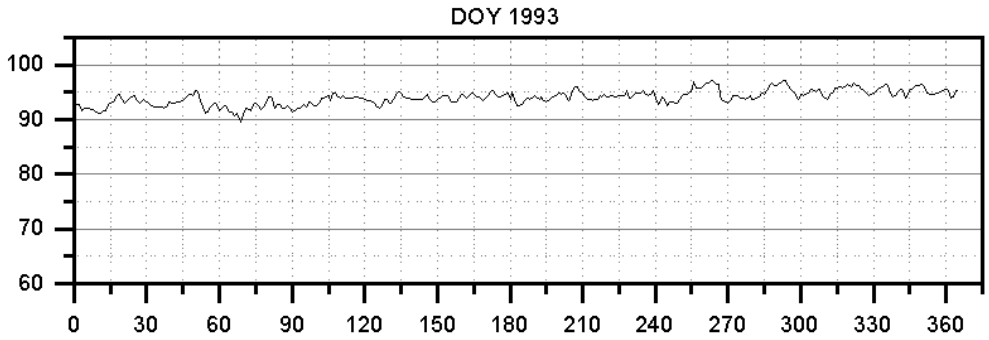
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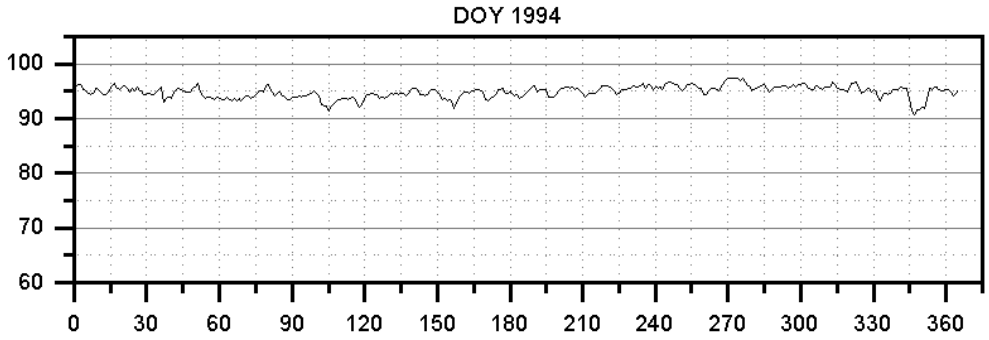
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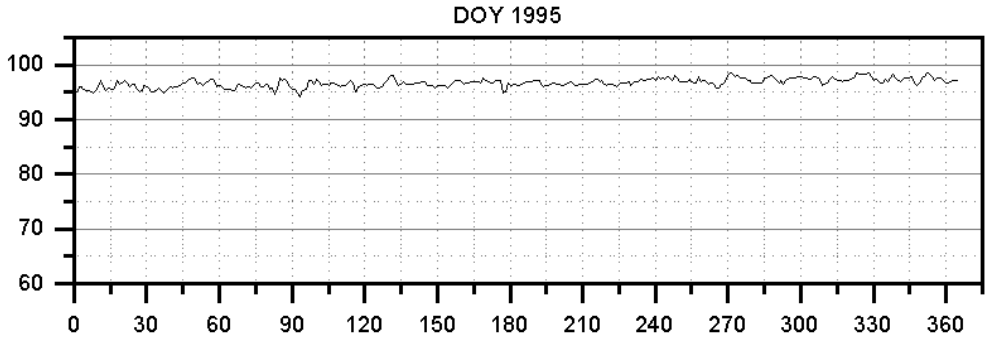
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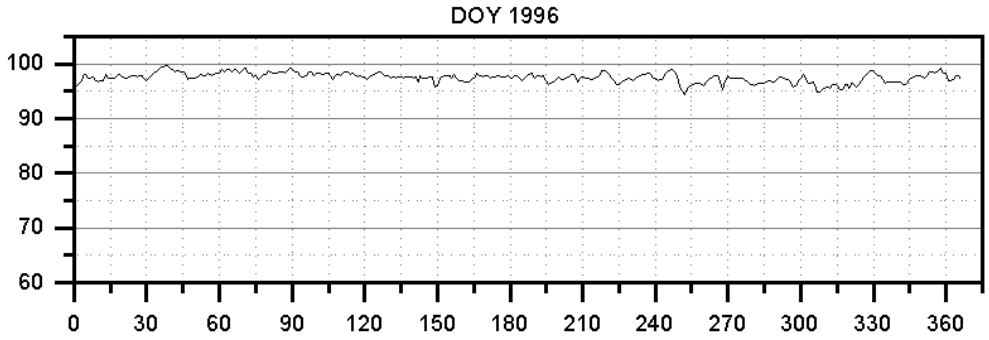
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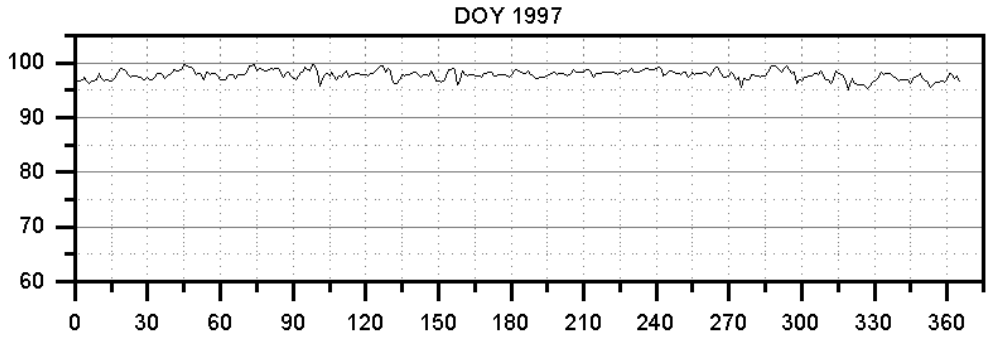
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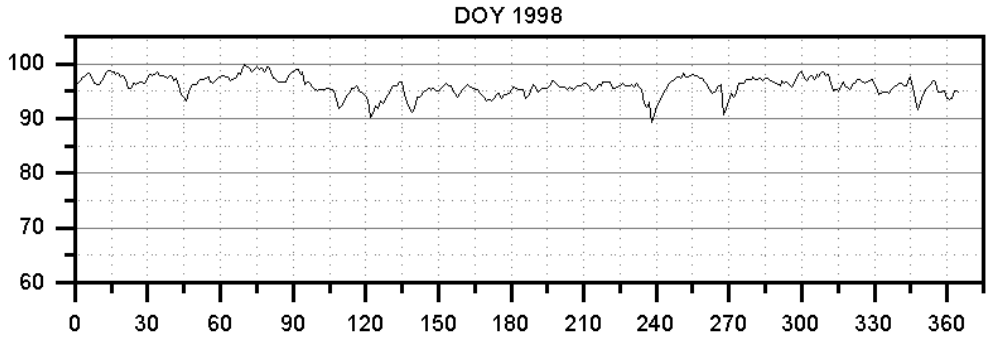
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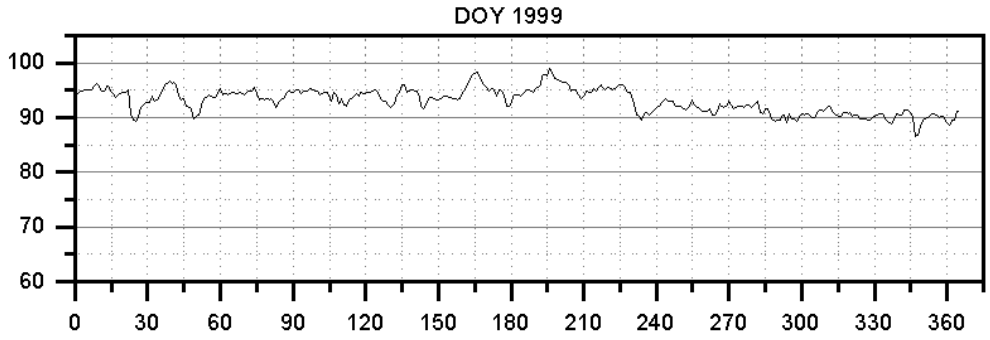
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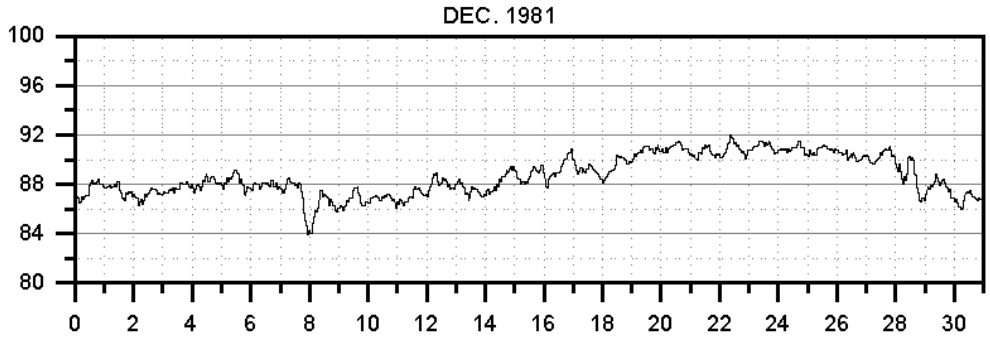
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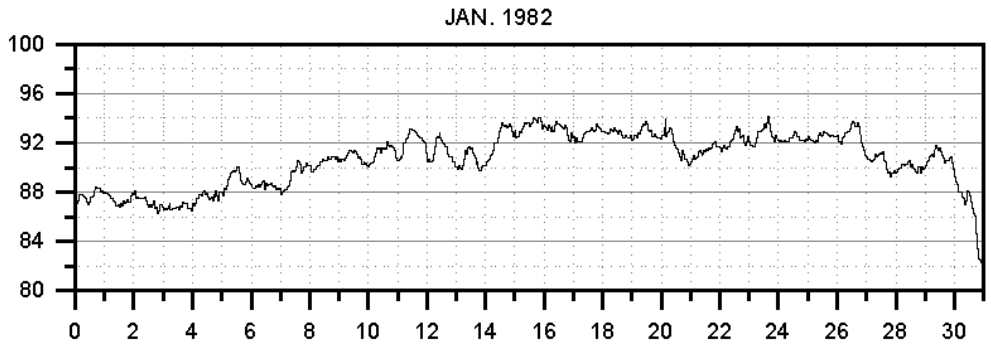
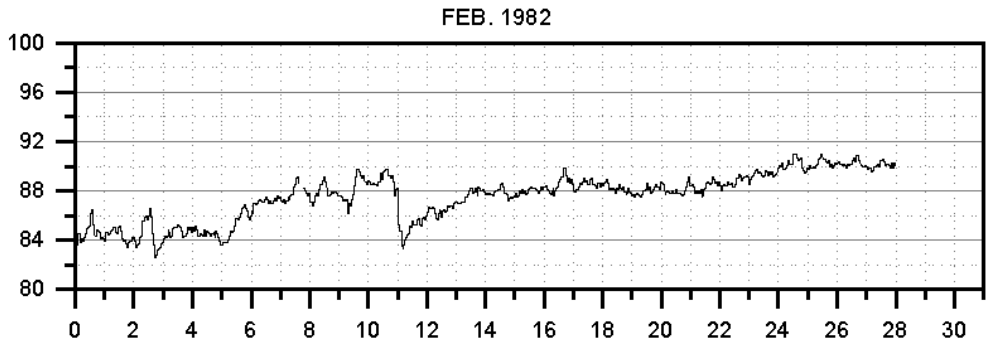
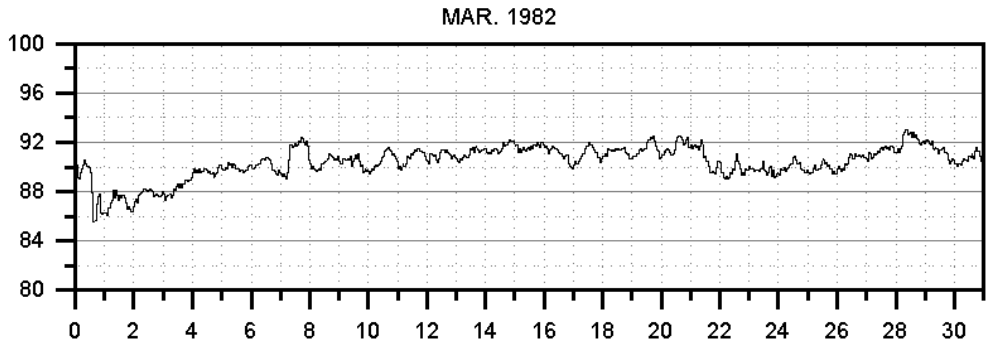
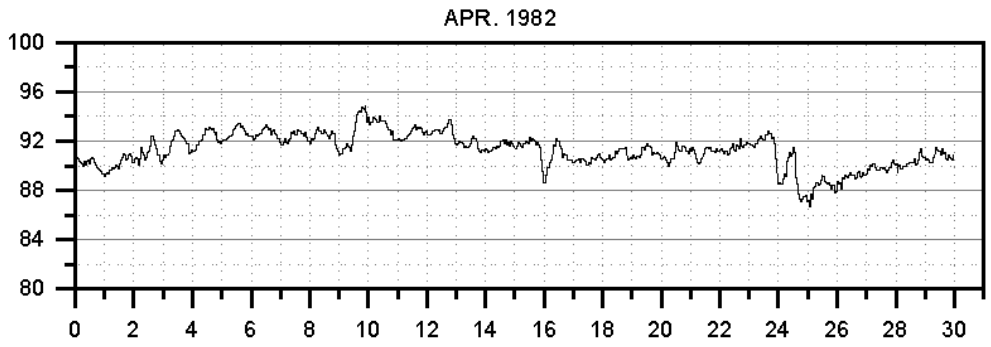
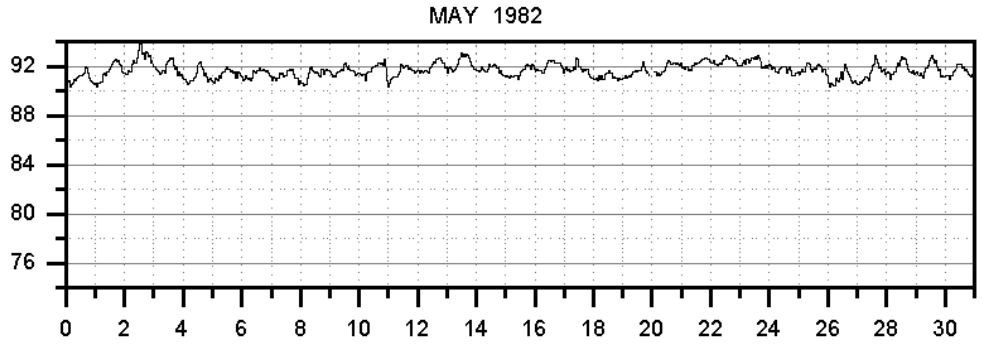
3.3. HOURLY VALUES.







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76
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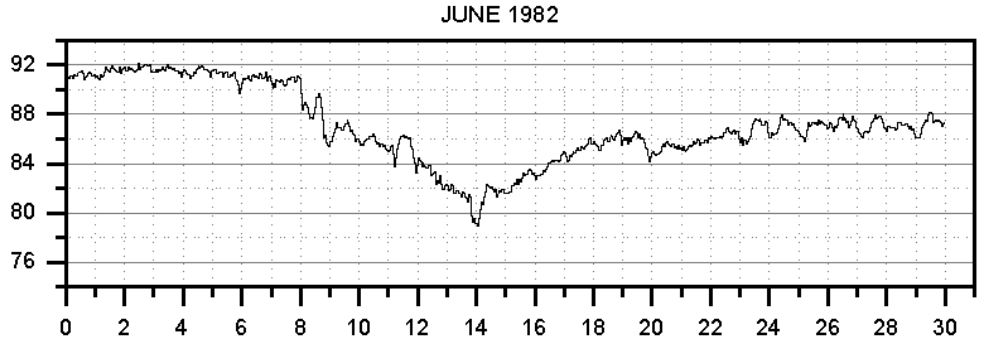
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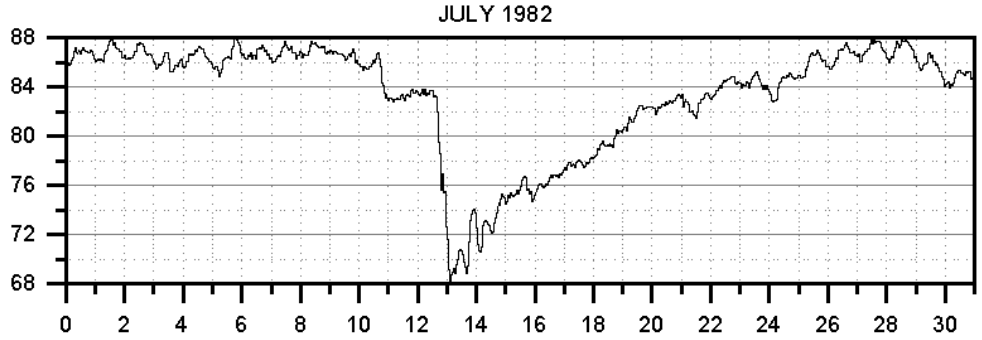
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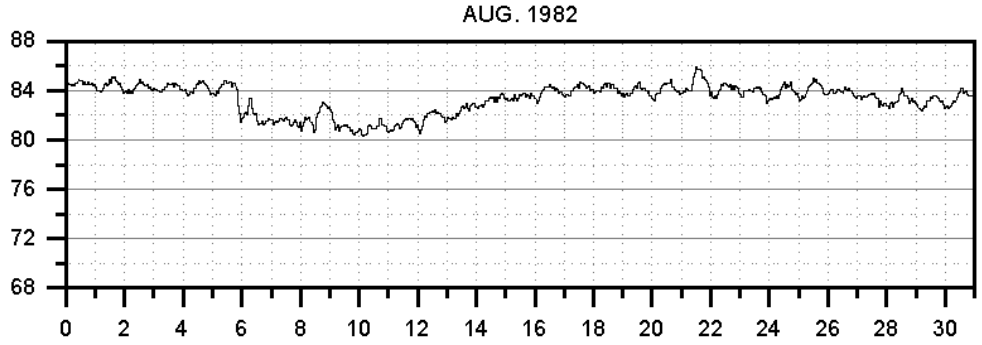
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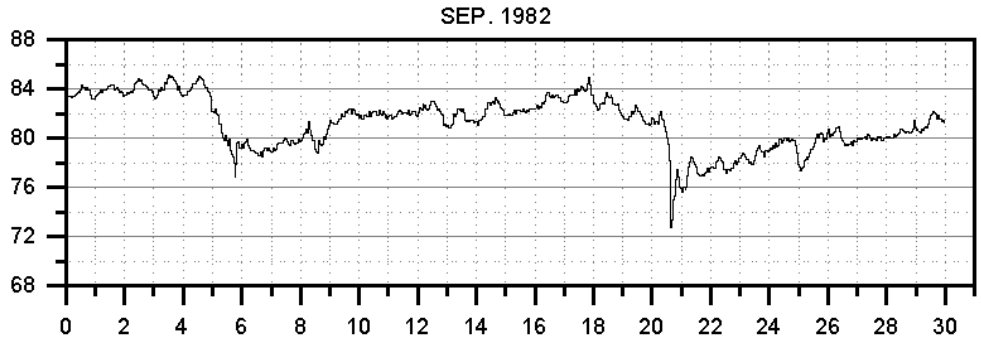
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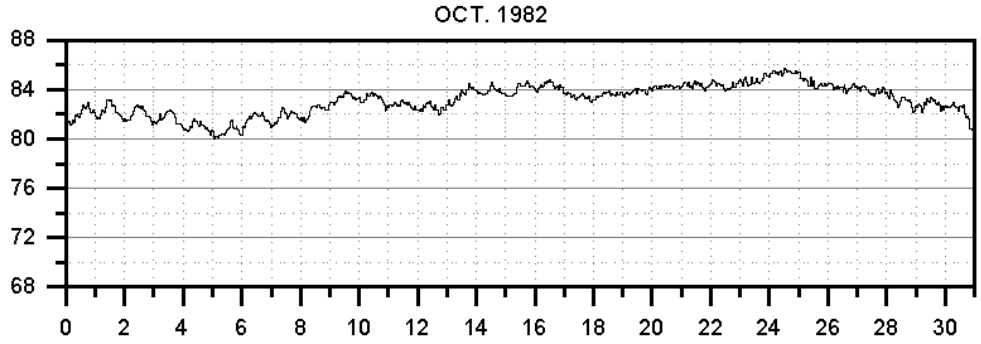
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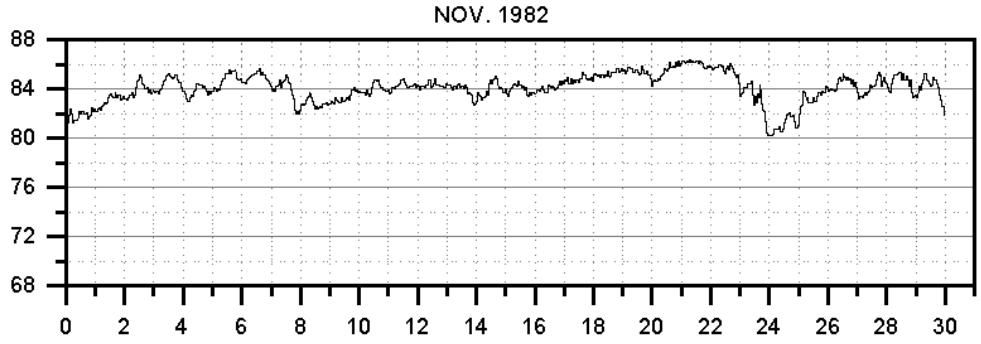
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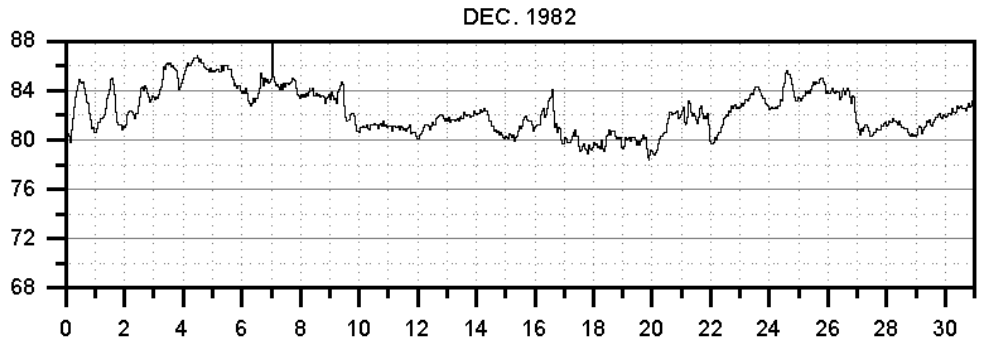
DEC. 1982
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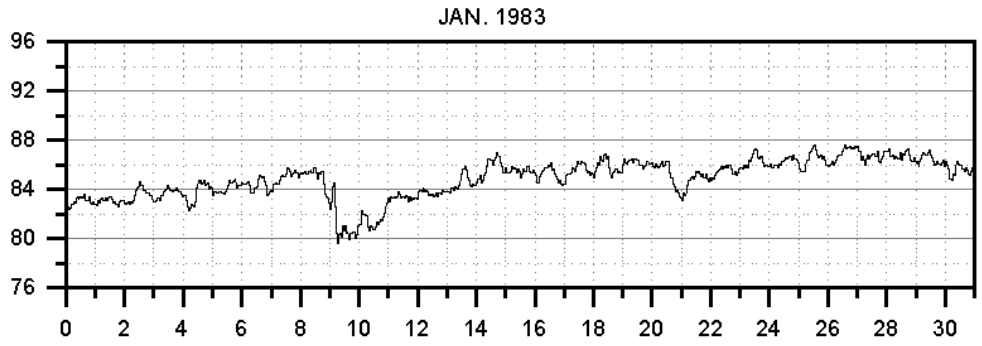
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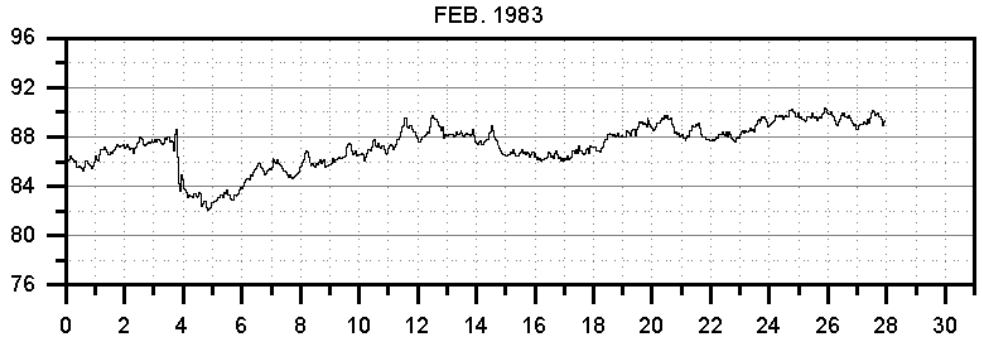
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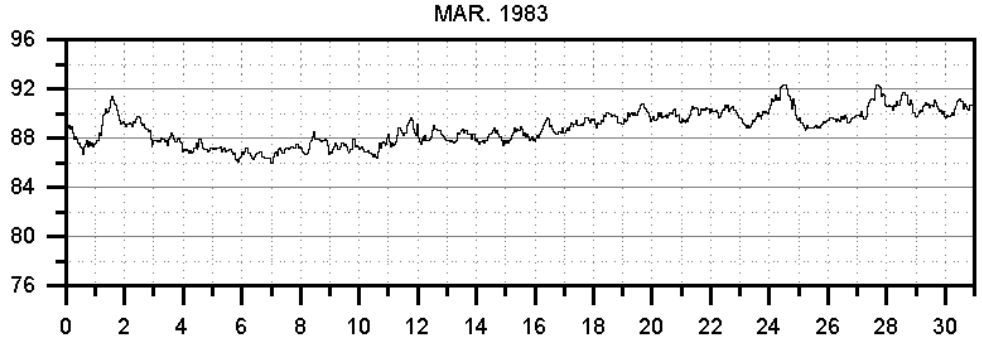
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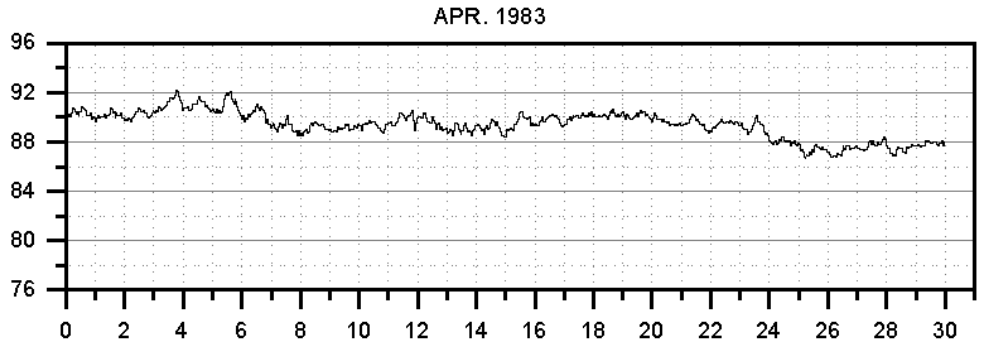
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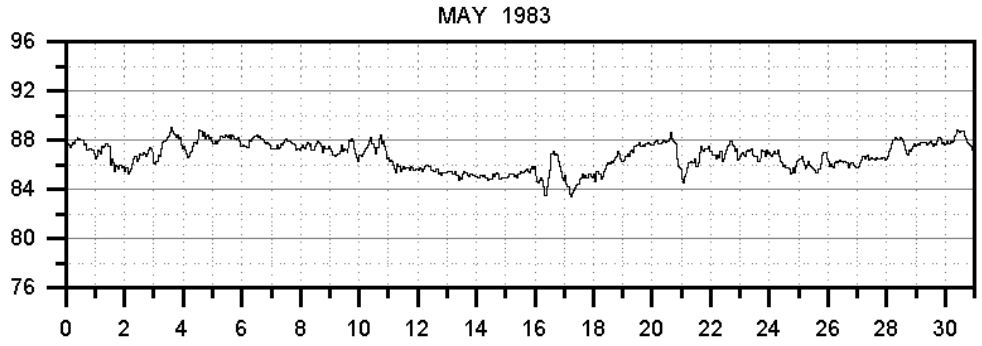
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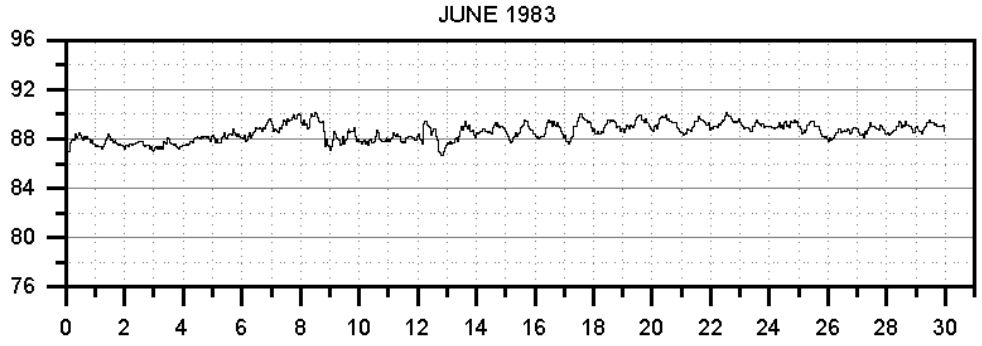
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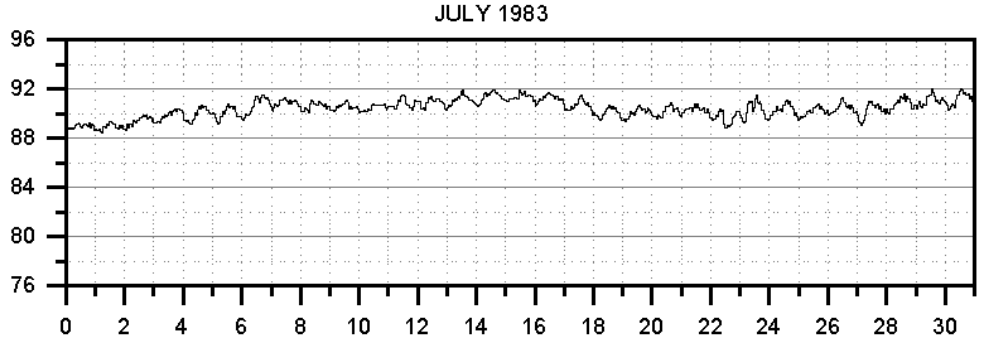
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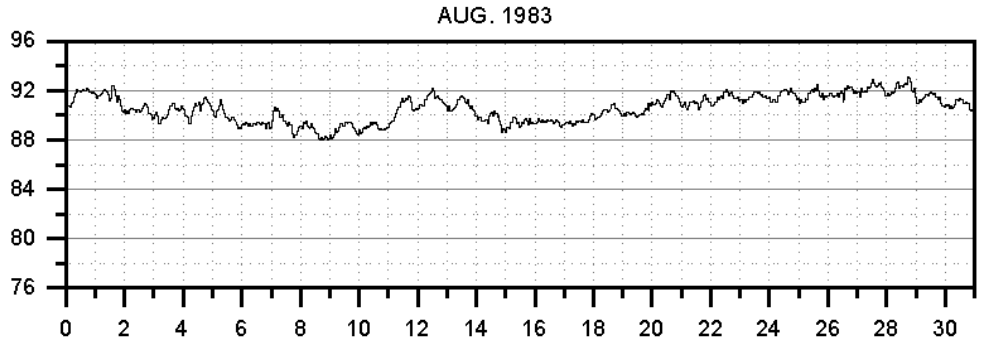
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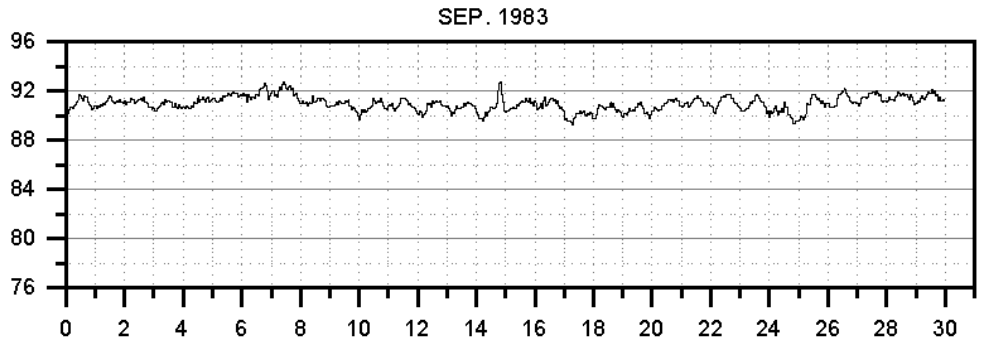
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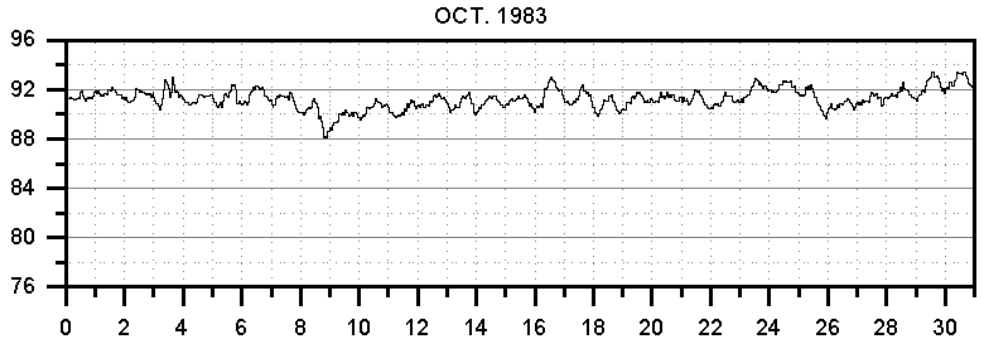
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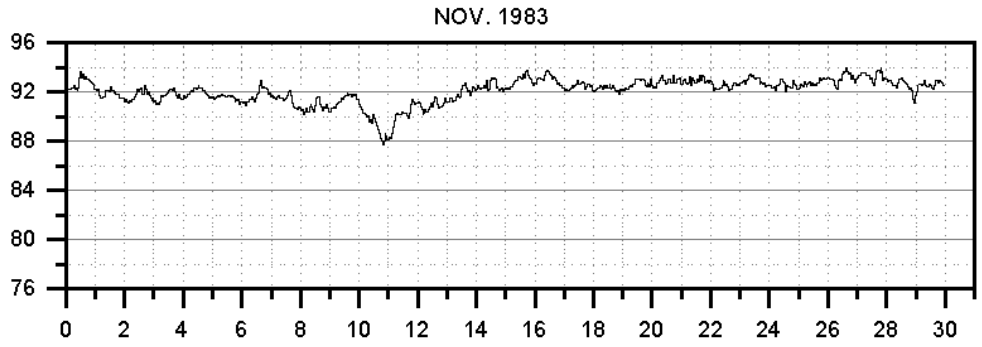
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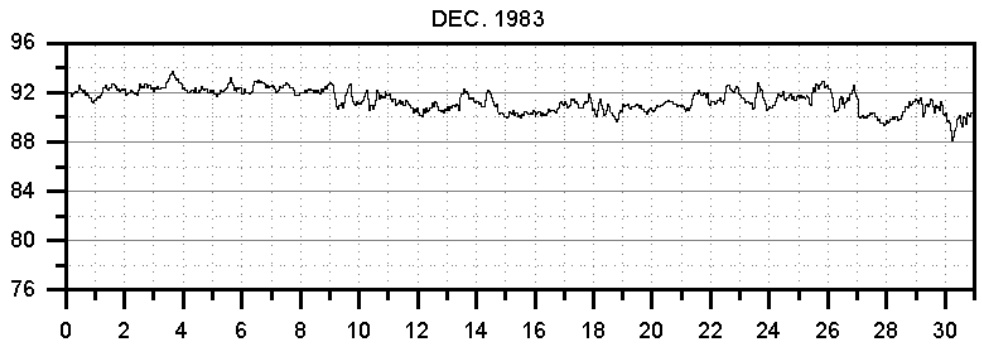
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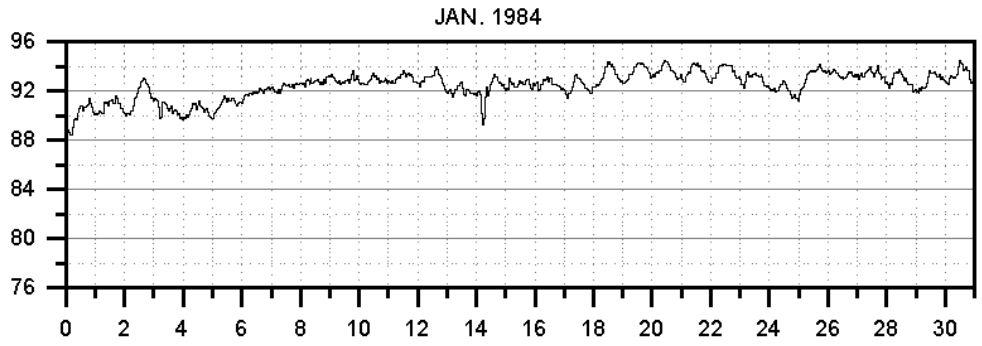
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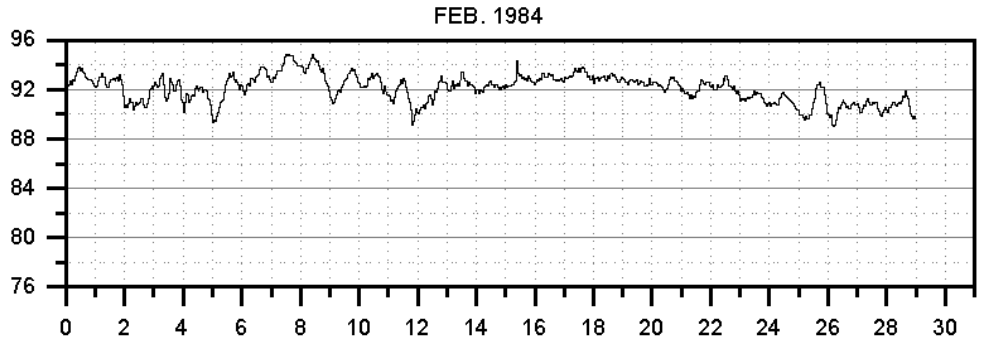
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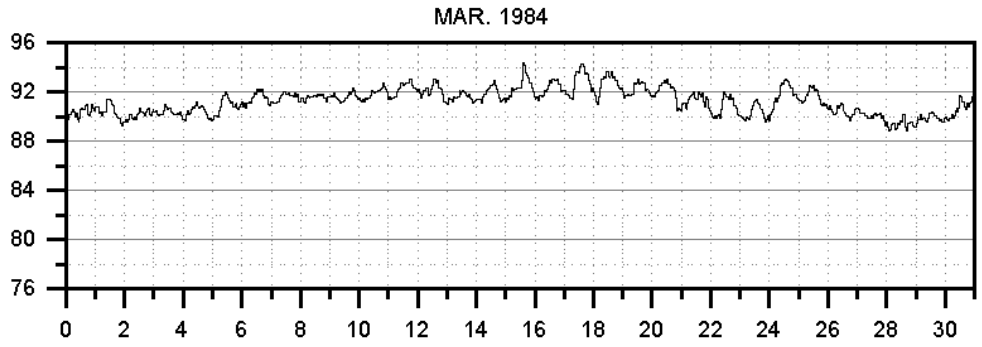
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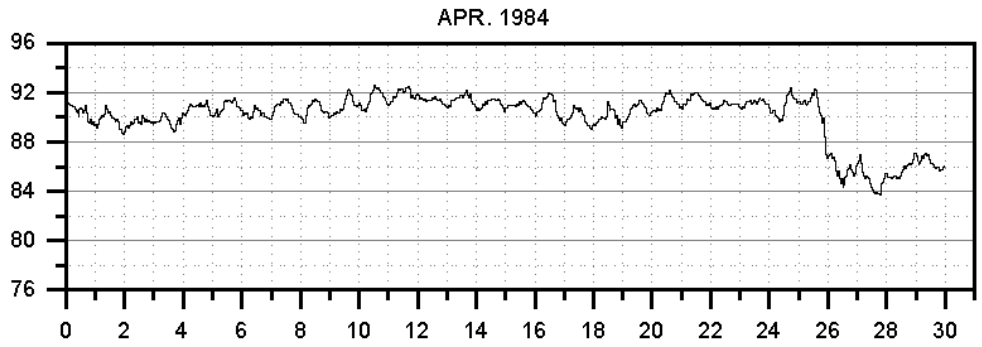
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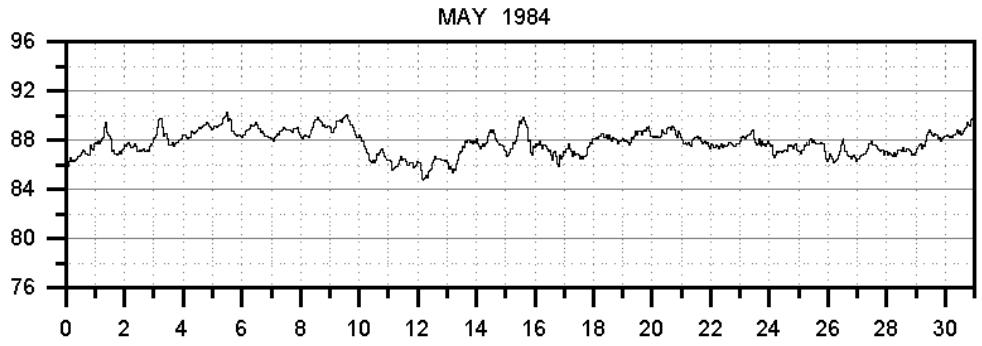
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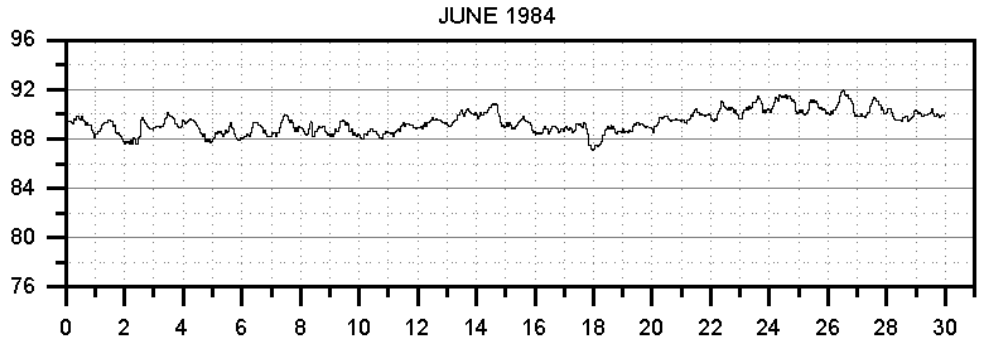
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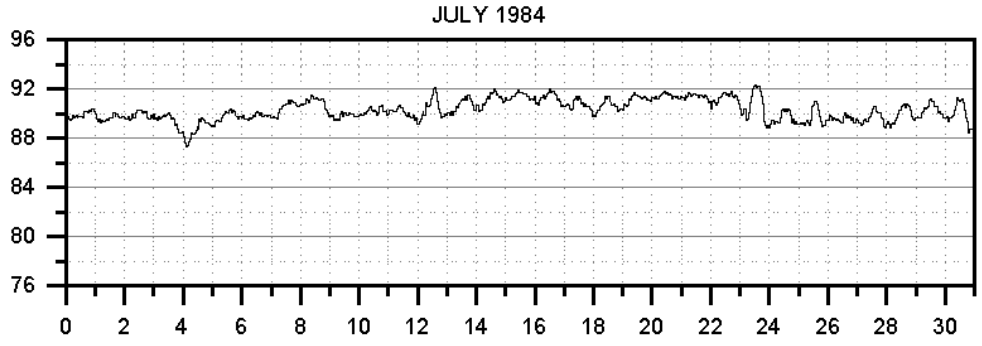
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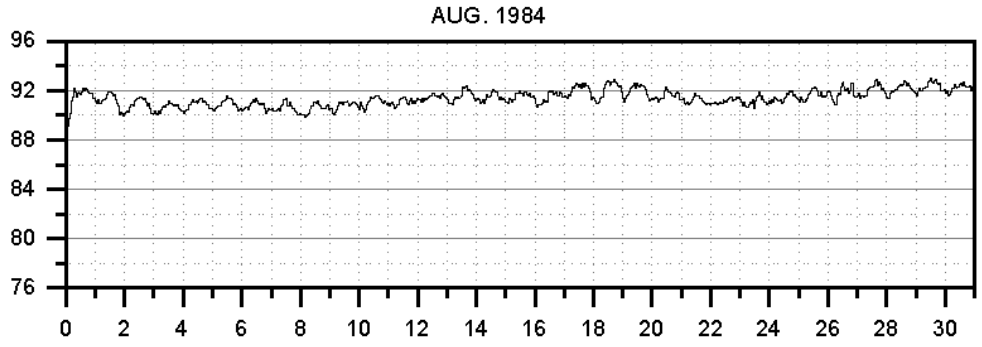
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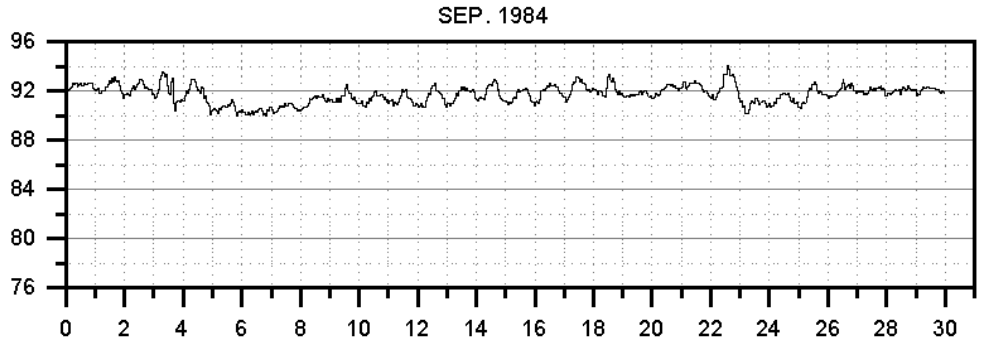
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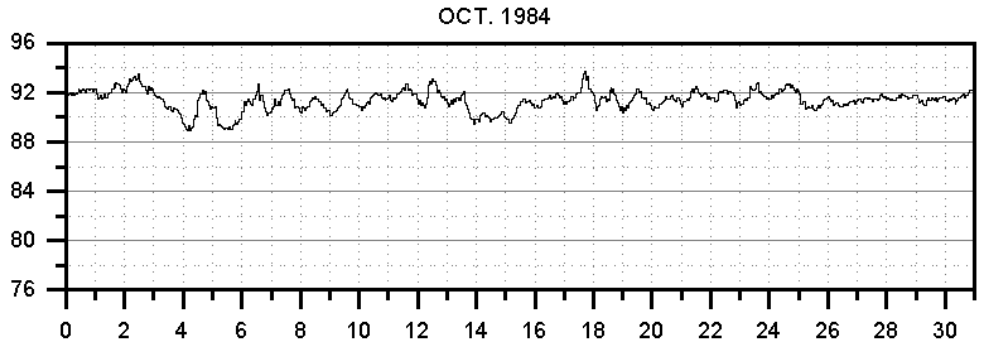
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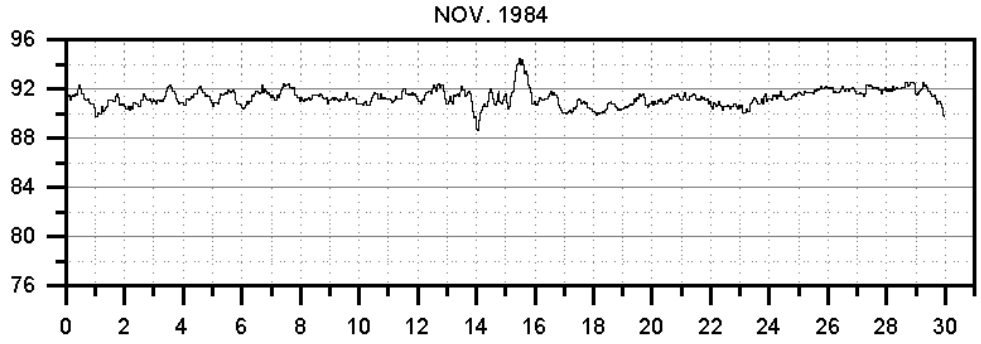
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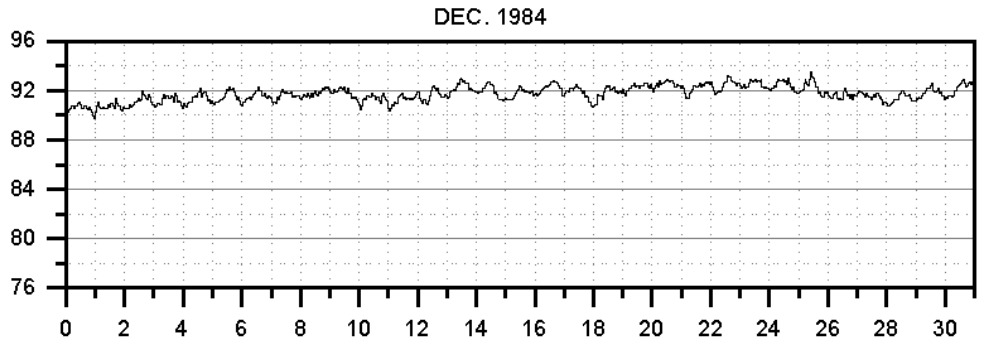
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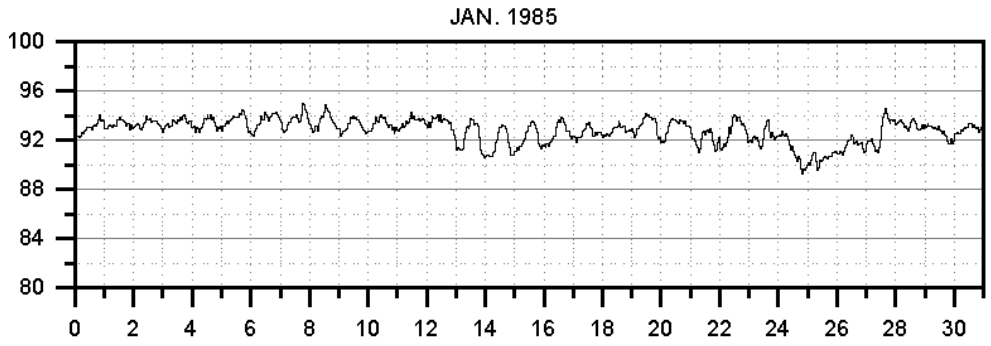
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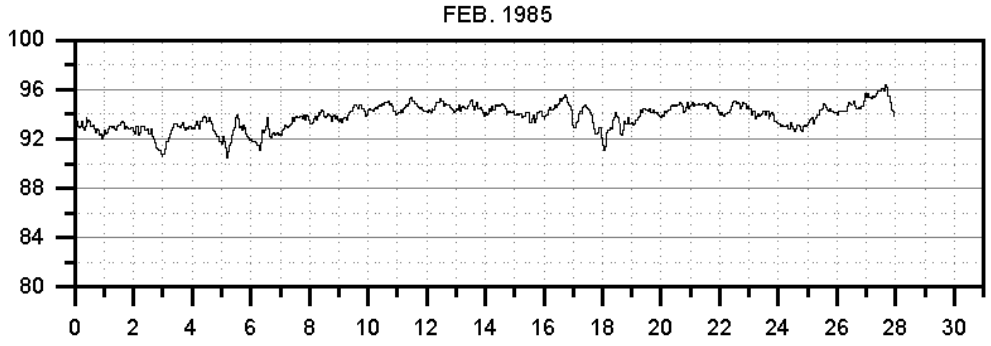
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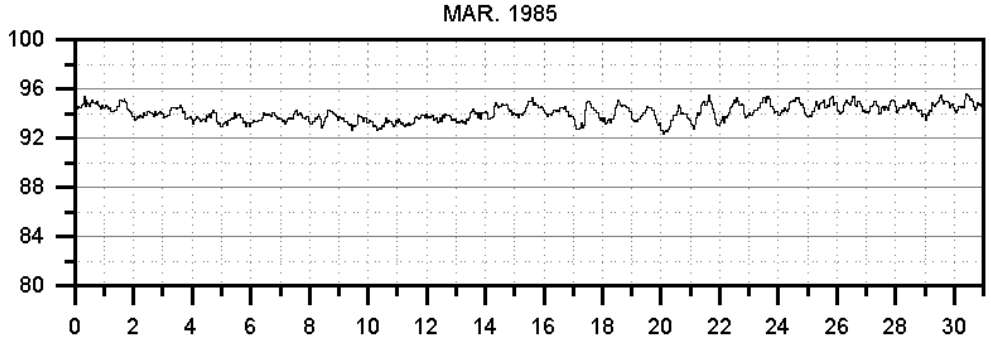
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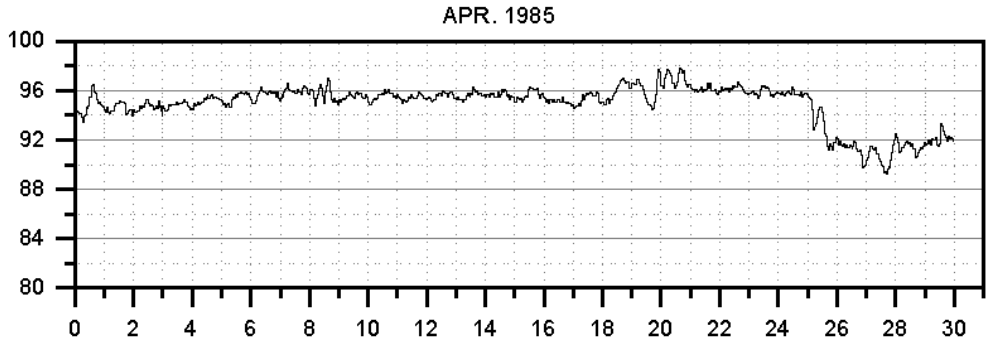
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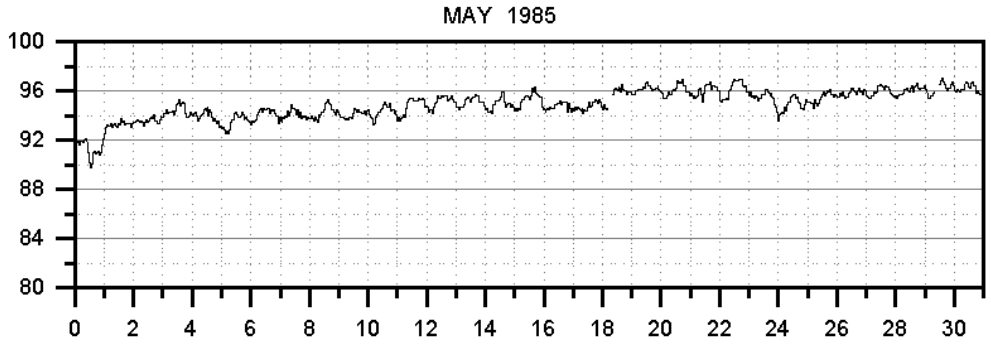
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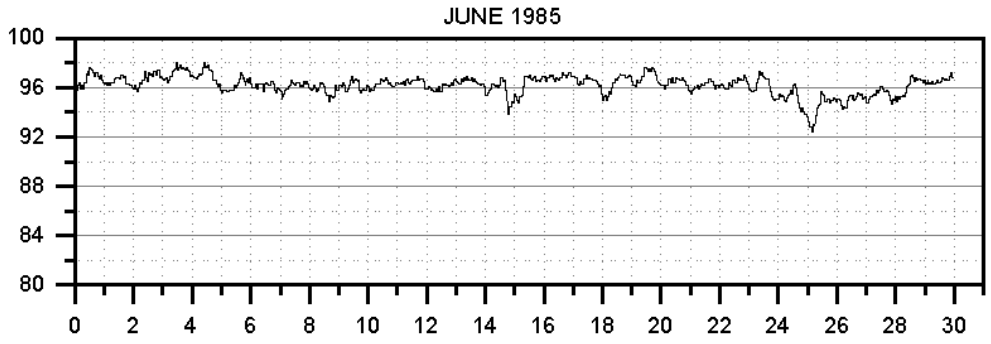
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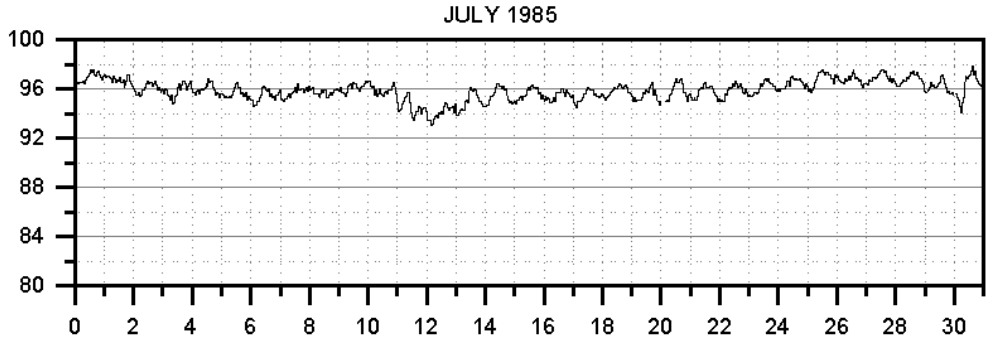
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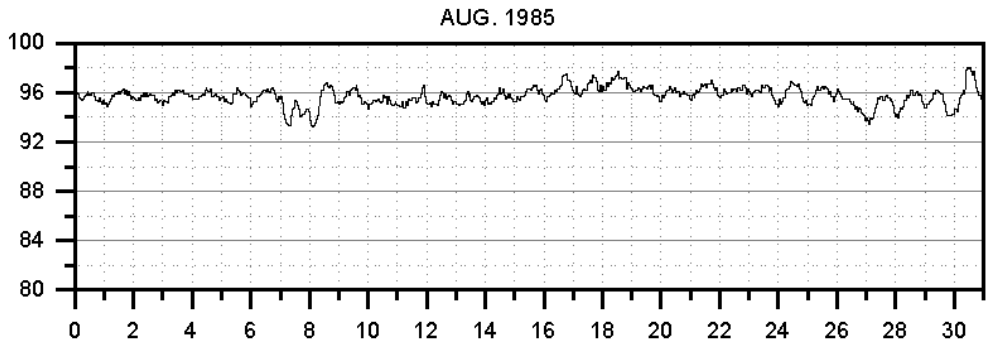
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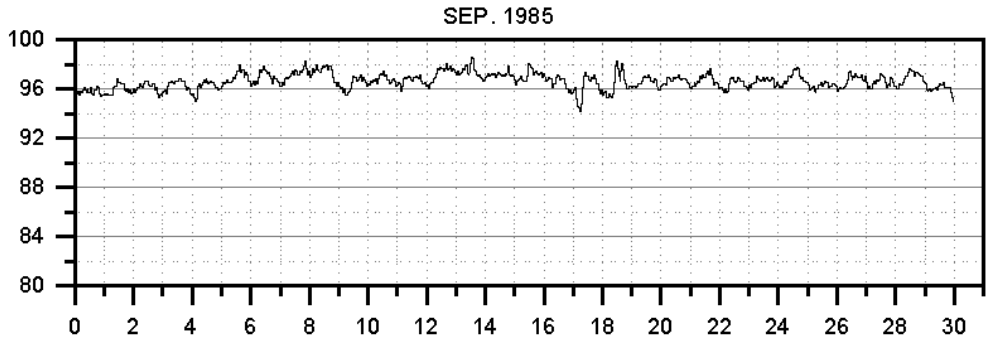
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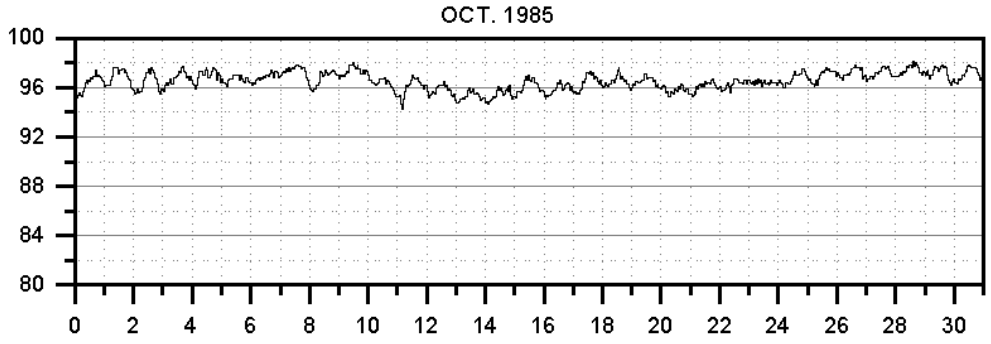
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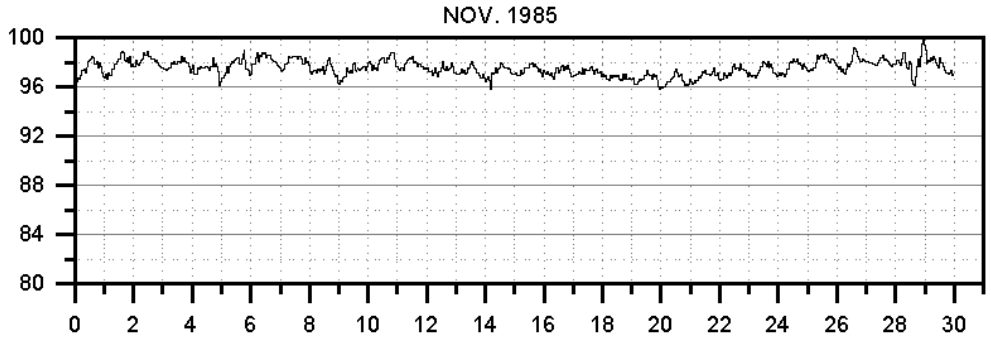
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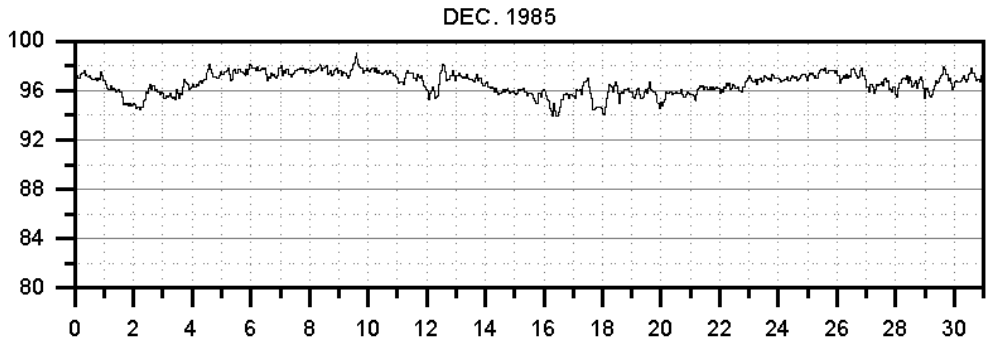
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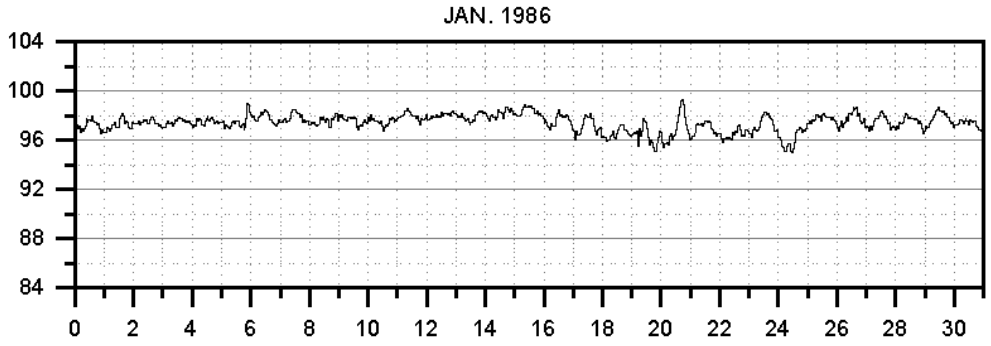
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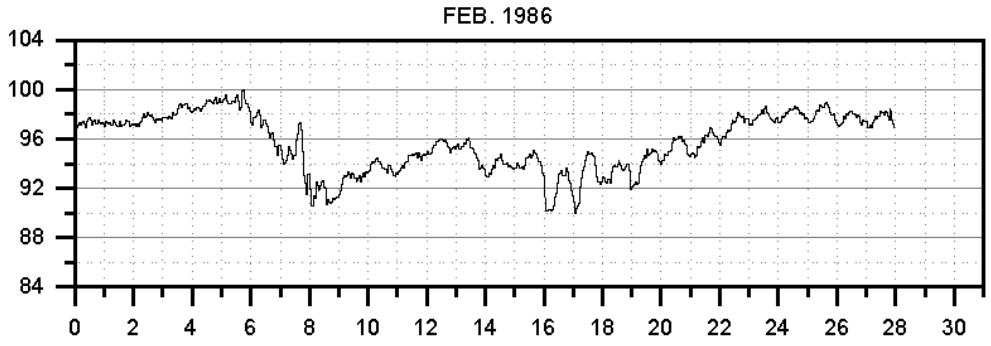
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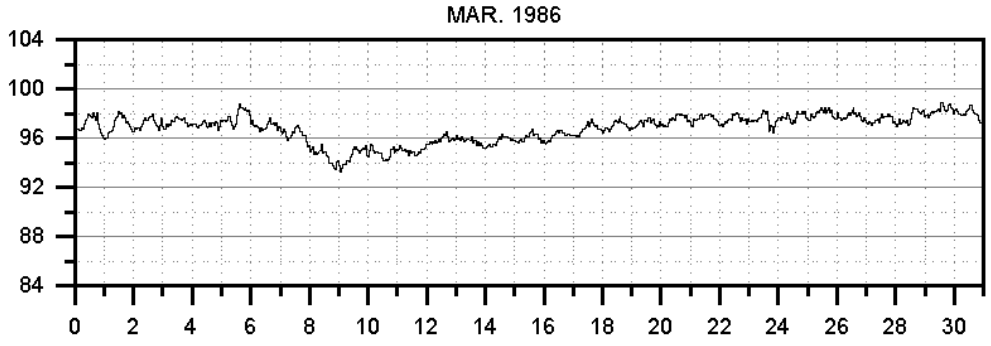
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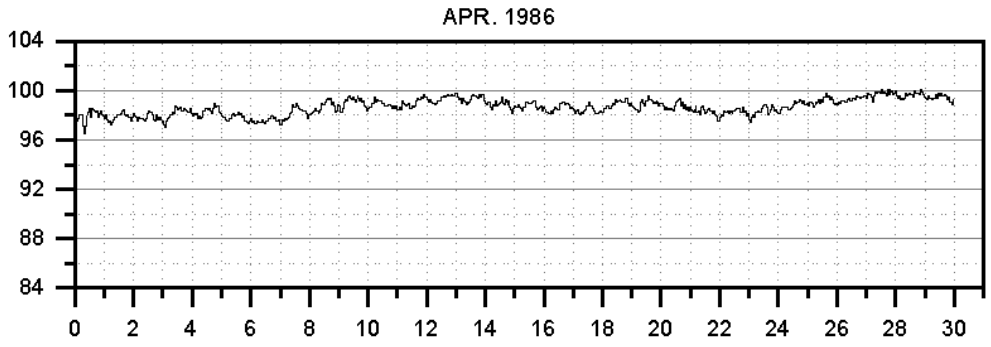
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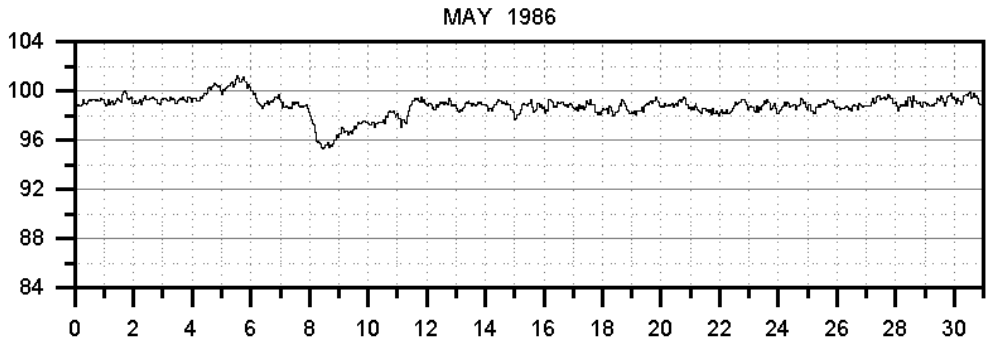
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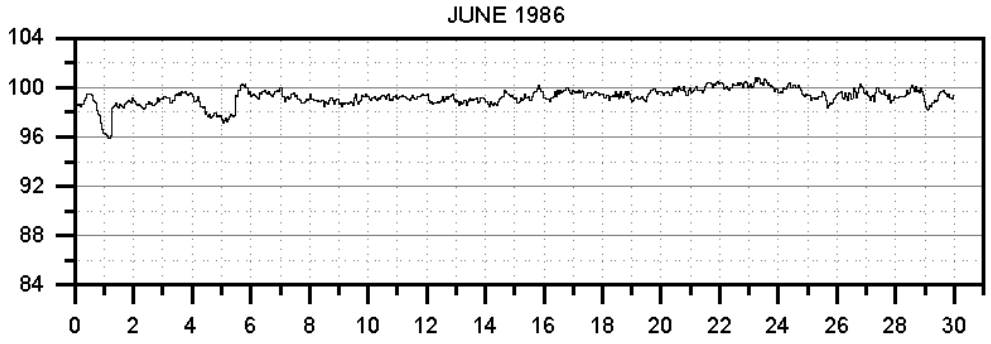
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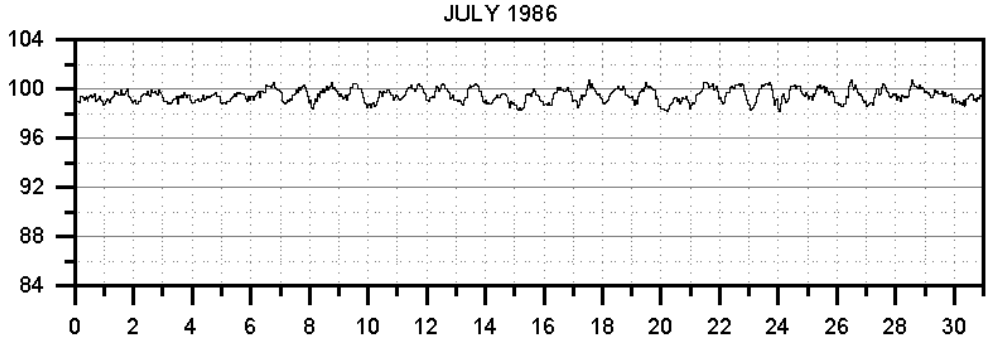
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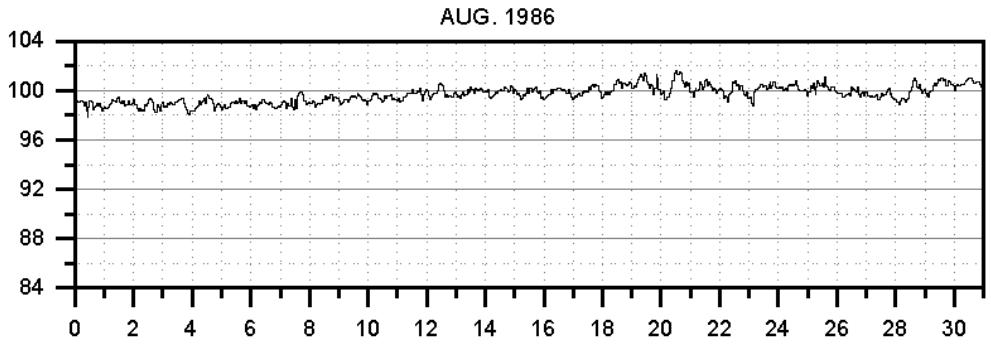
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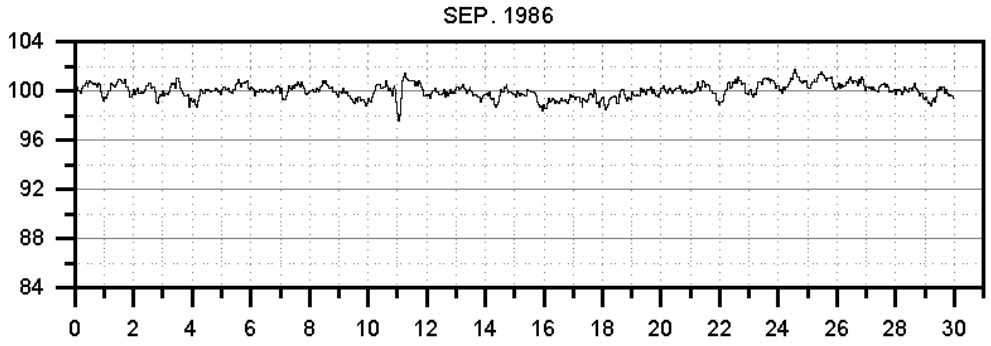
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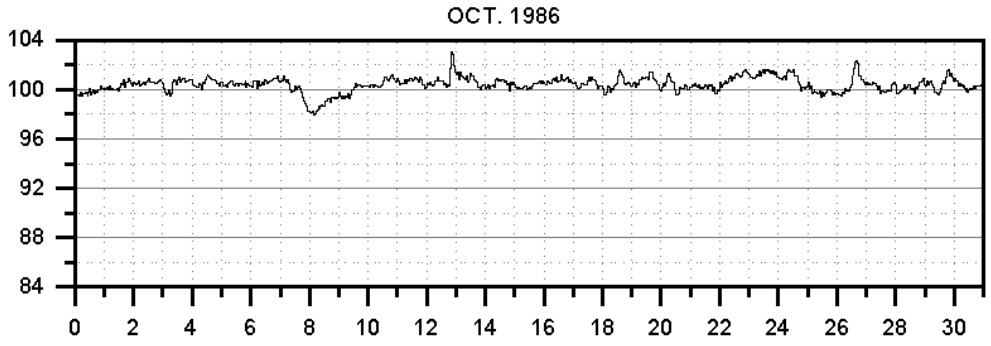
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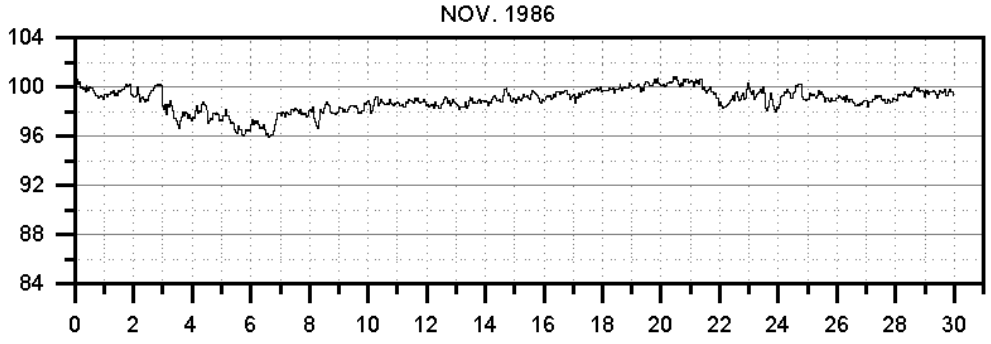
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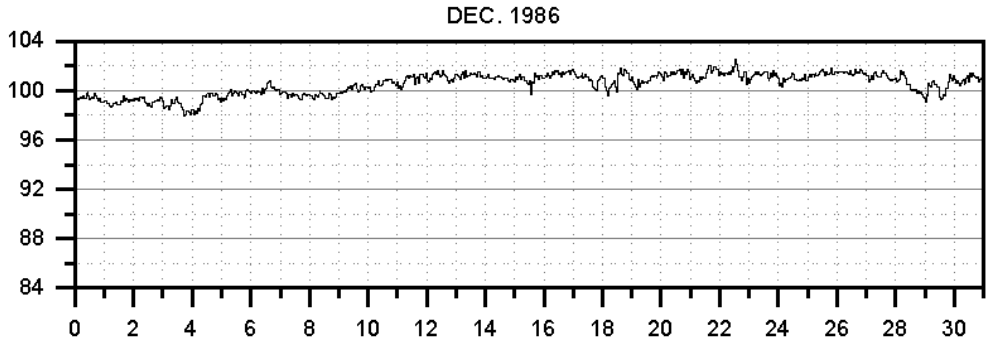
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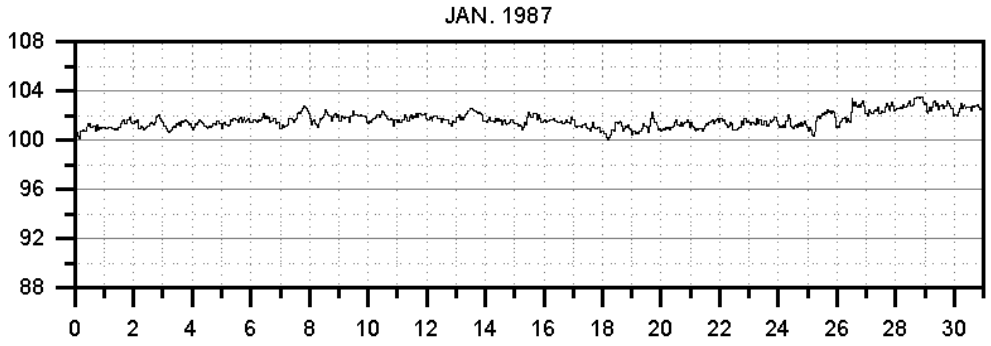
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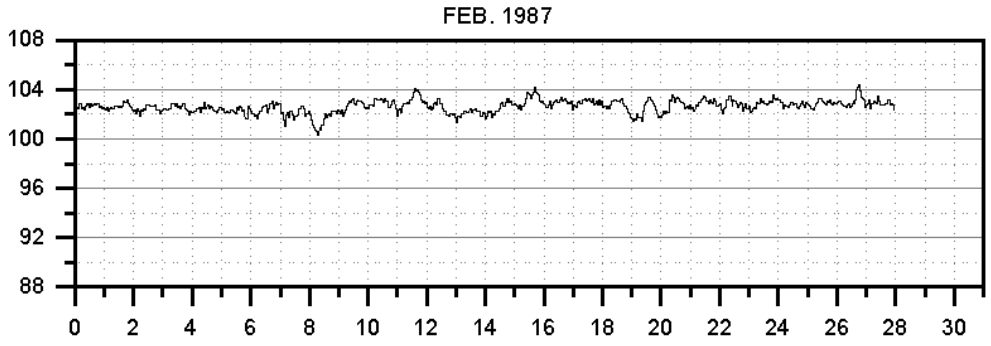
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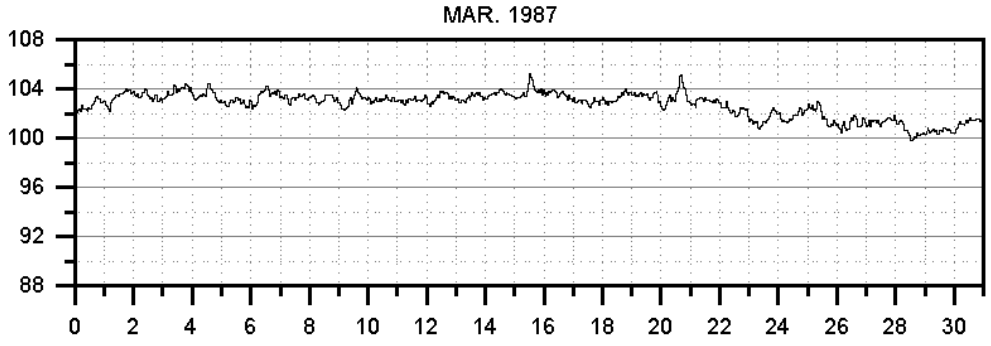
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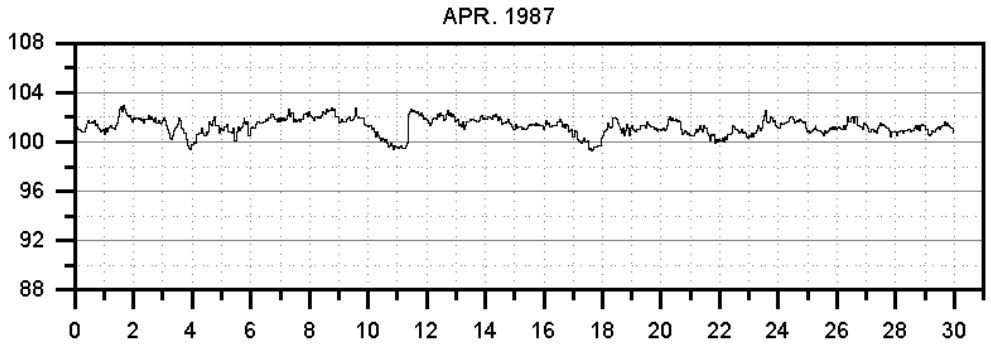
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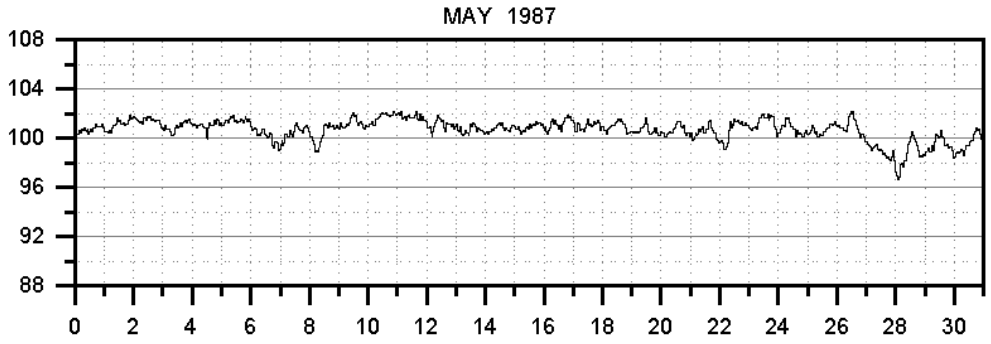
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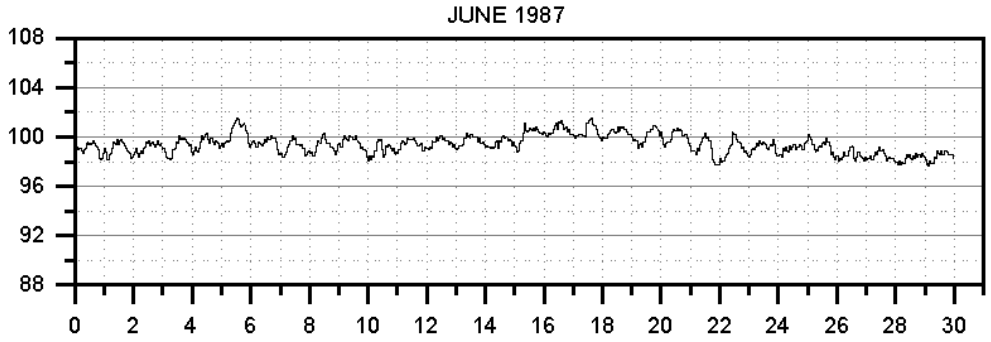
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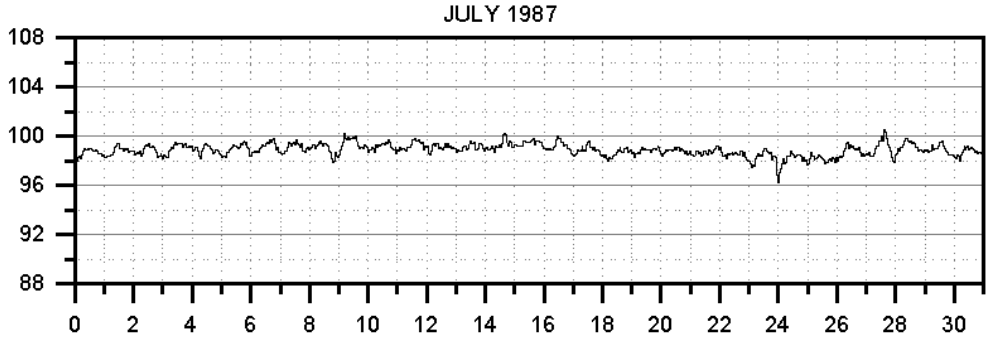
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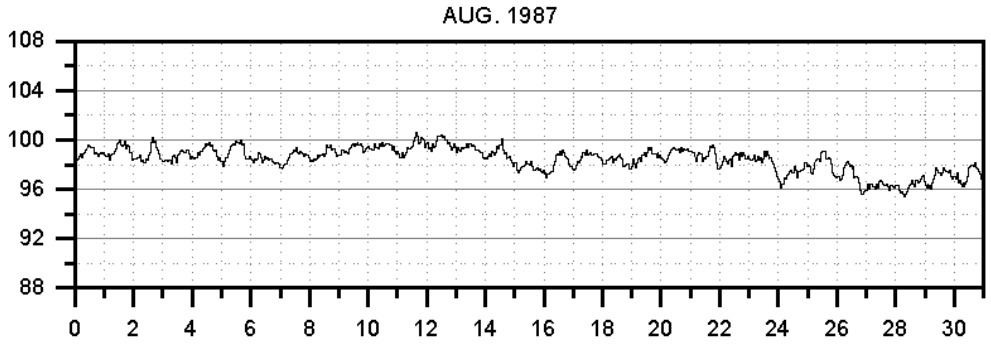
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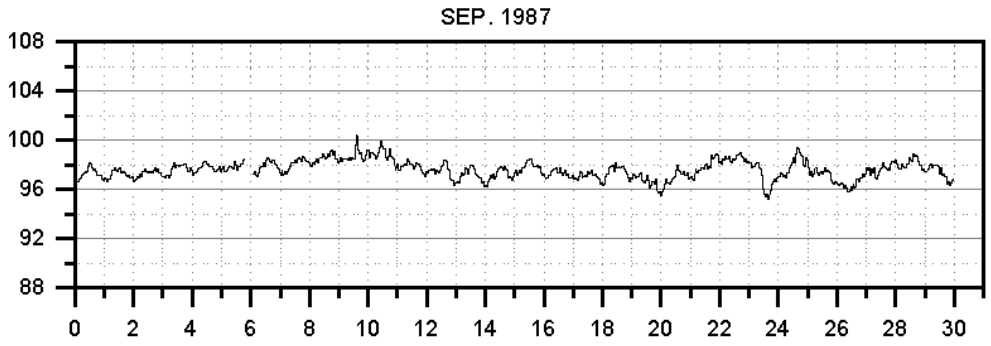
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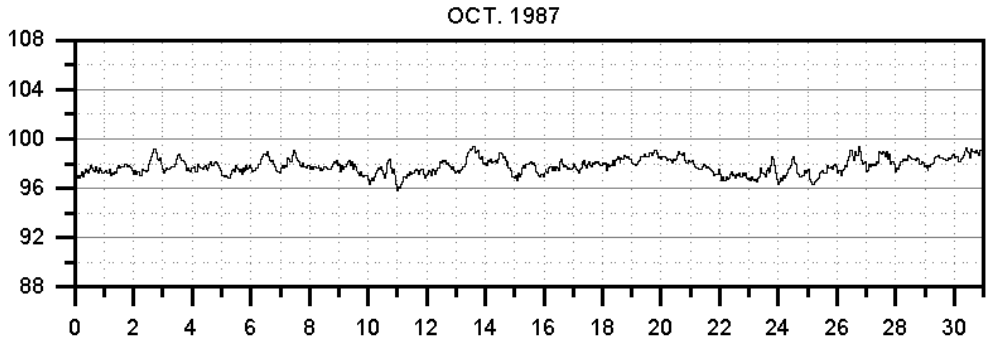
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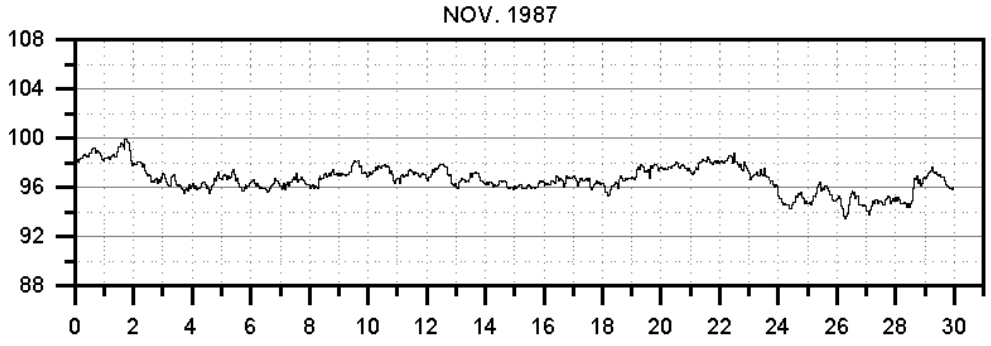
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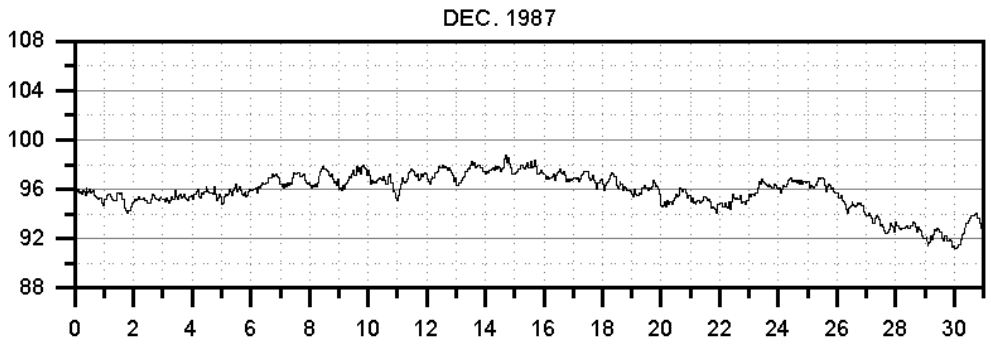
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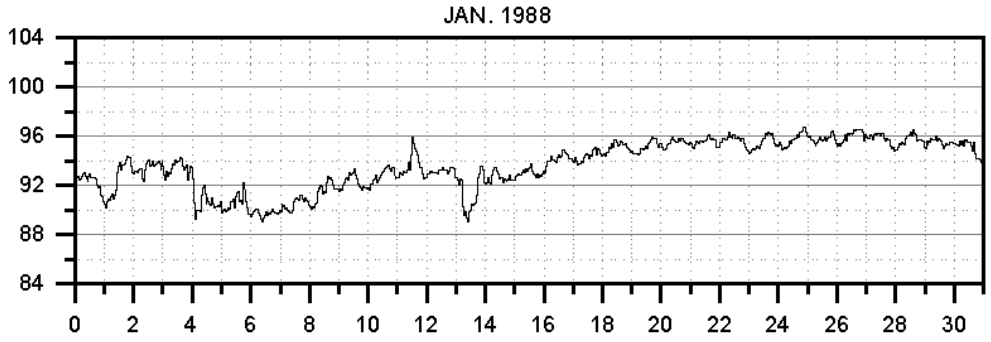
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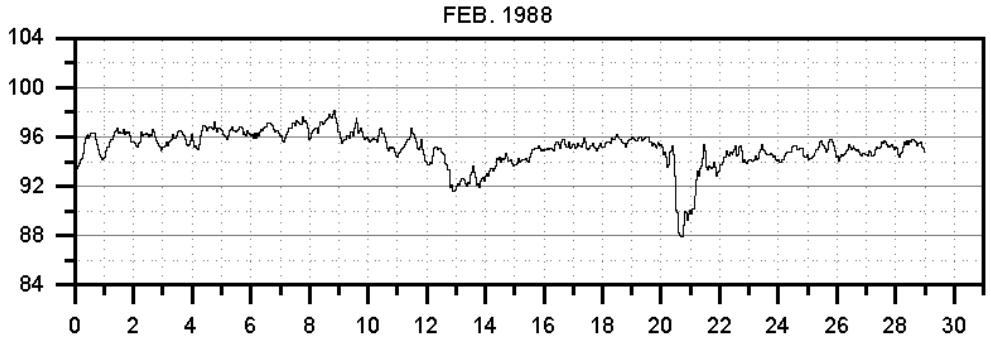
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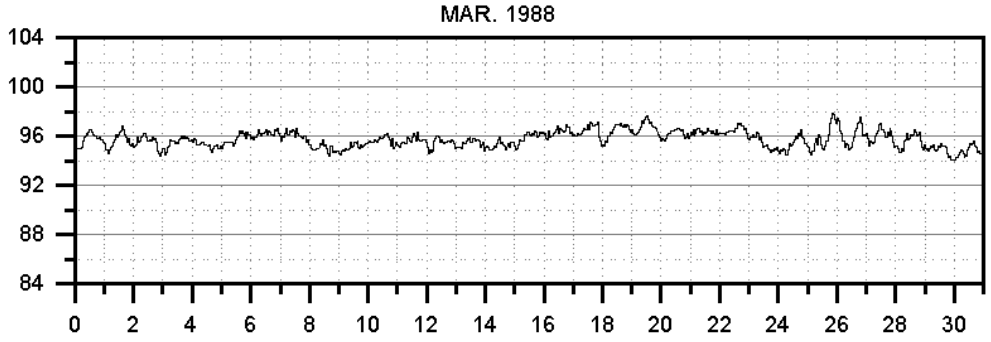
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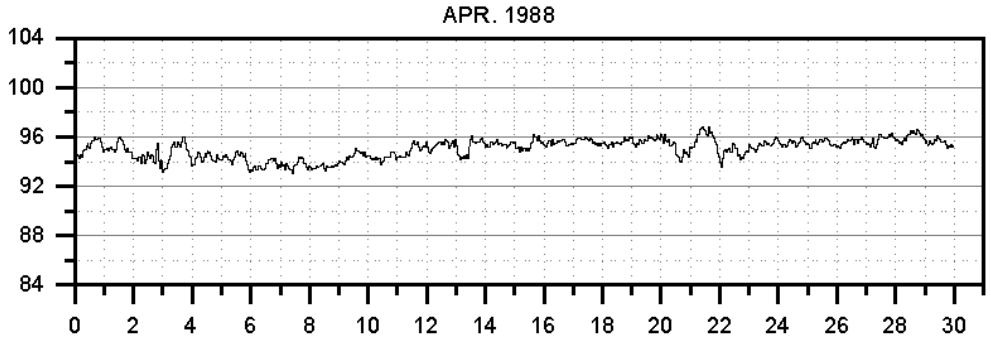
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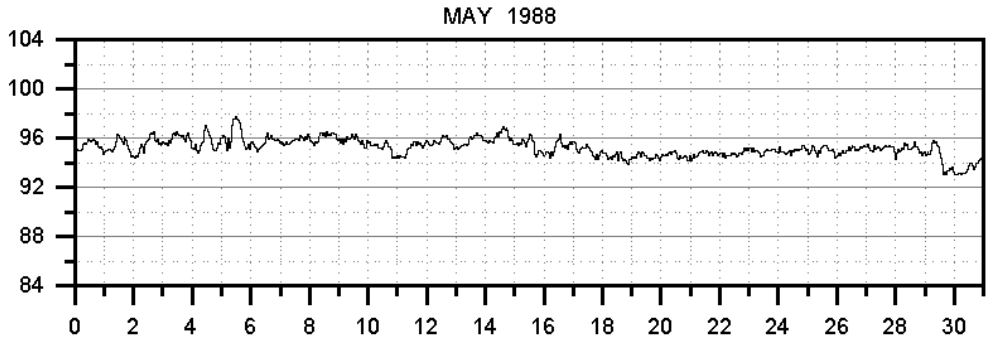
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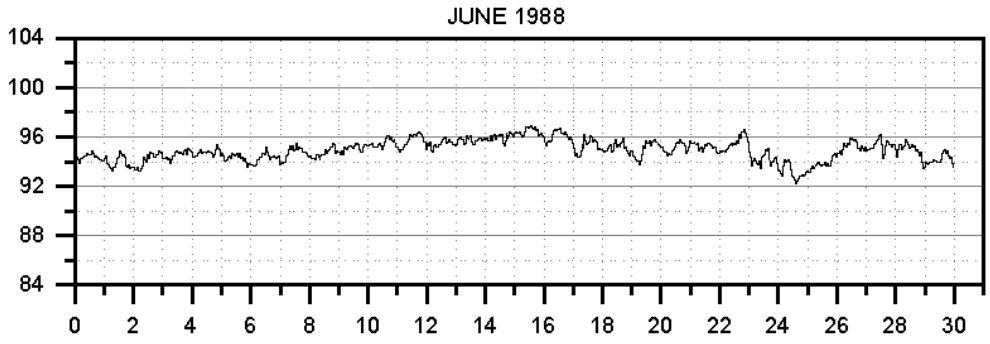
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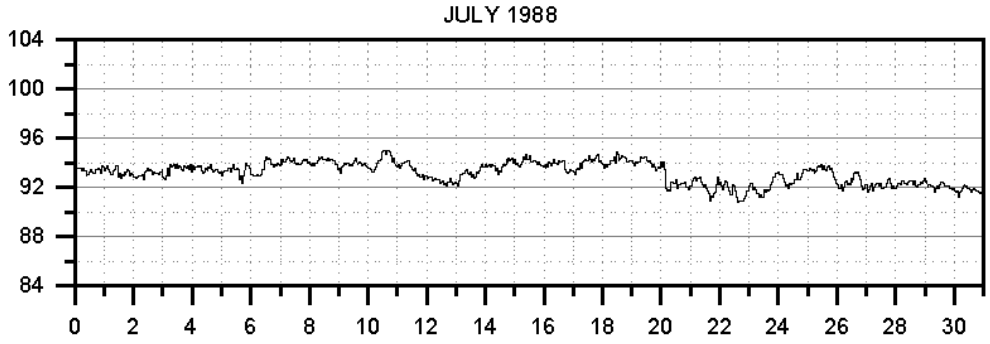
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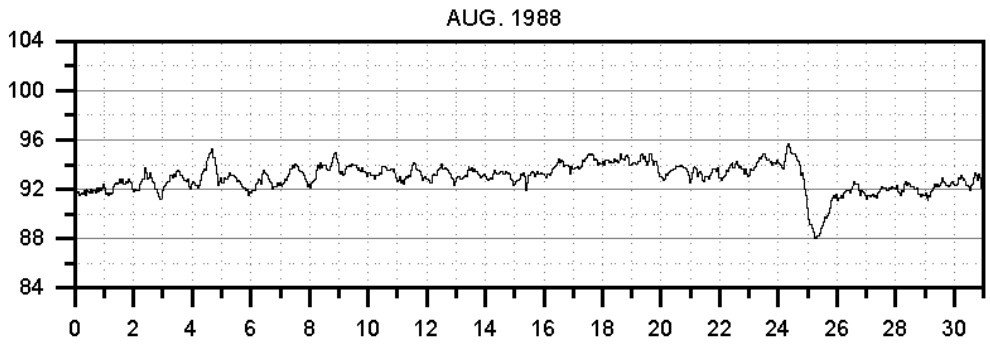
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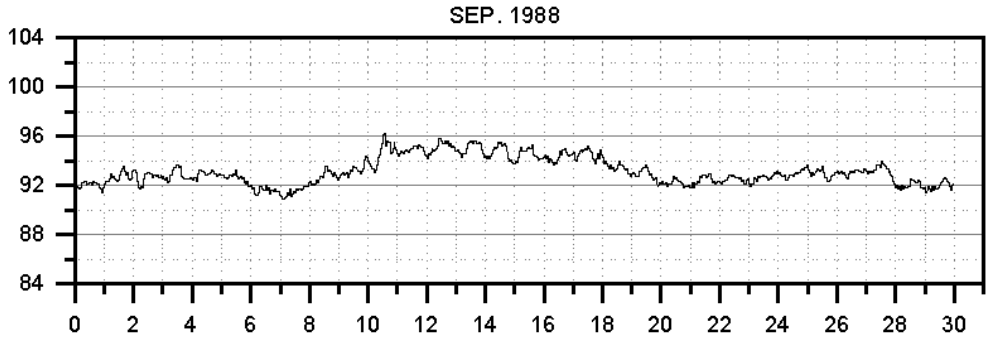
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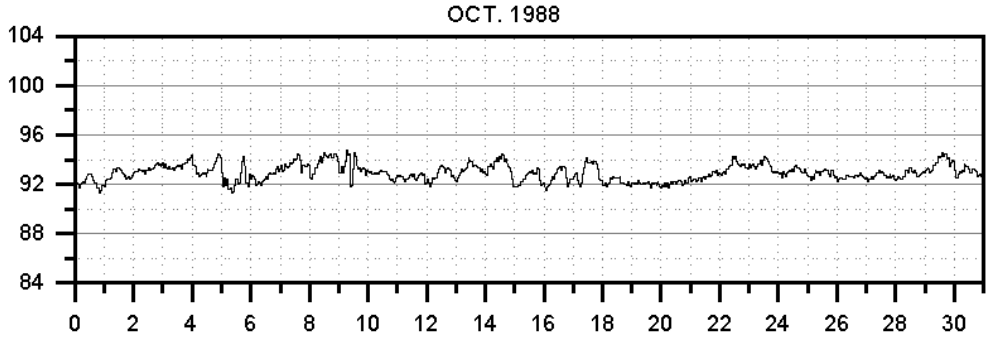
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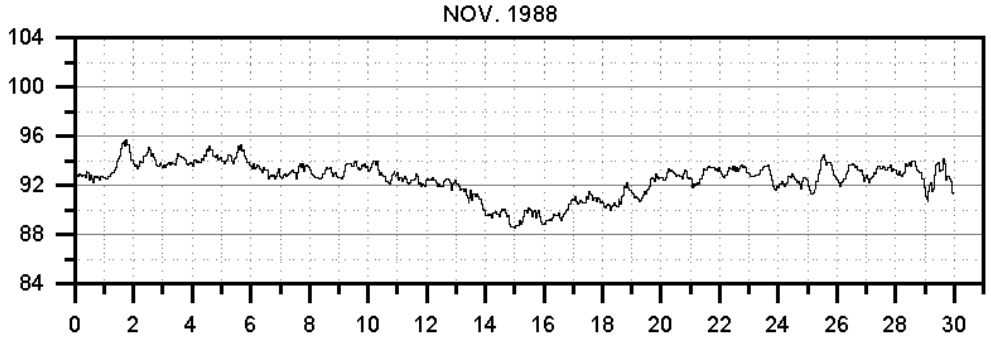
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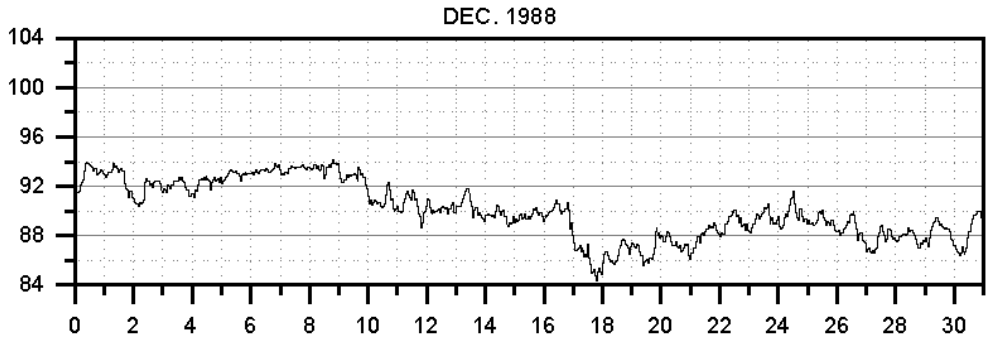
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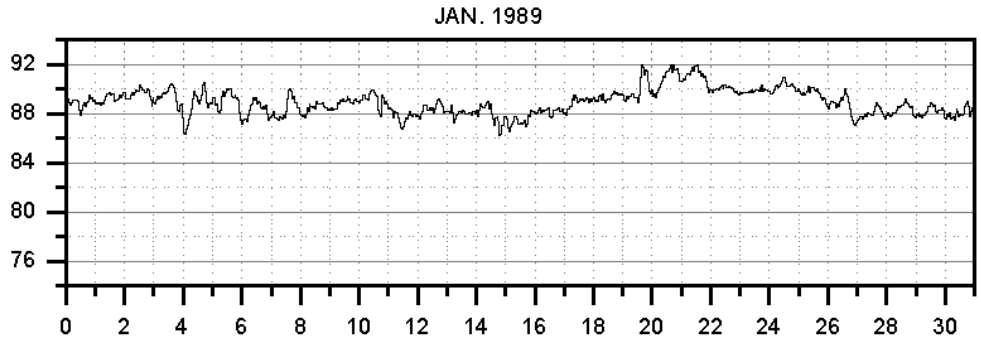
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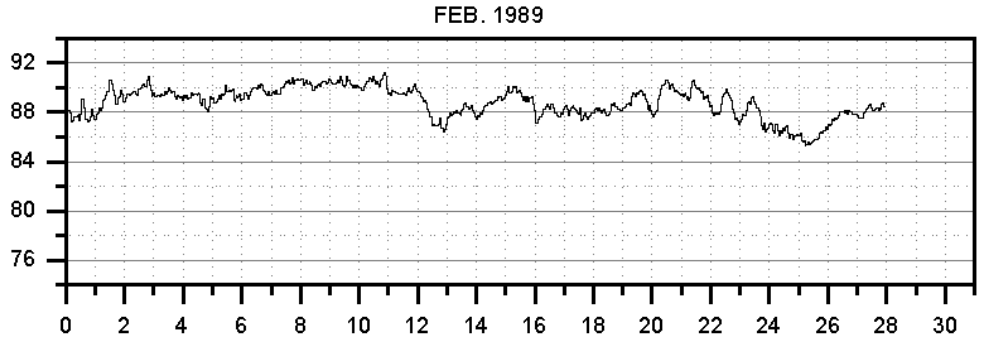
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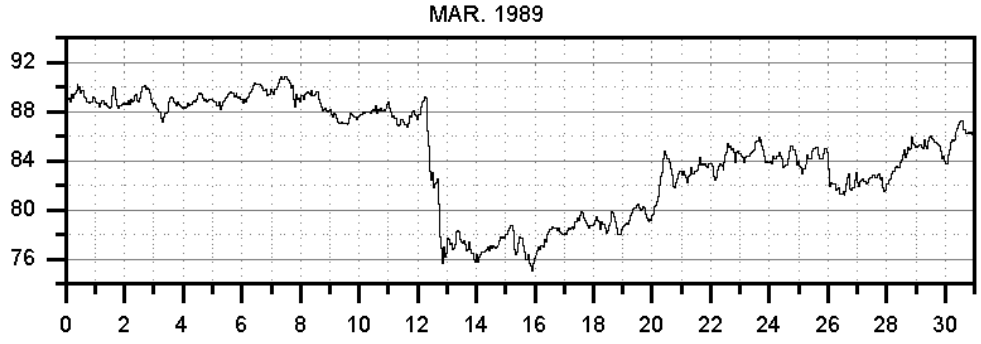
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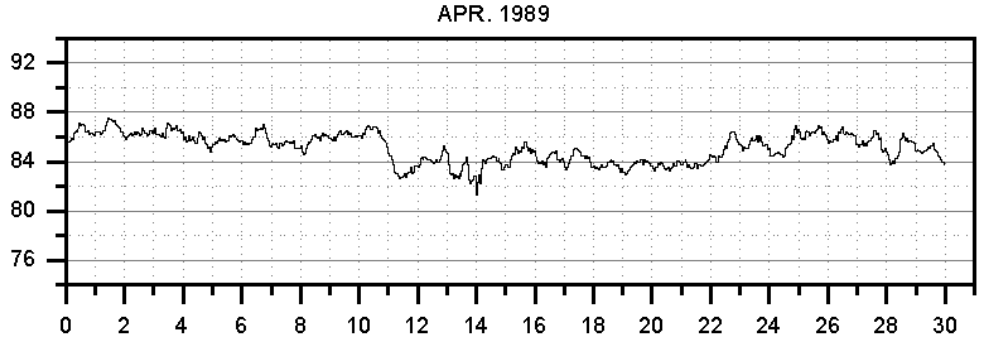
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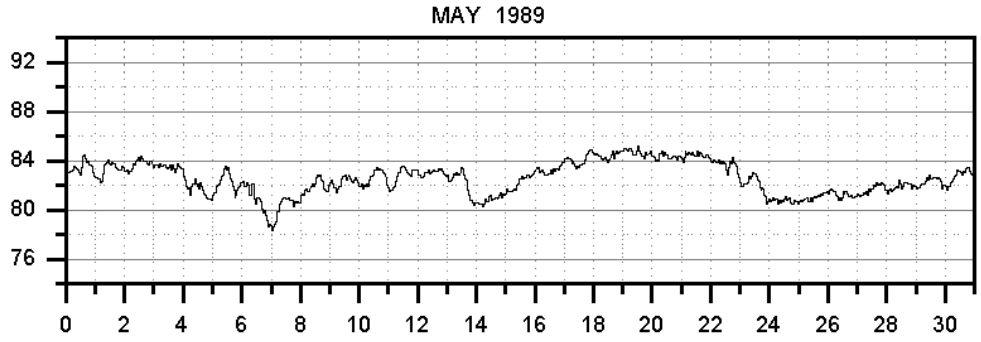
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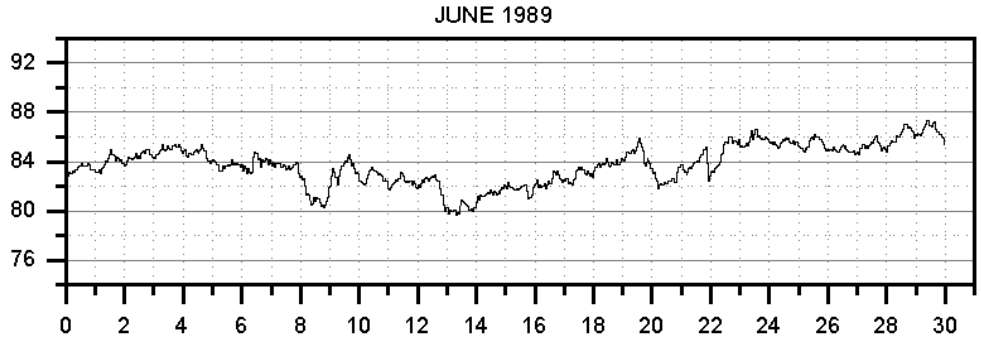
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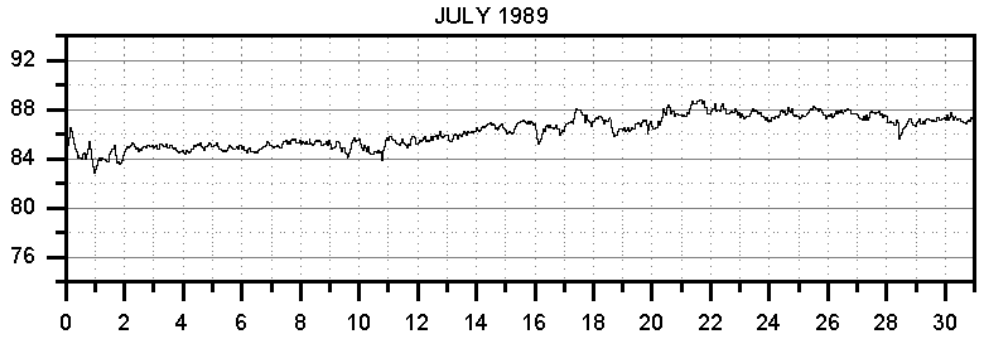
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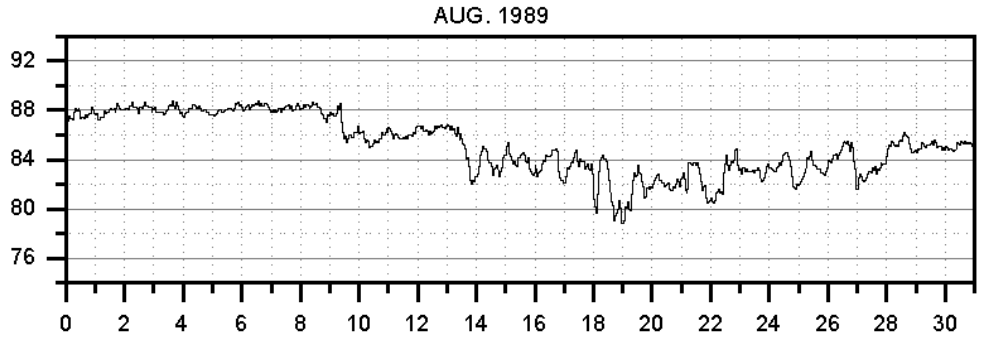
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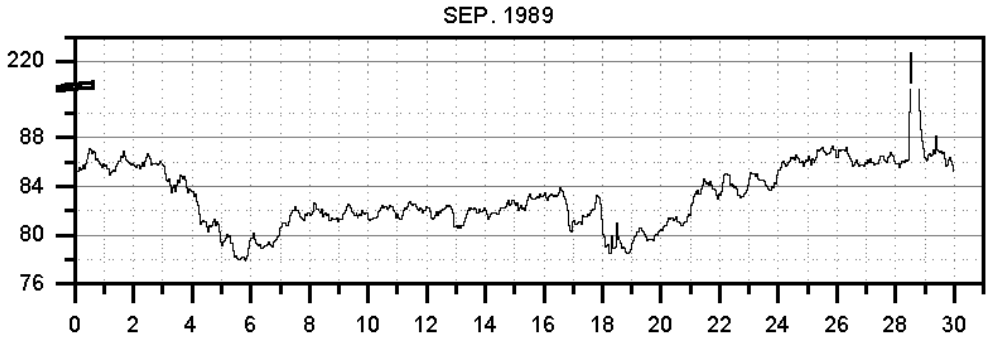
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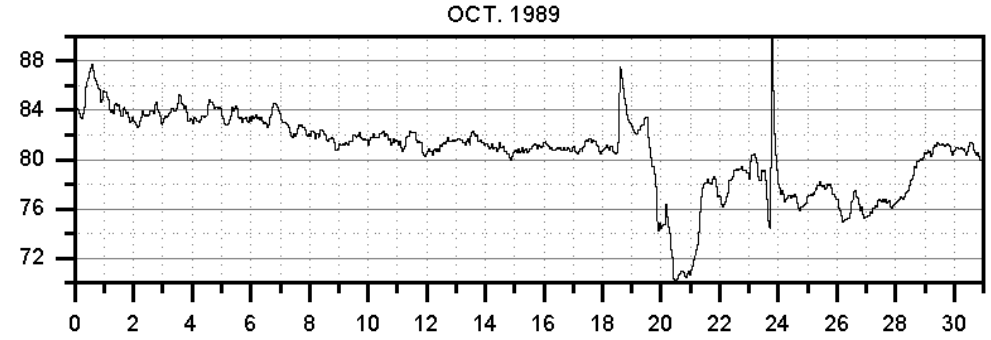
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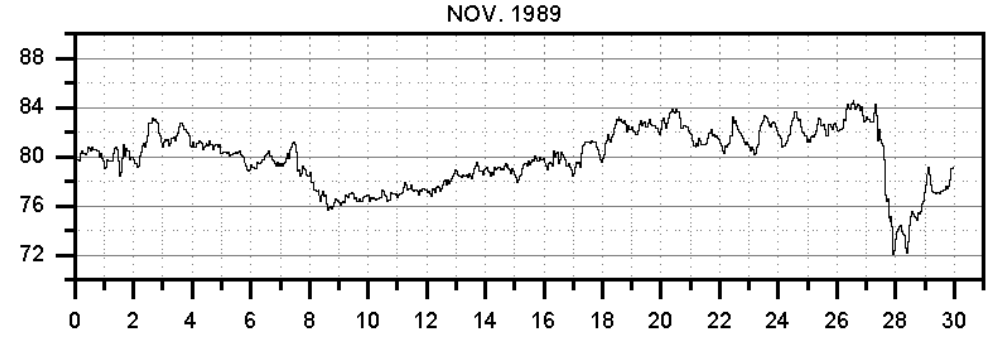
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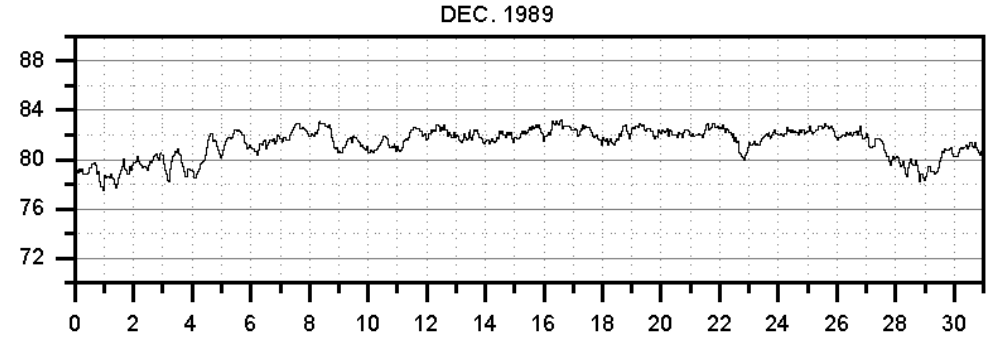
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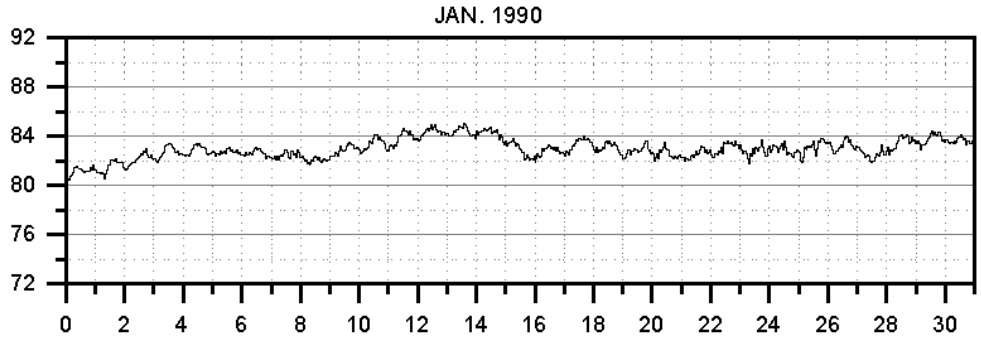
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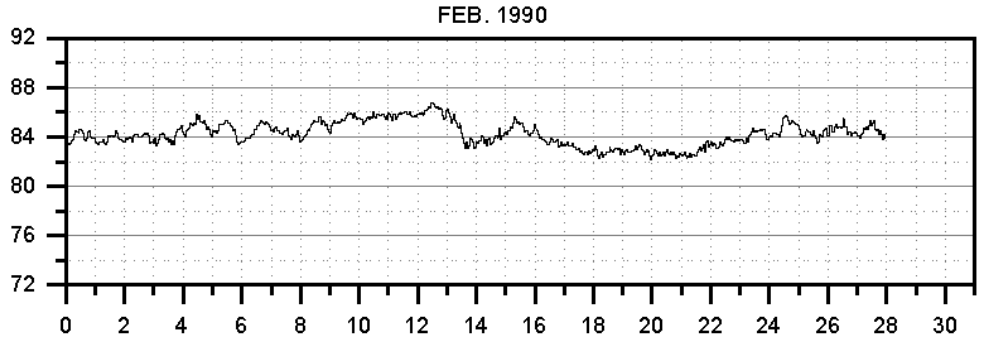
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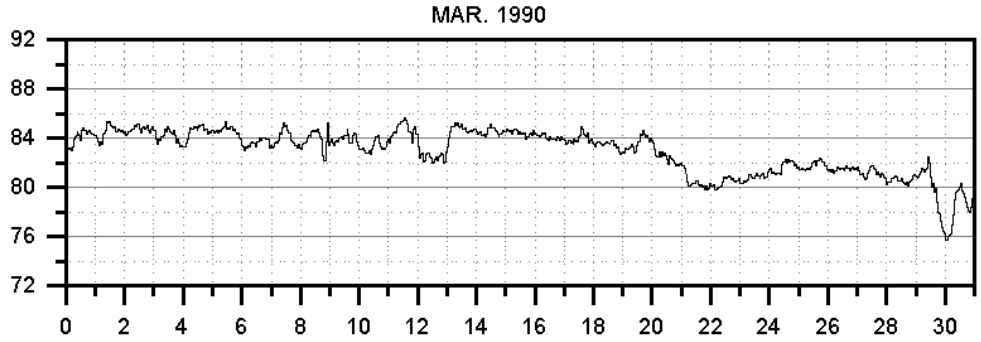
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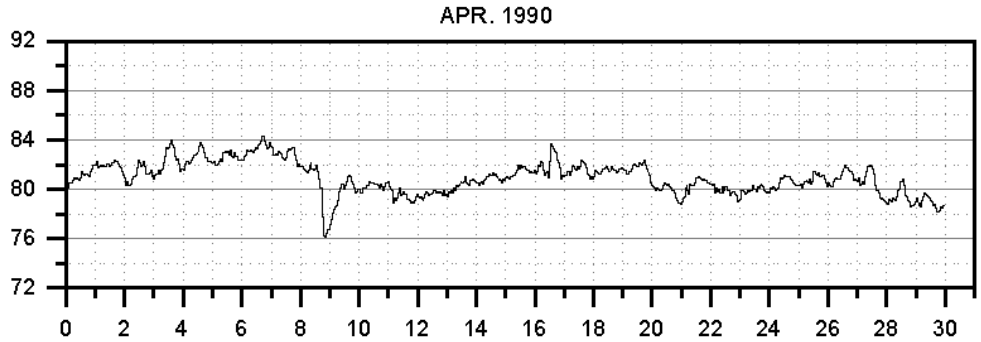
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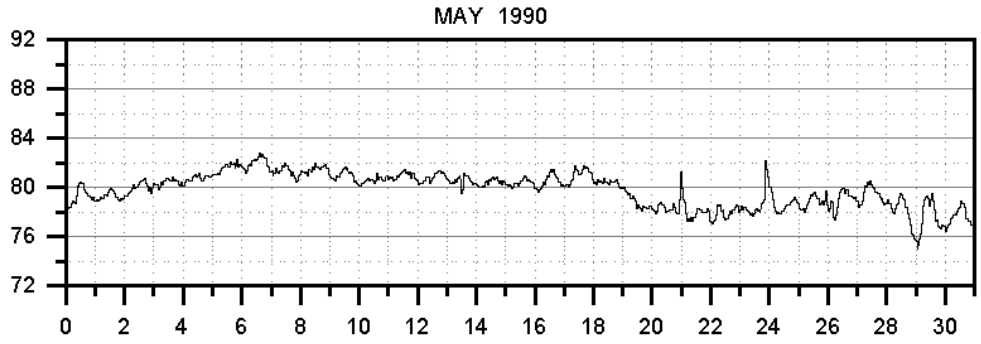
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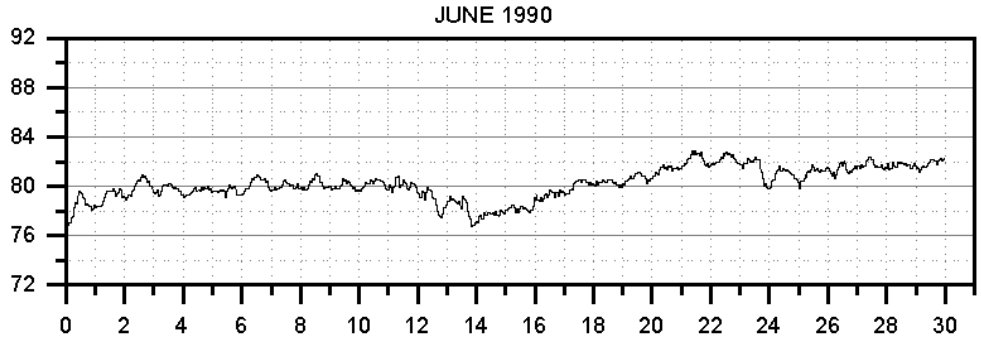
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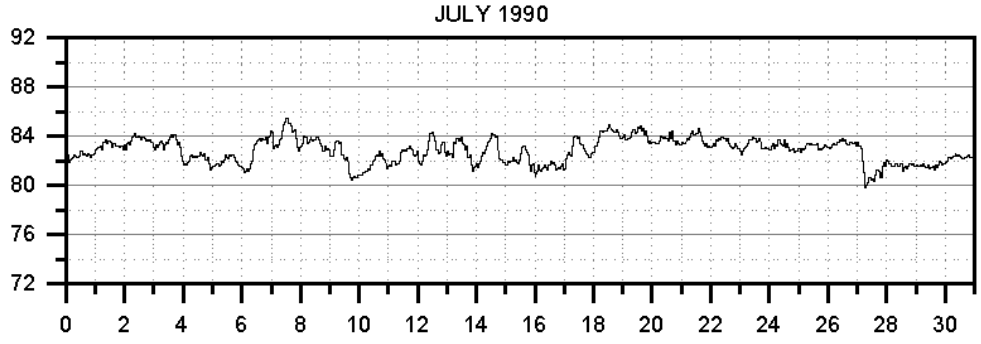
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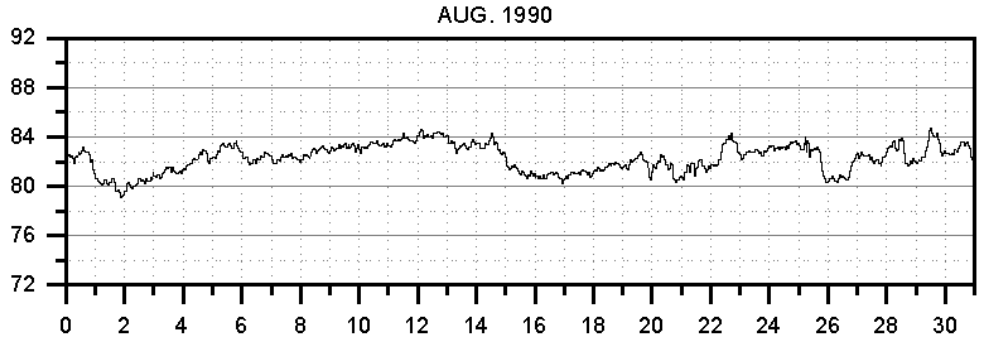
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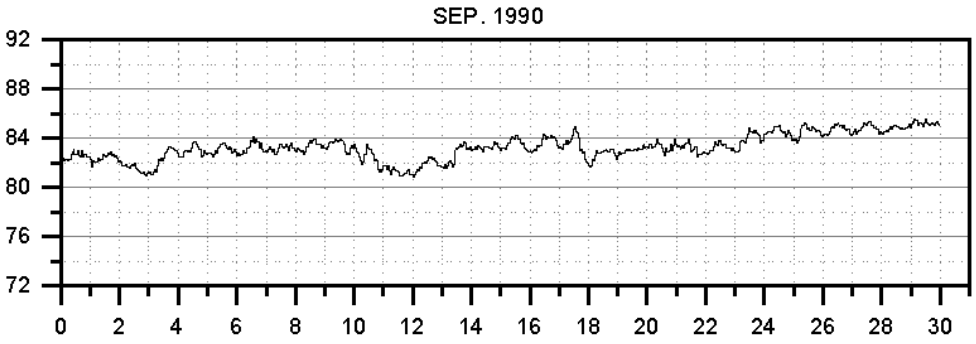
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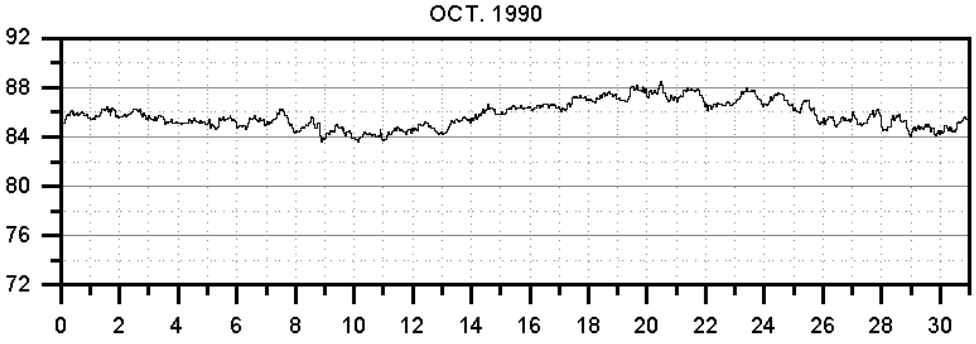
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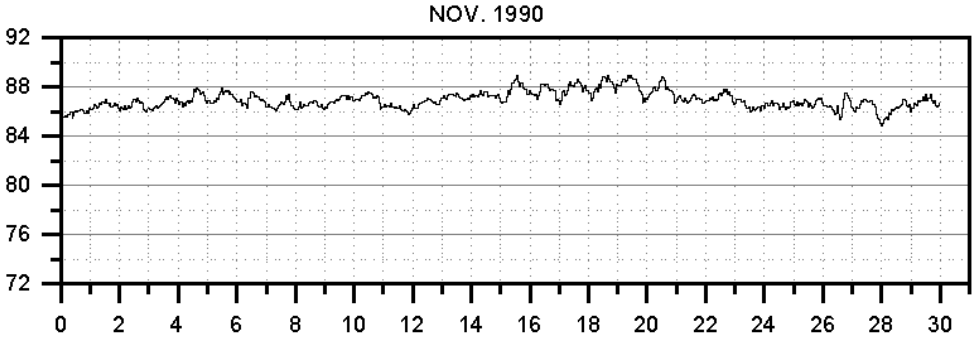
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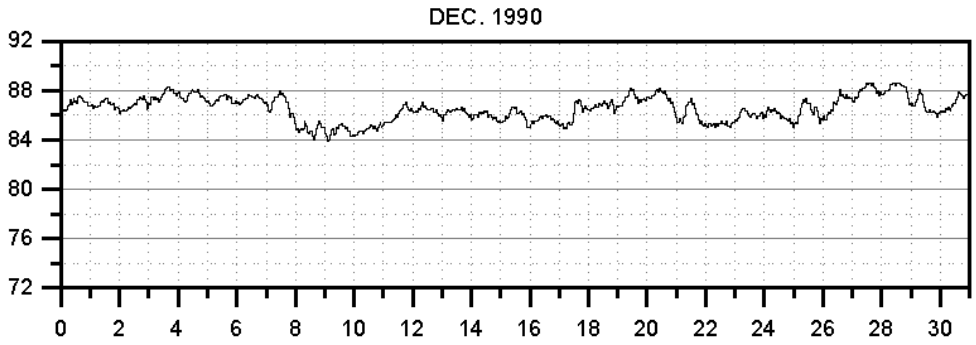
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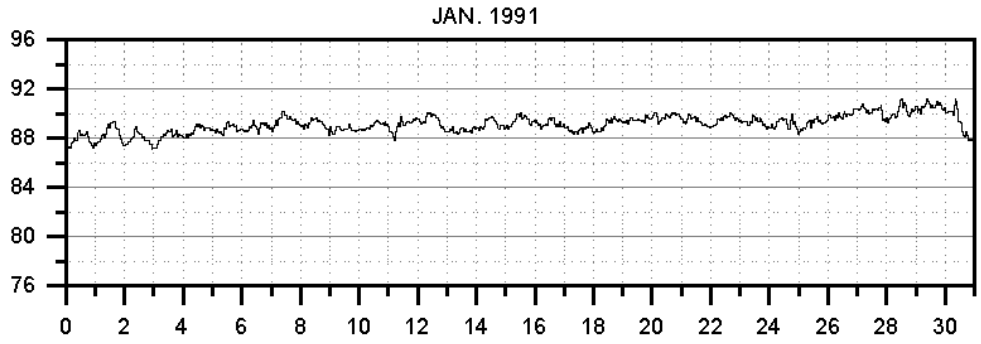
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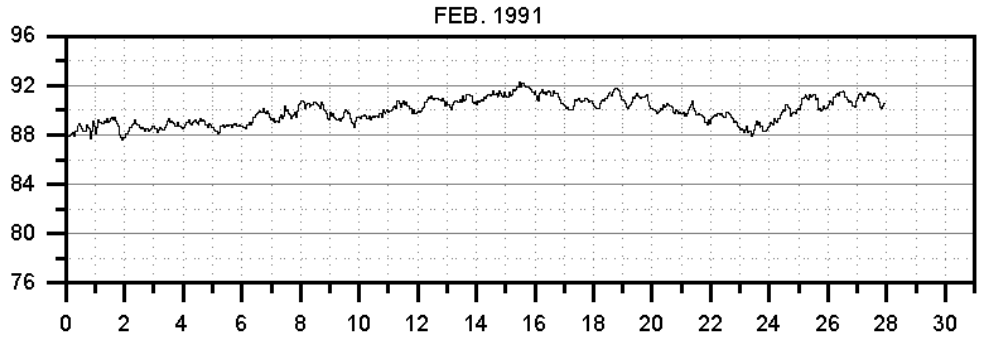
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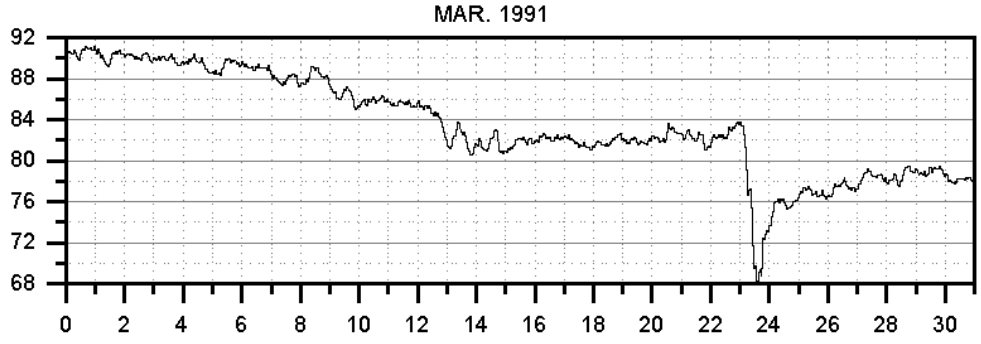
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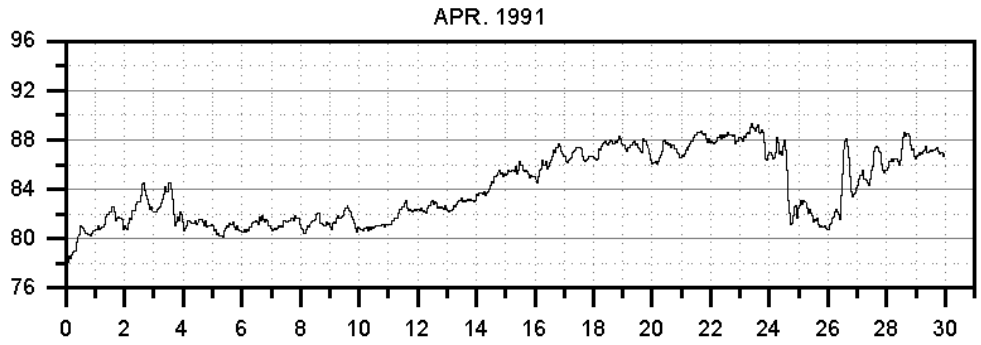
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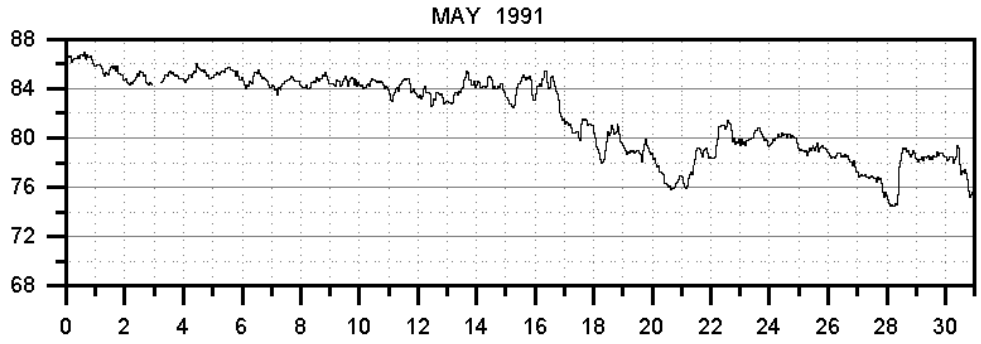
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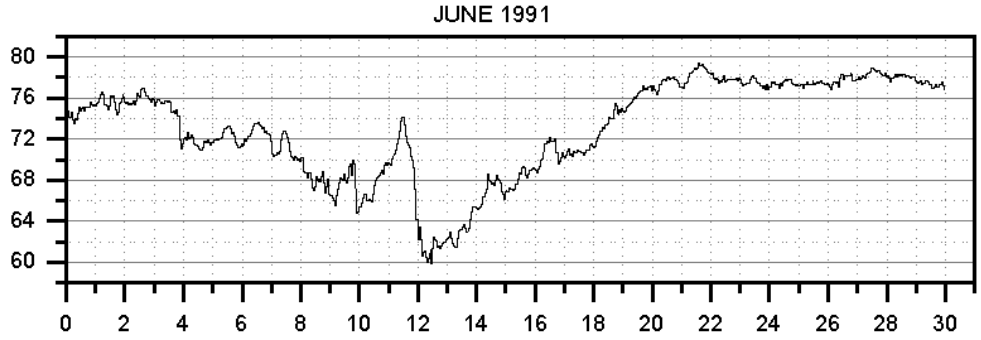
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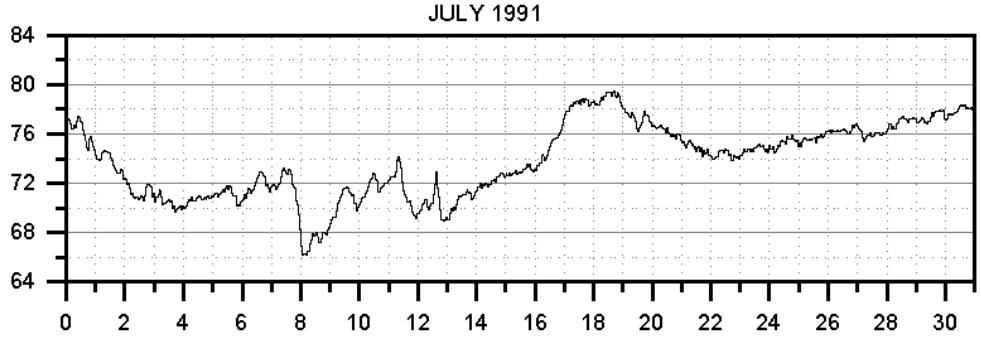
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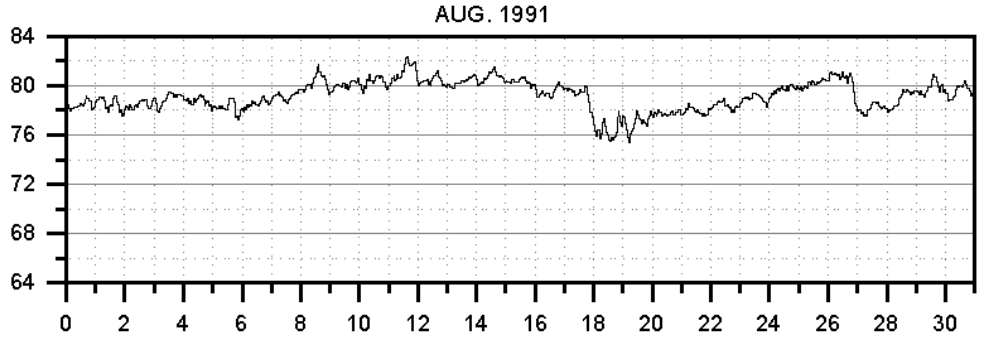
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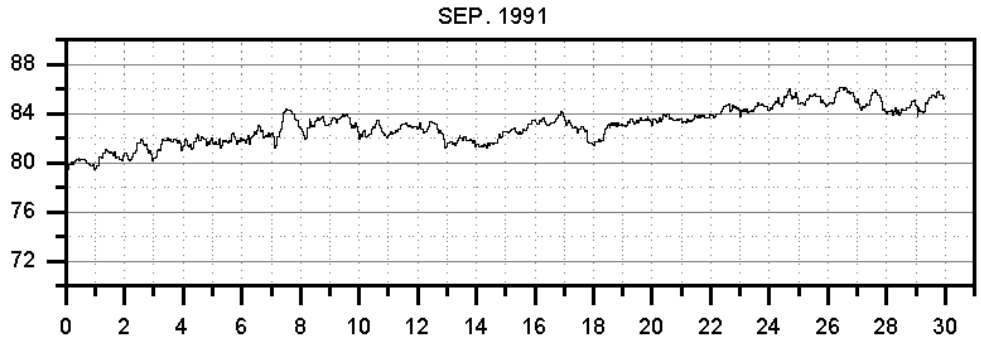
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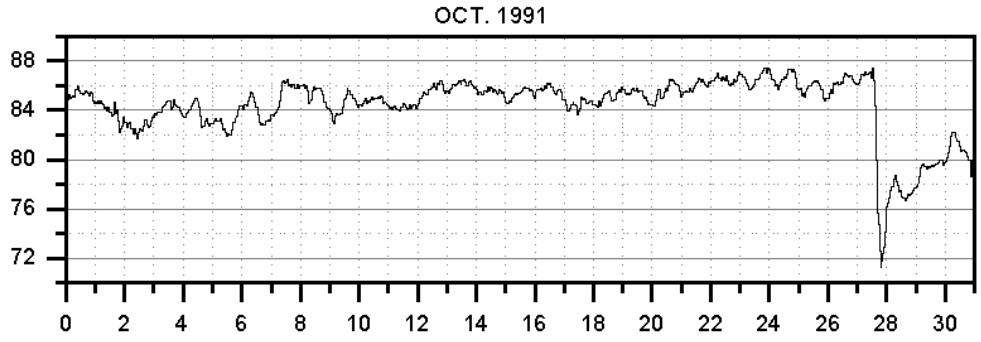
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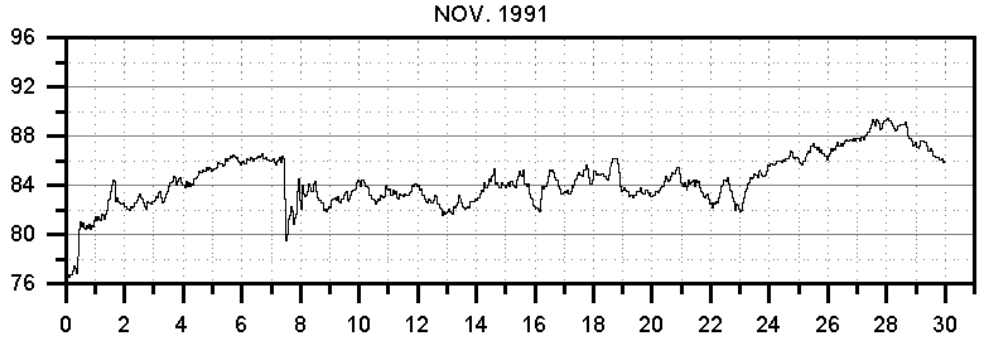
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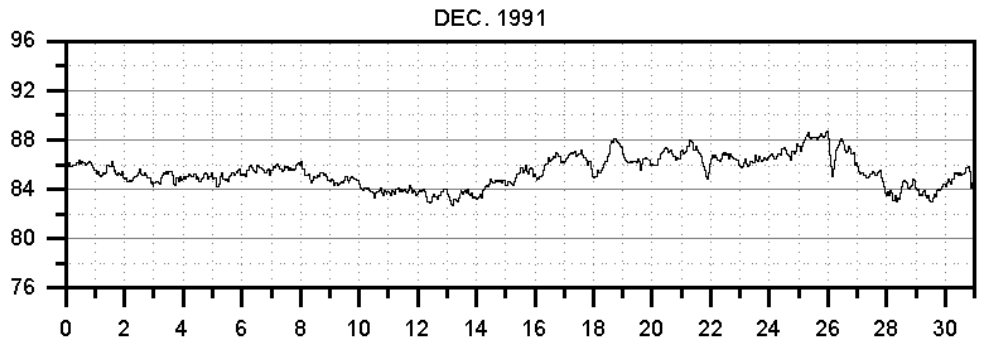
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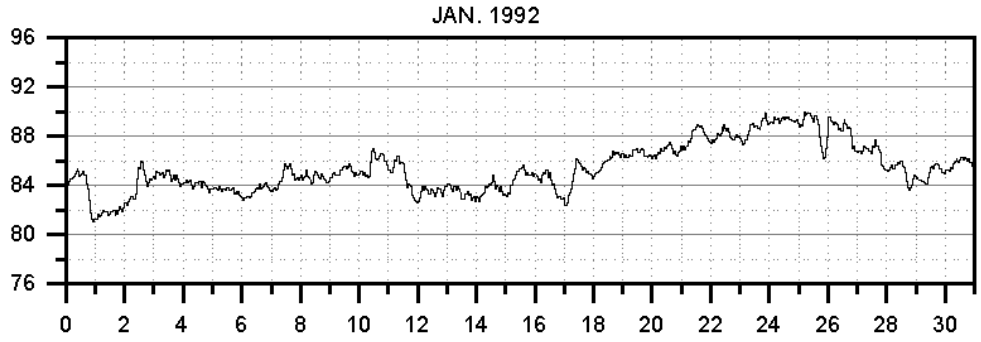
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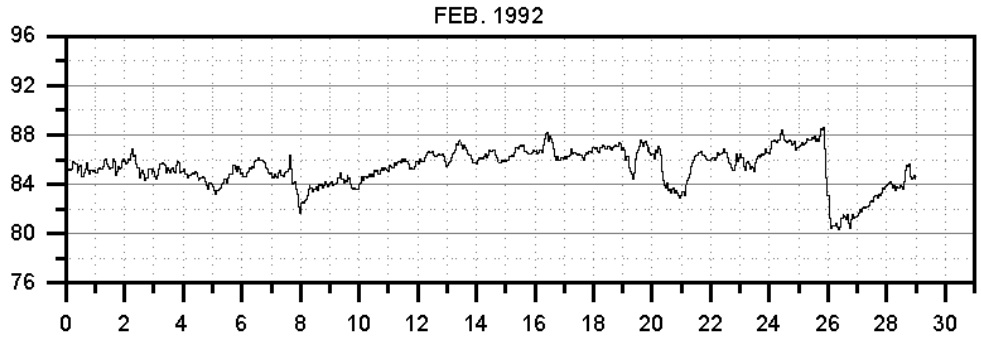
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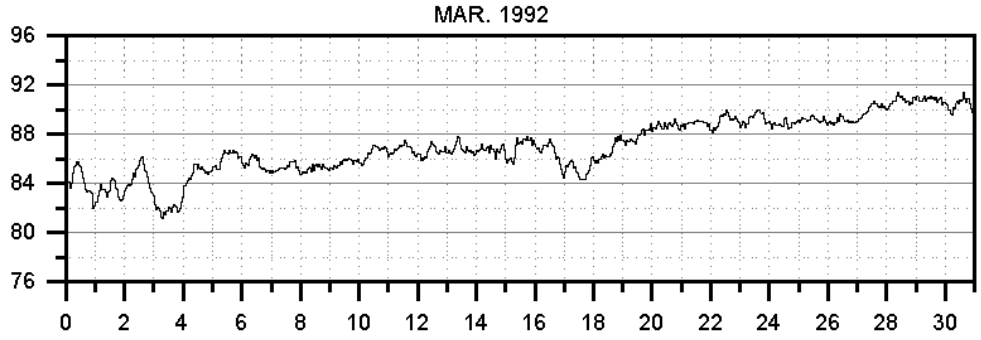
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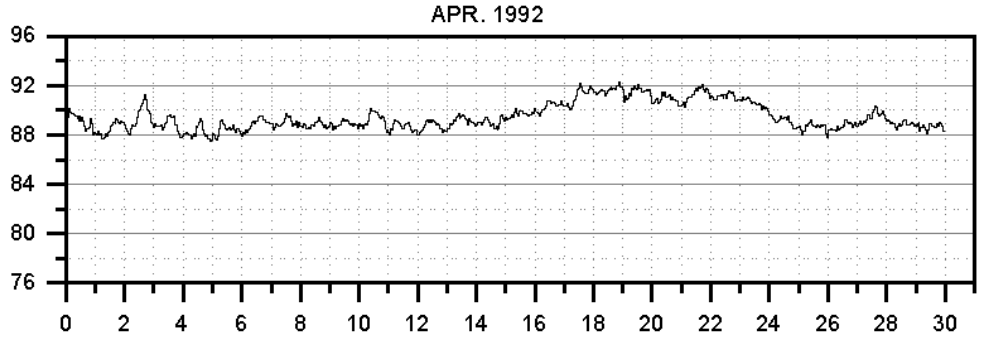
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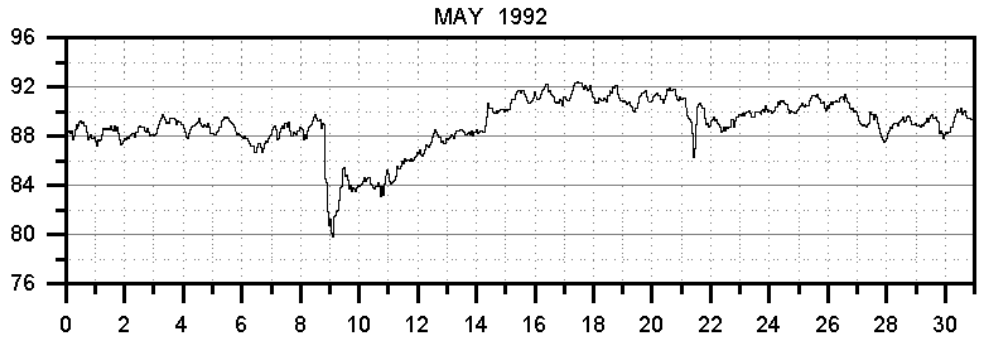
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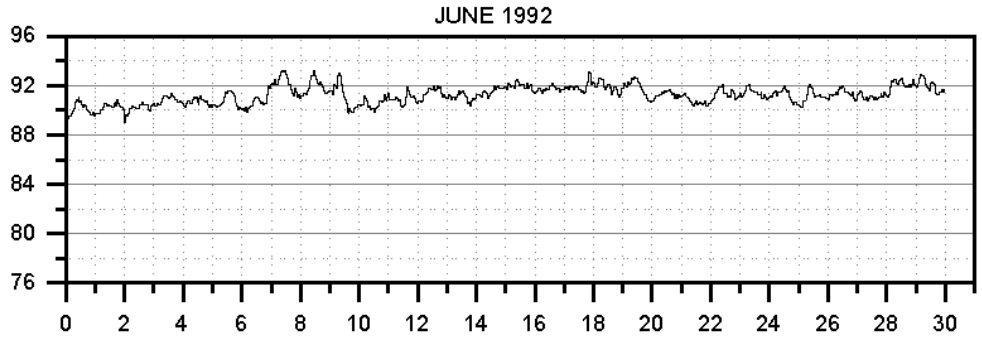
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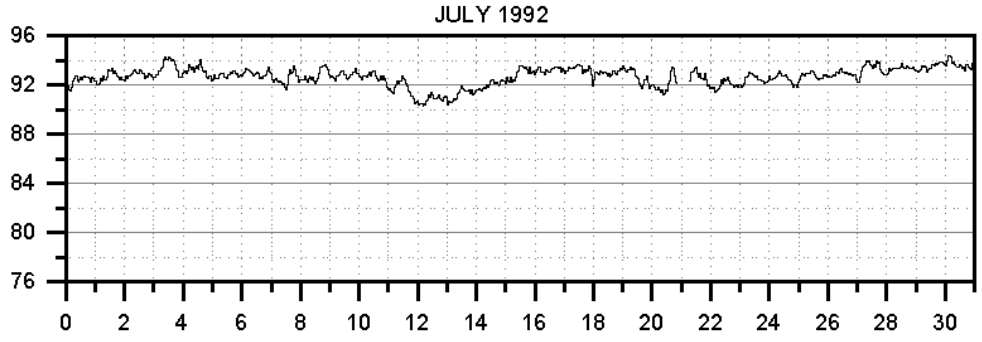
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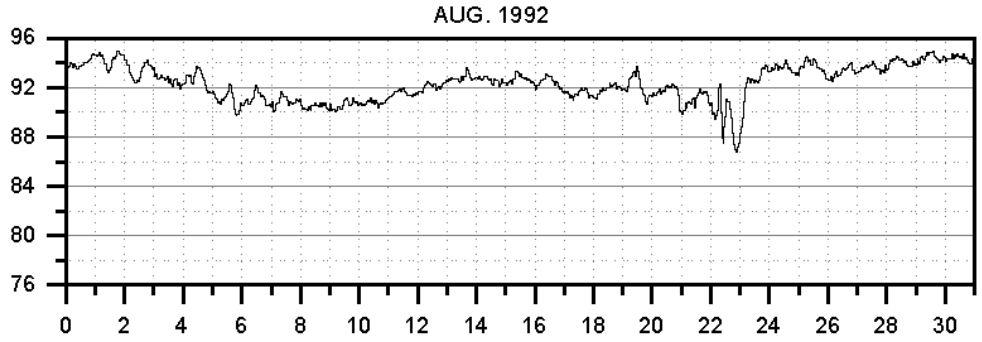
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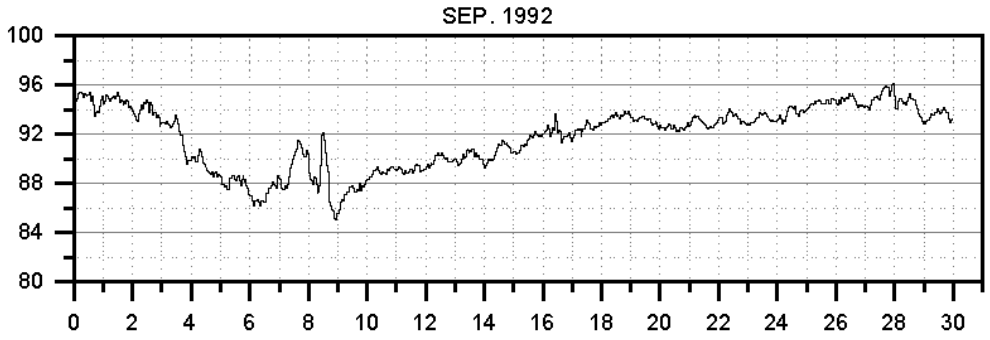
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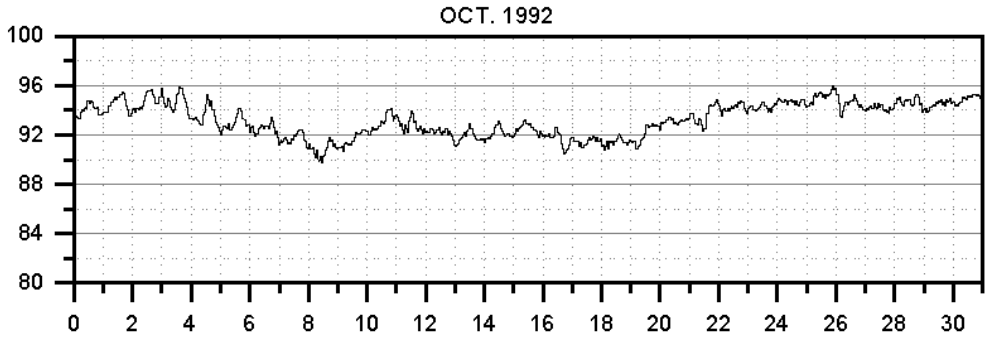
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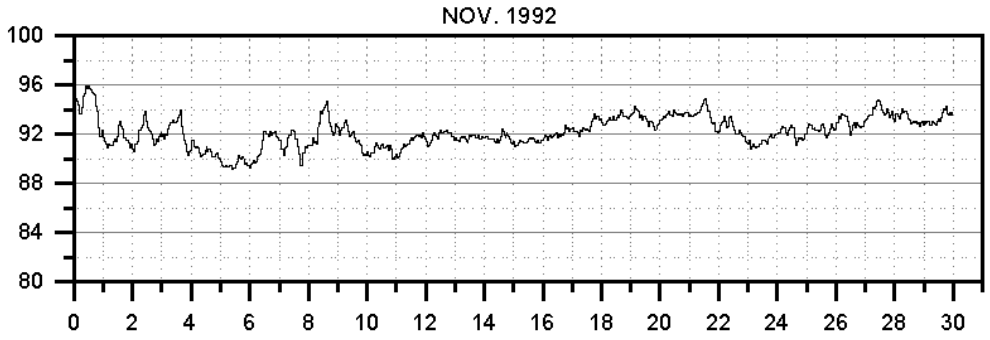
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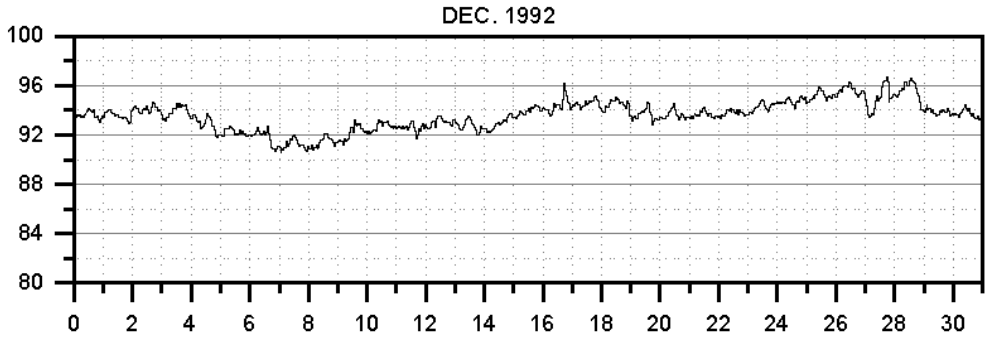
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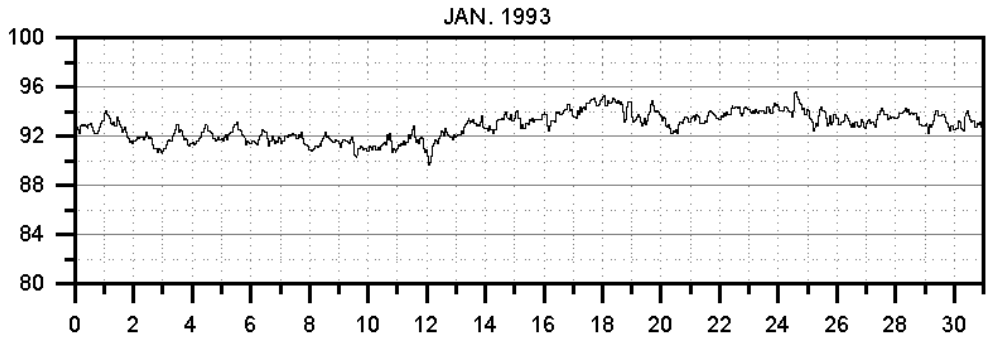
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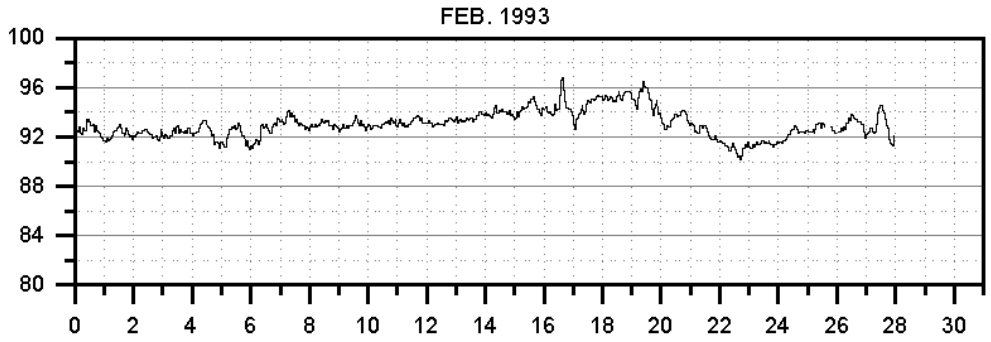
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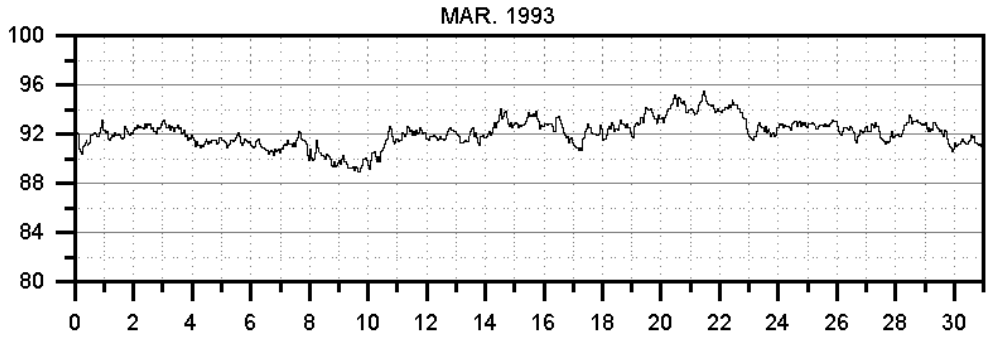
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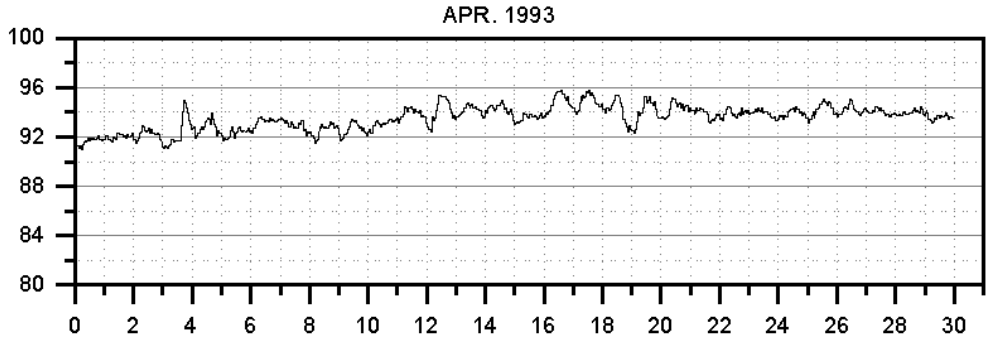
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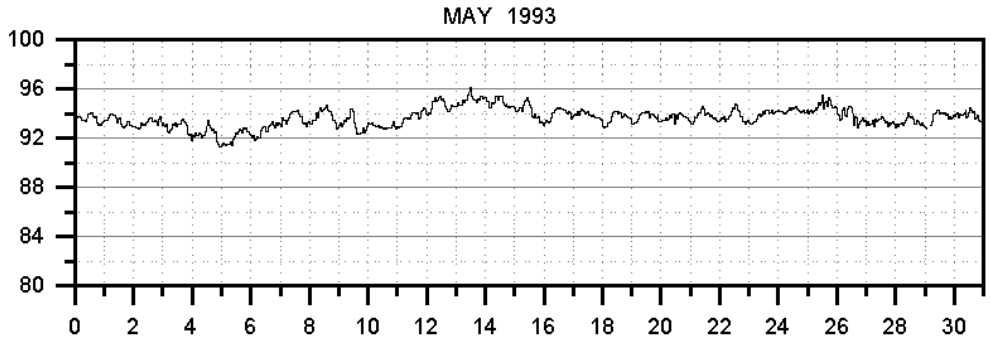
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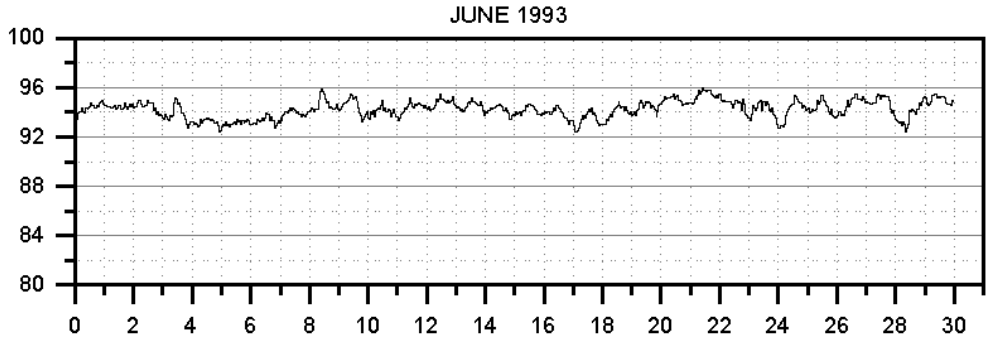
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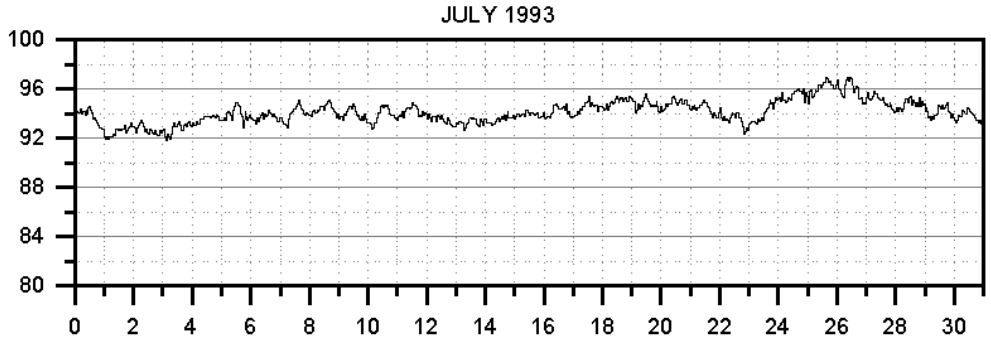
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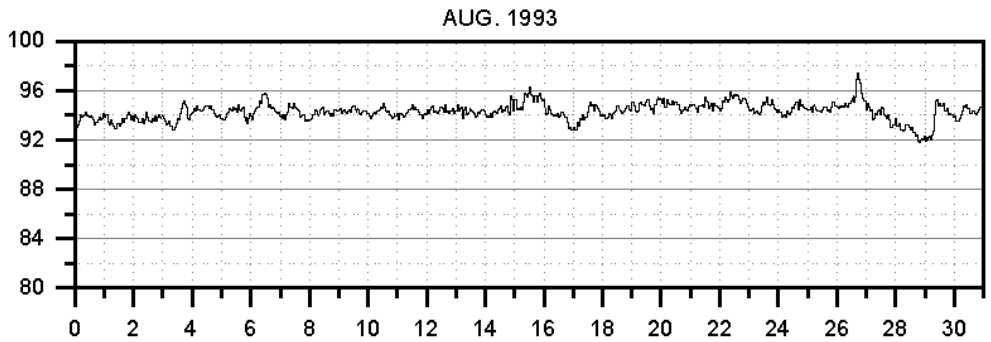
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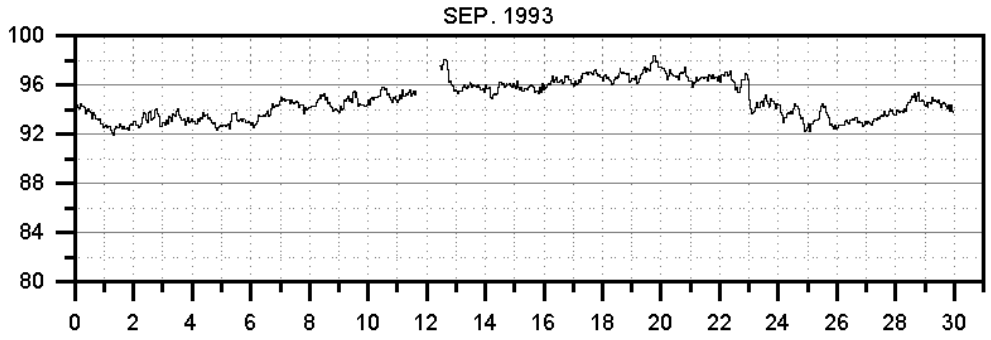
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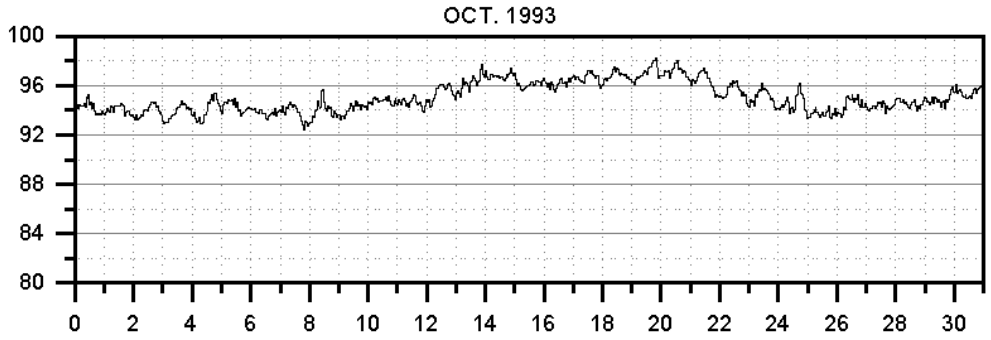
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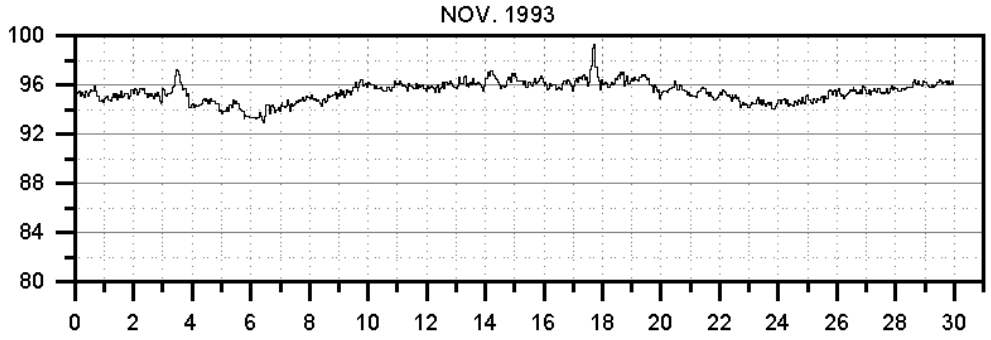
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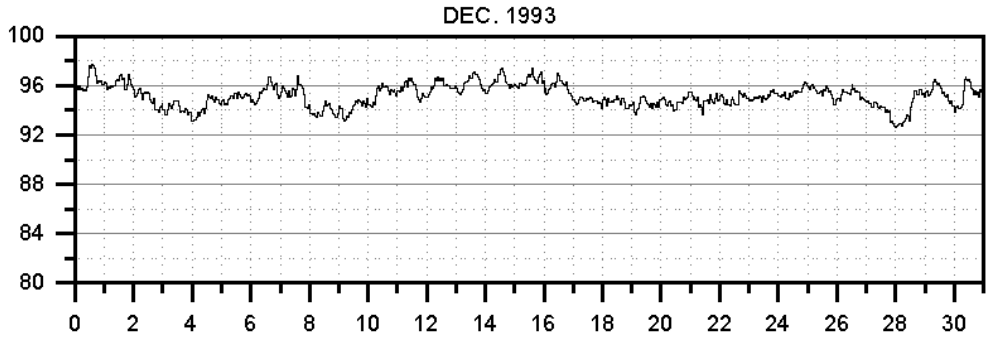
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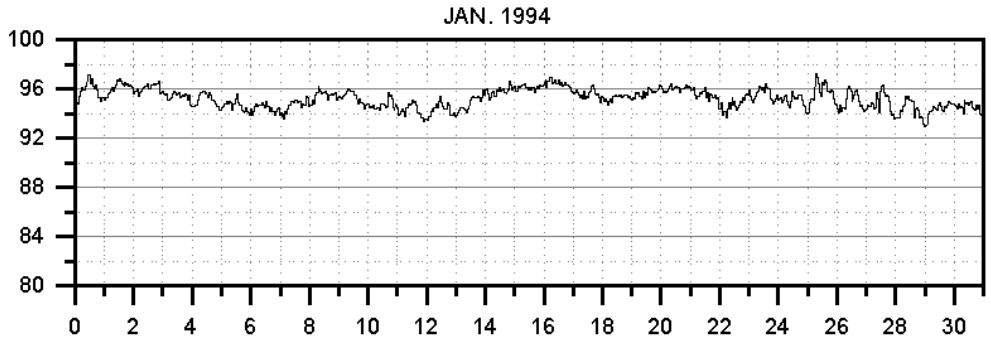
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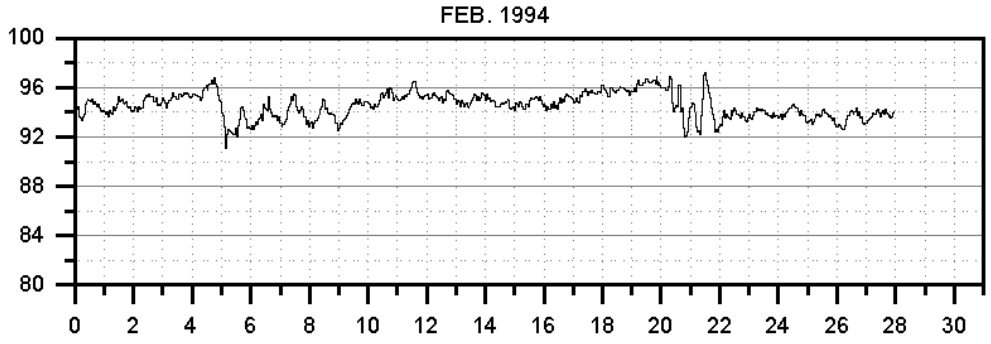
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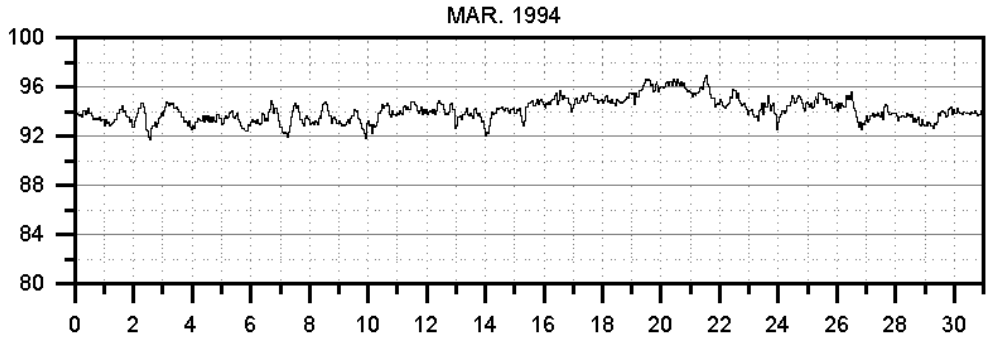
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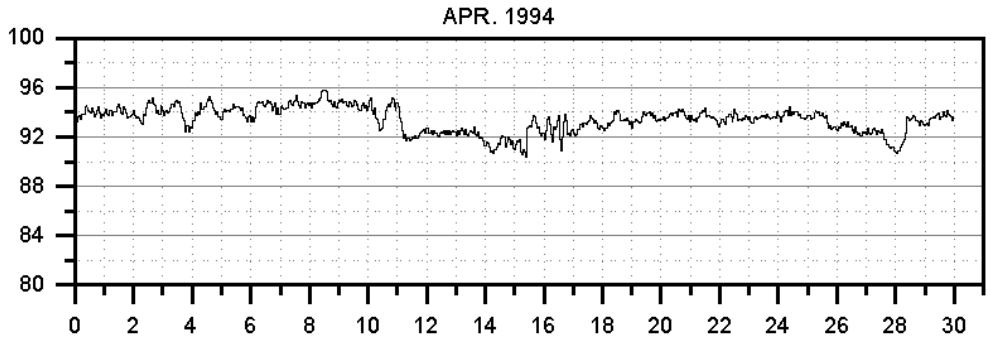
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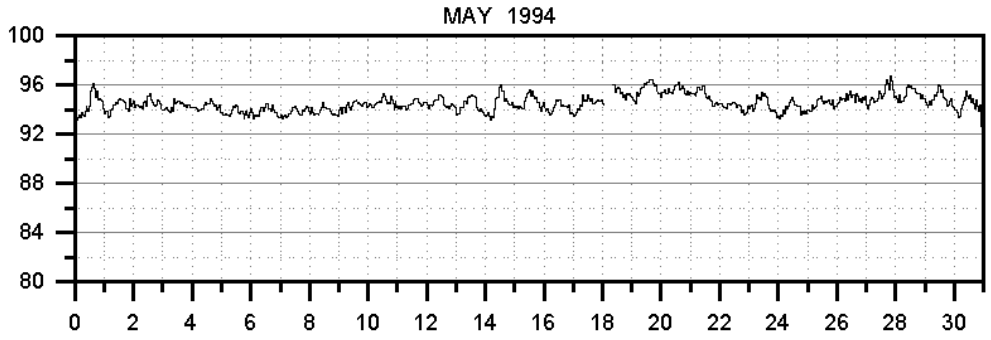
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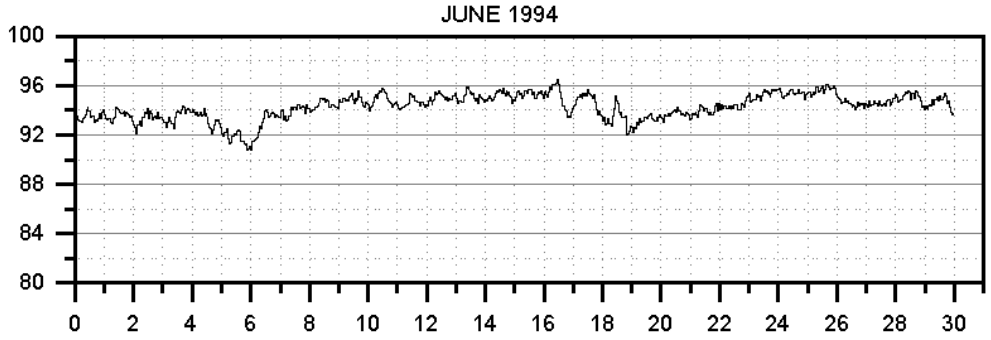
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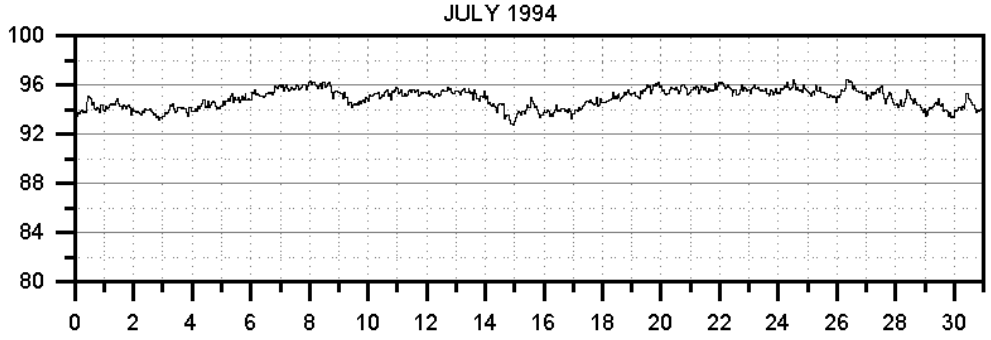
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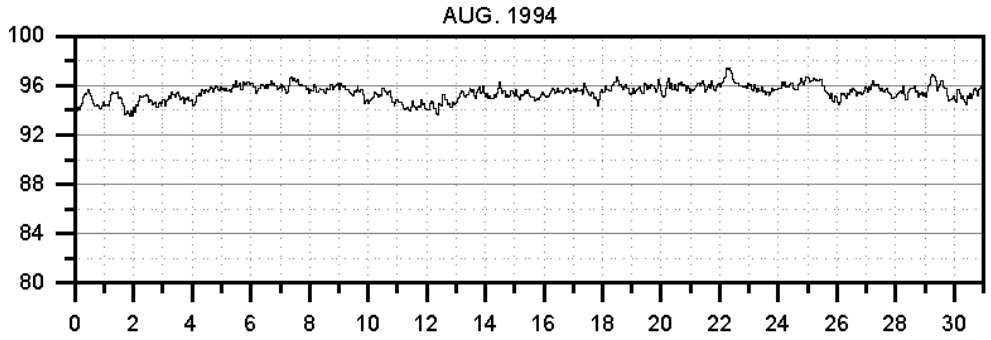
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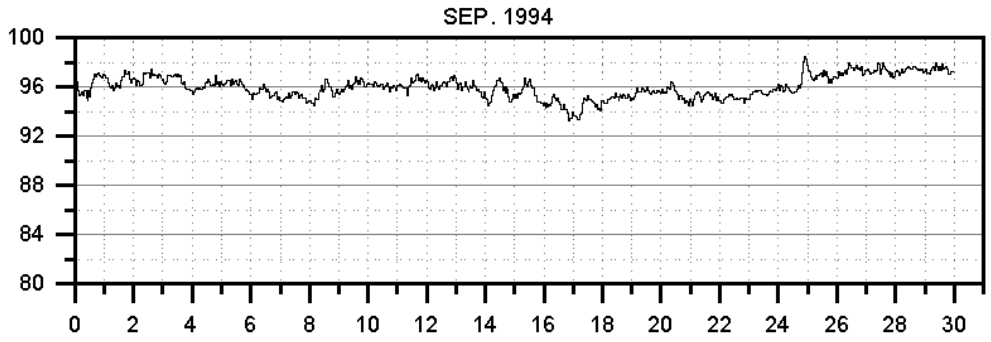
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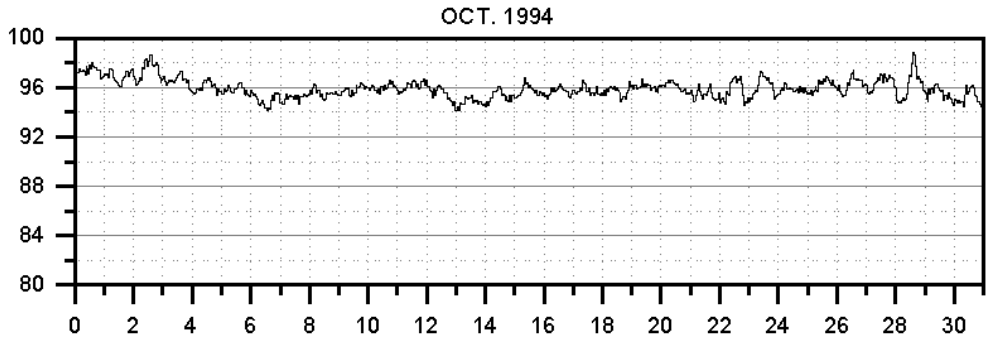
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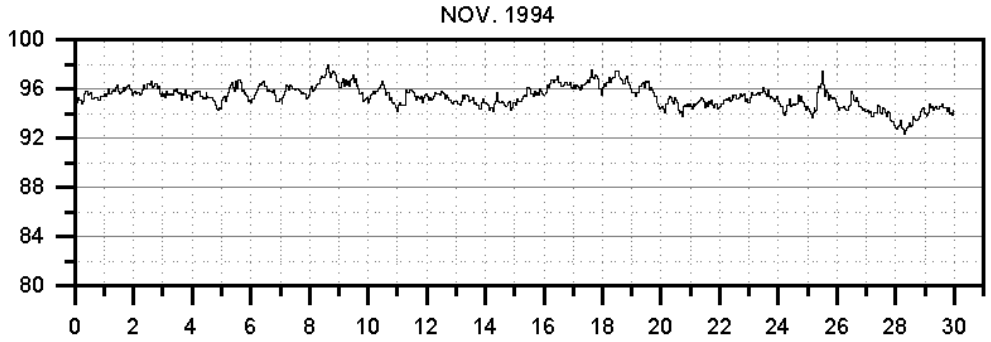
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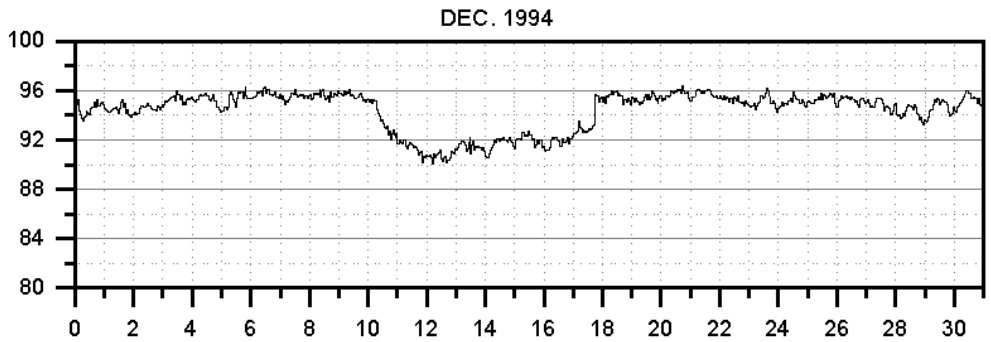
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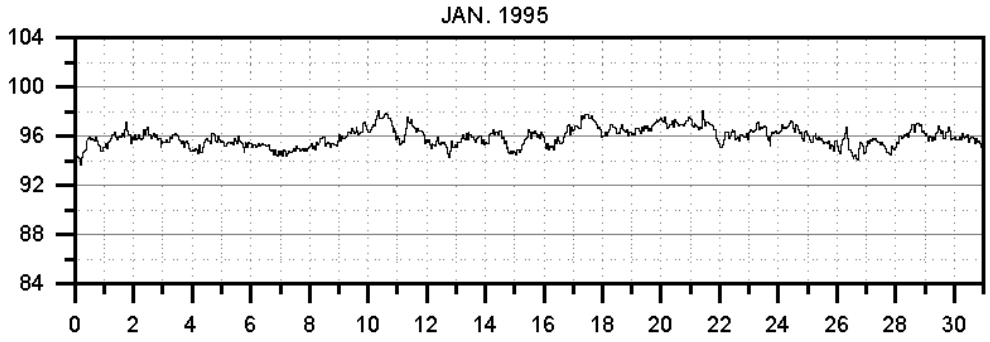
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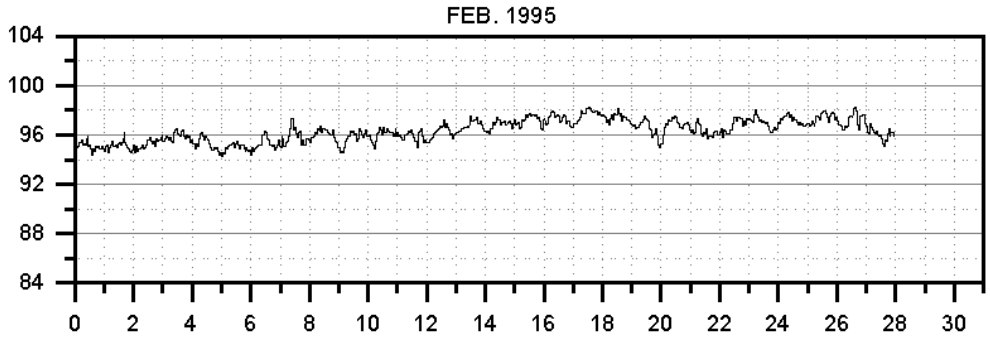
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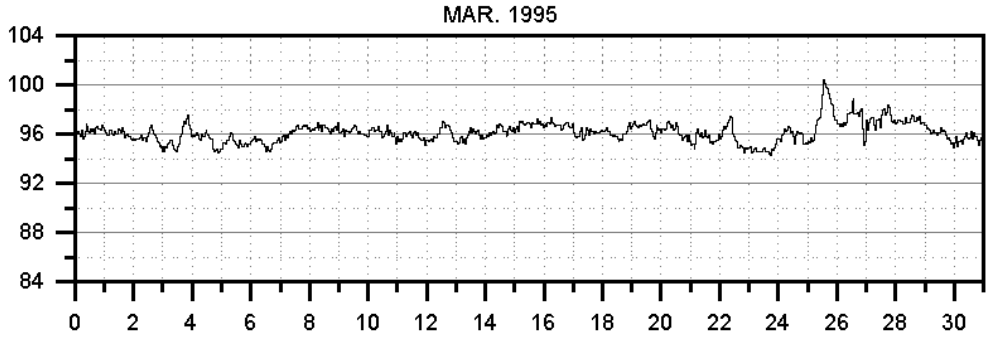
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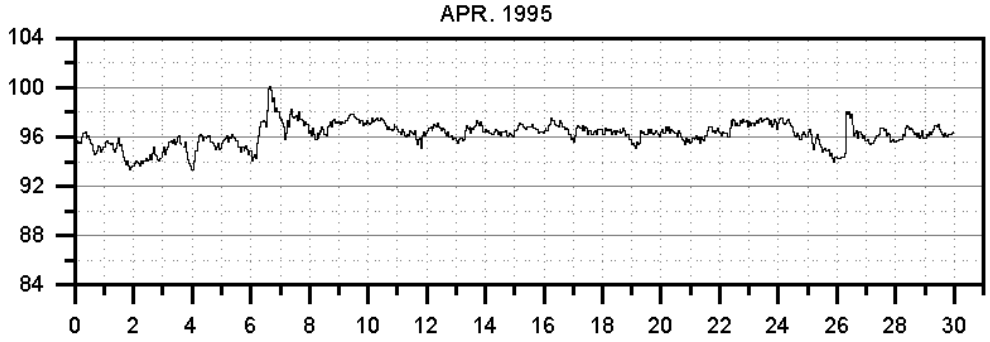
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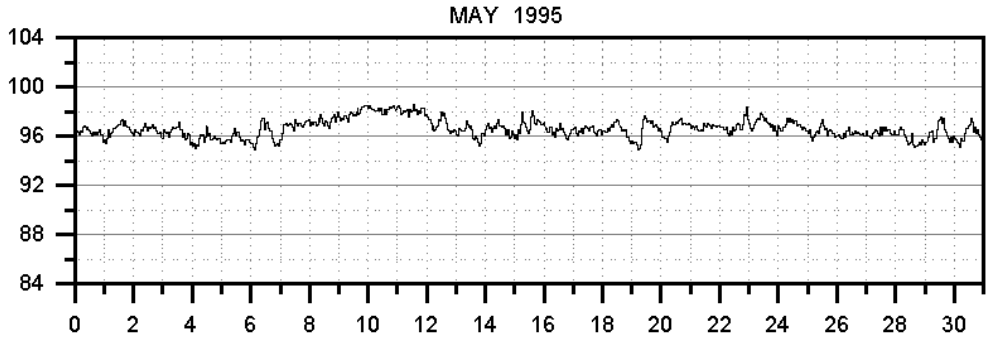
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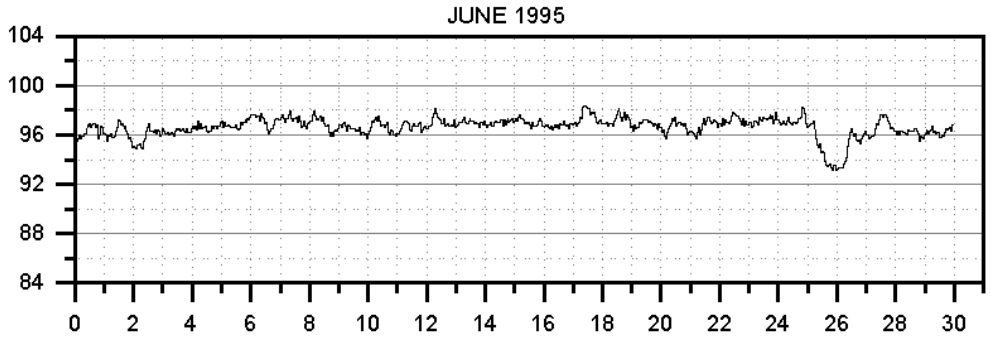
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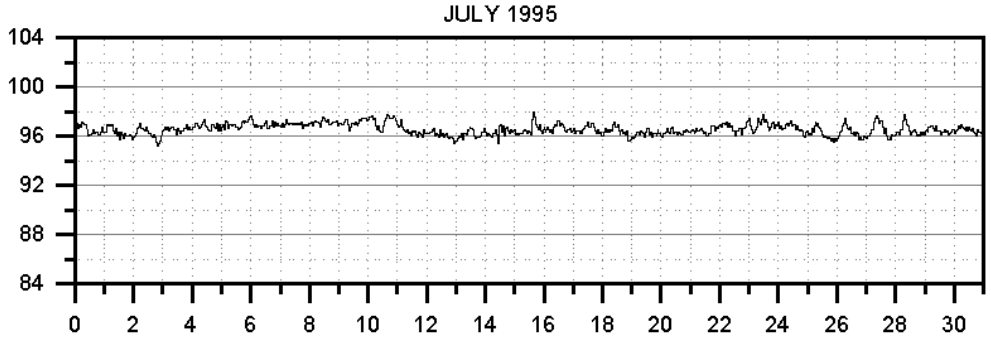
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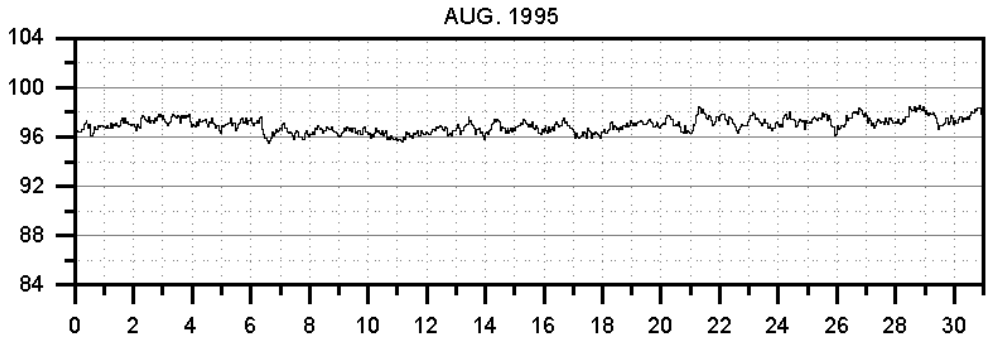
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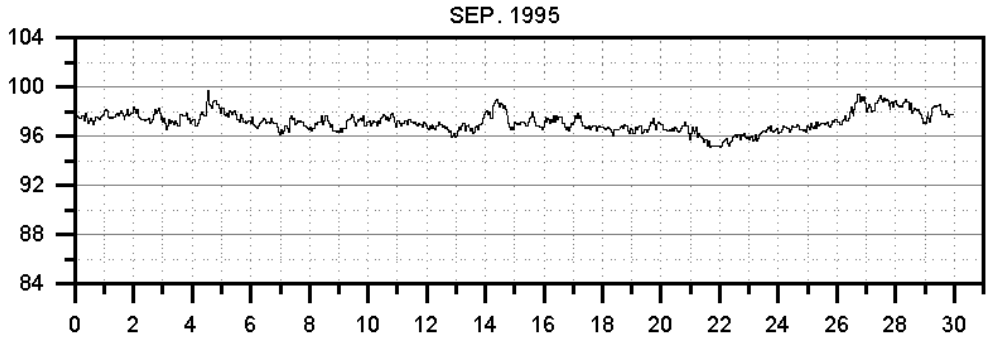
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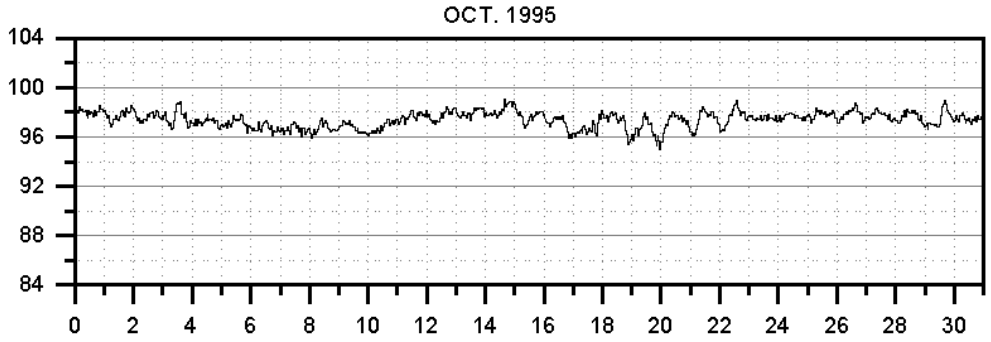
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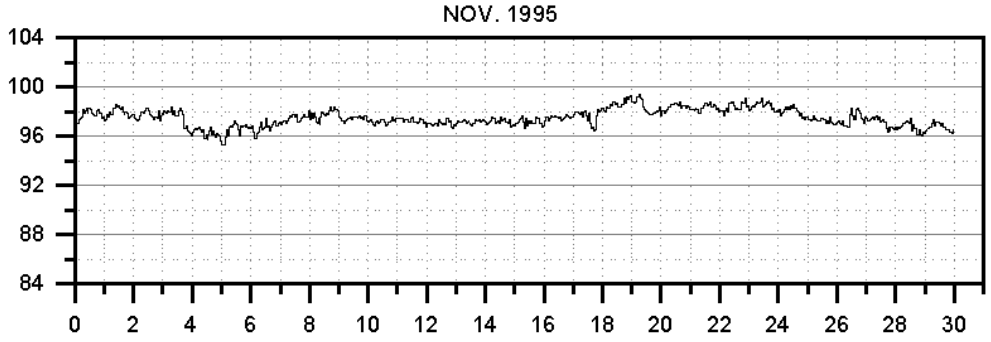
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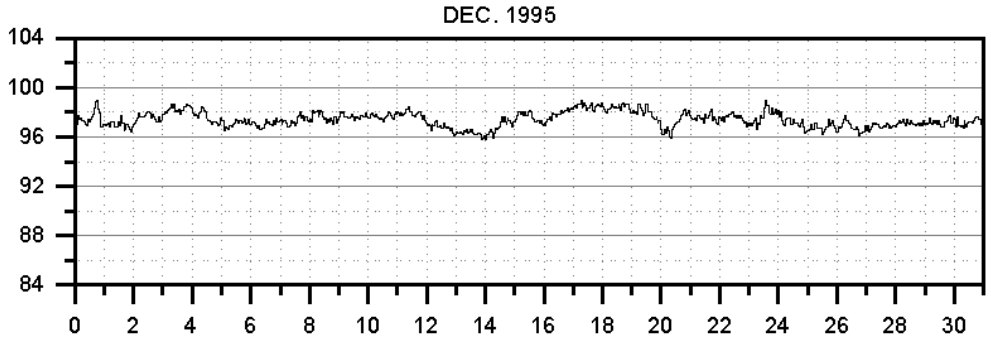
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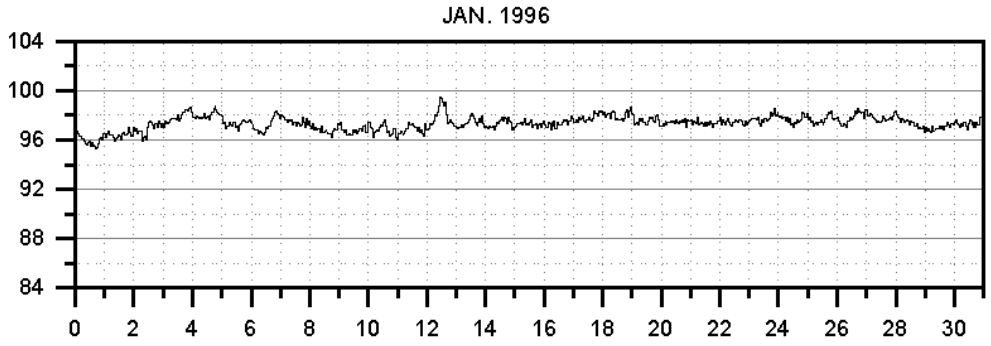
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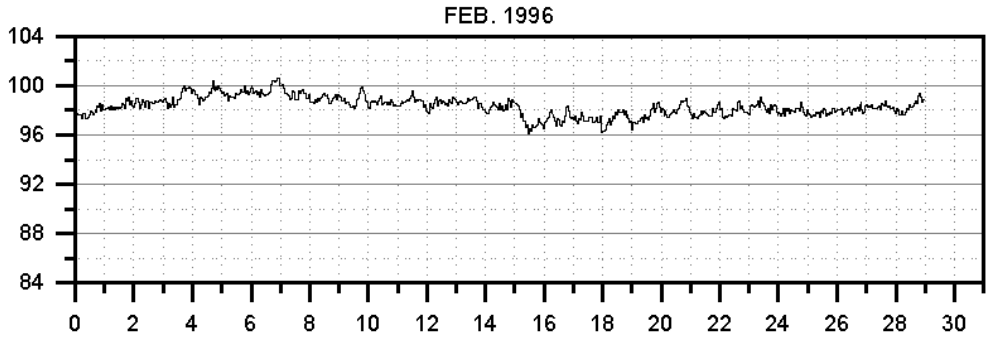
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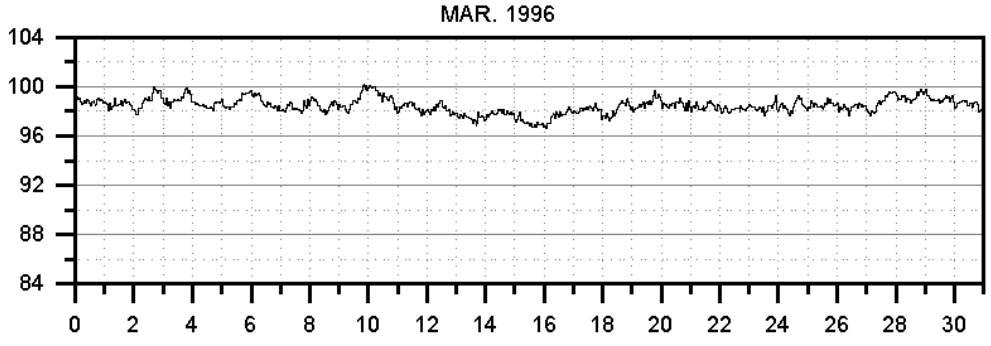
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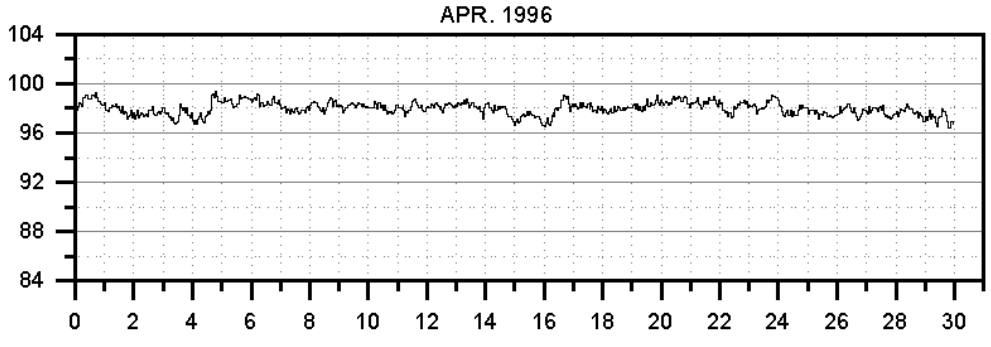
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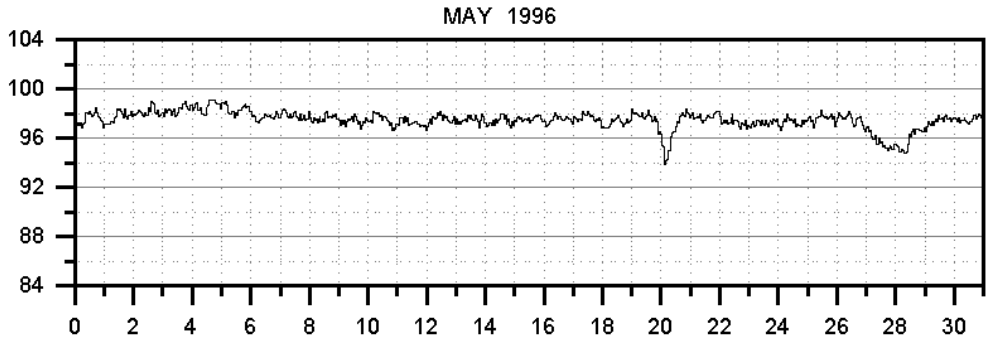
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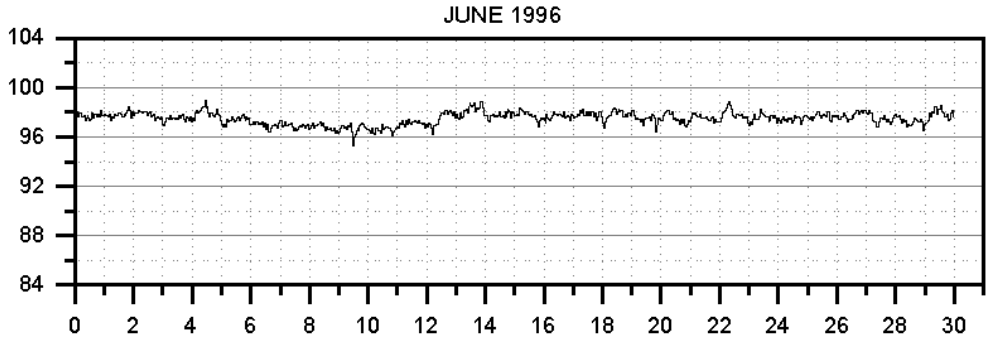
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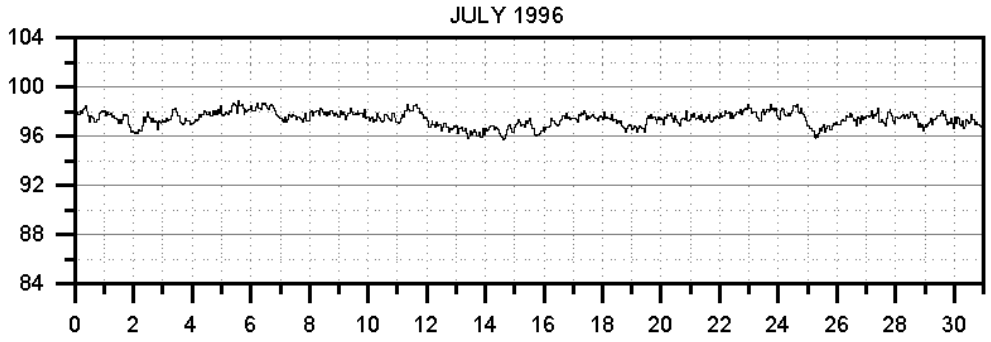
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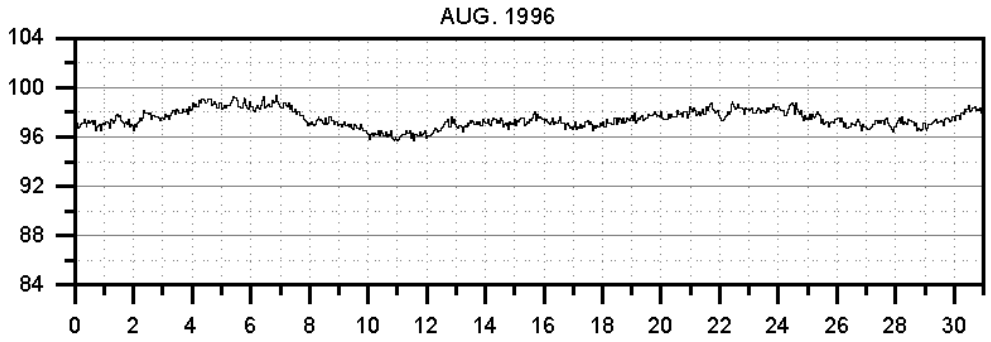
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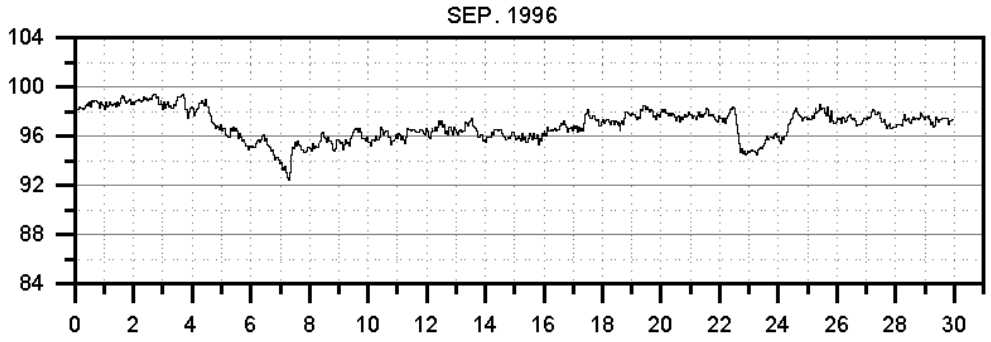
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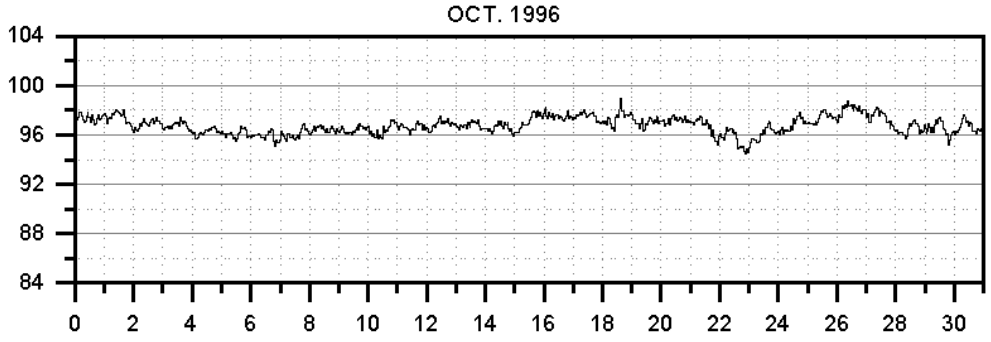
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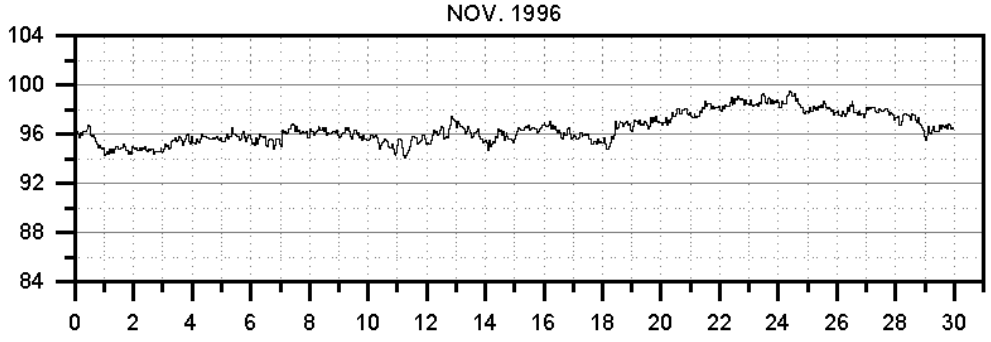
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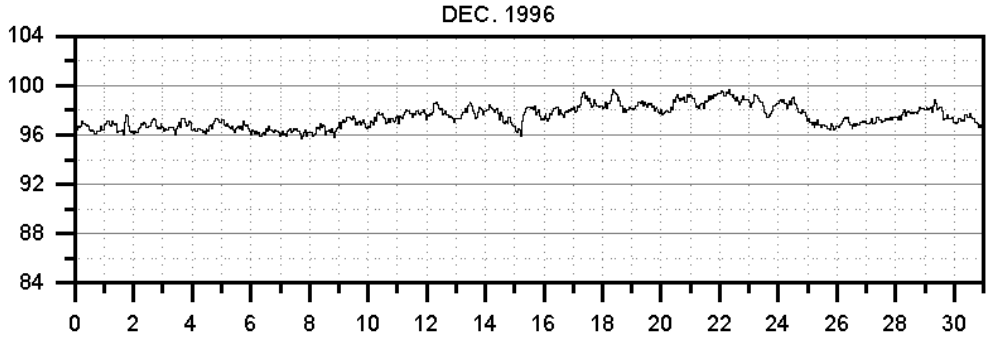
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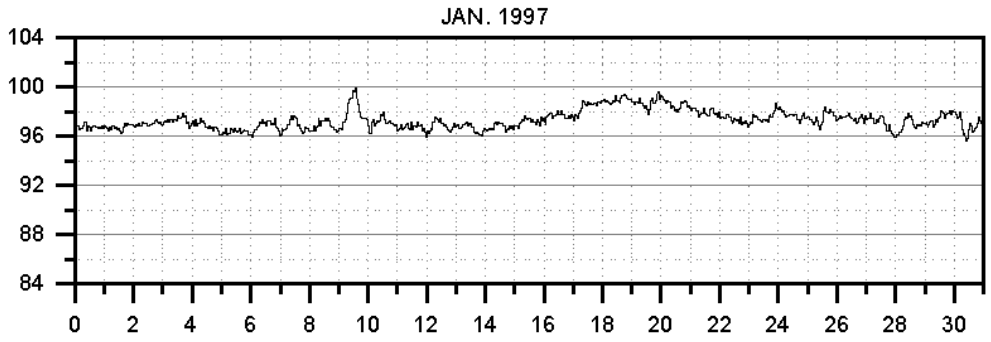
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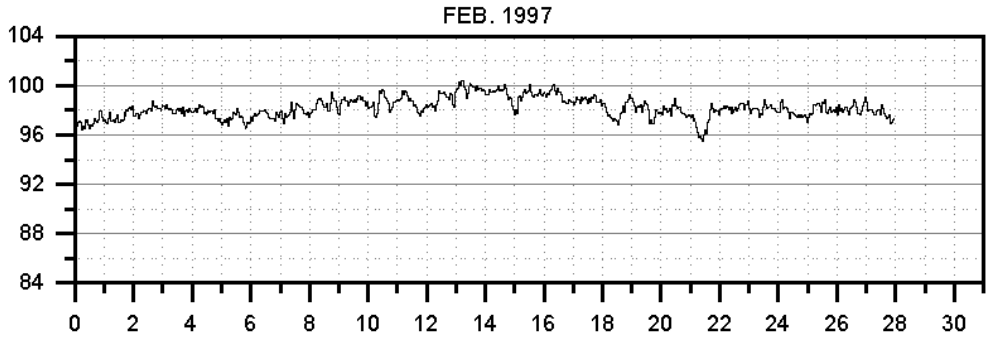
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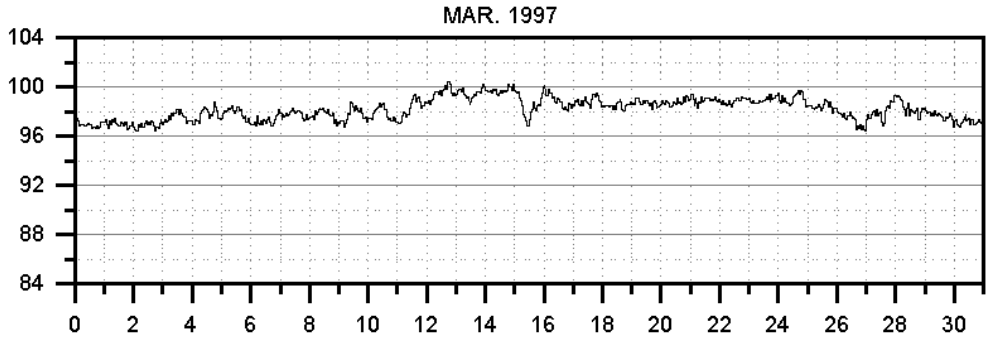
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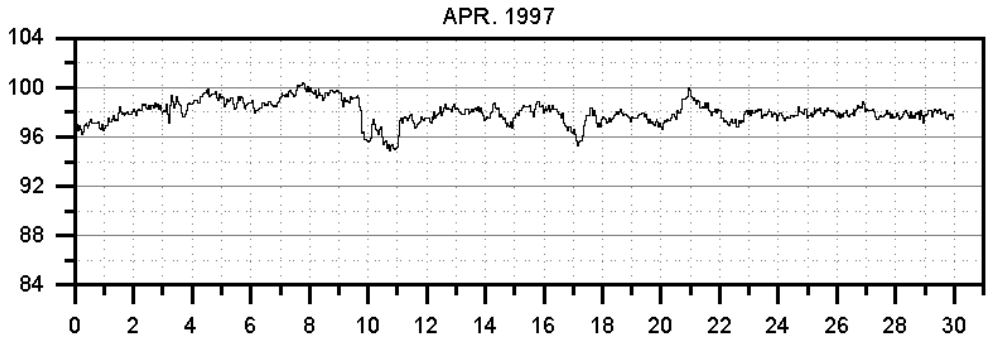
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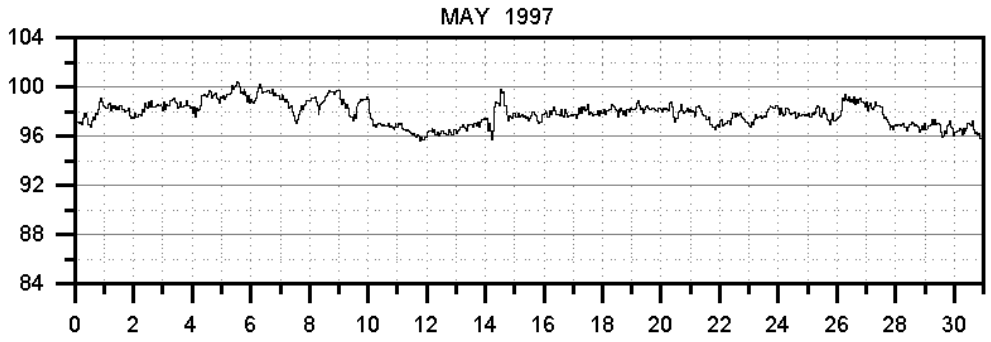
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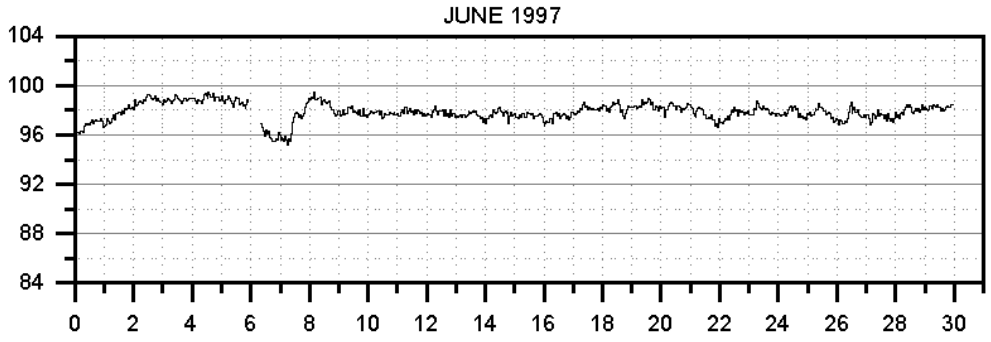
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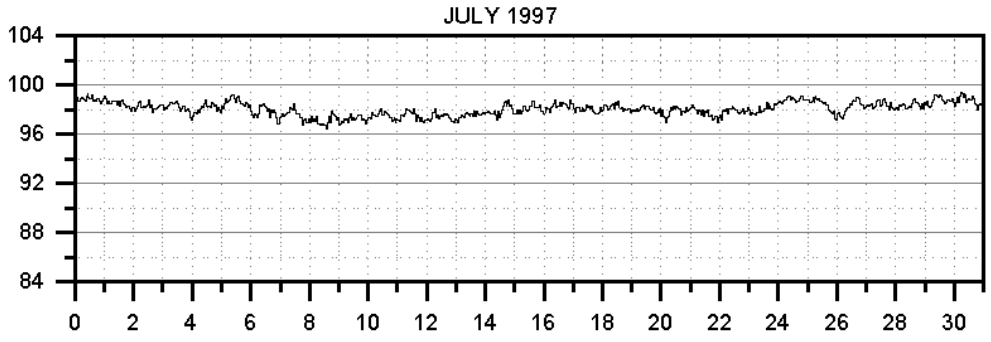
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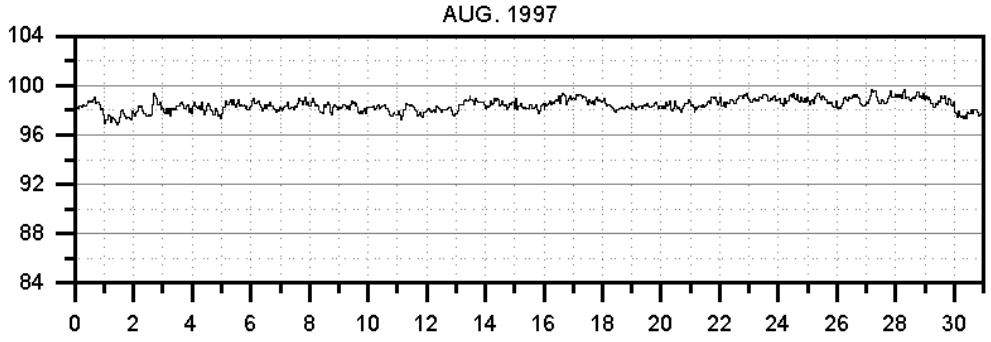
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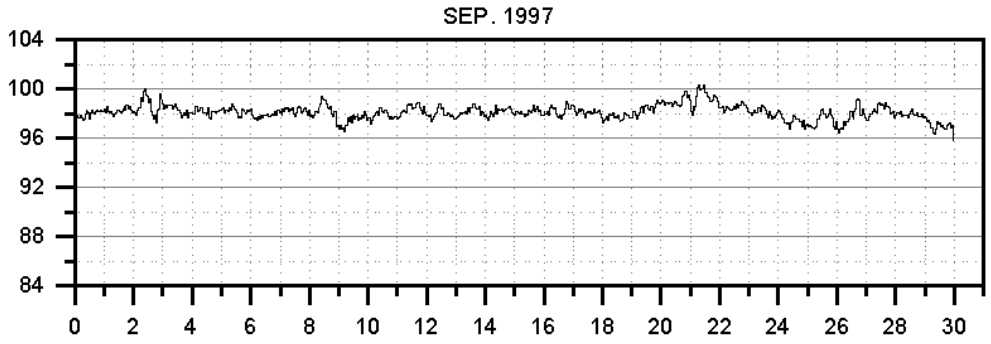
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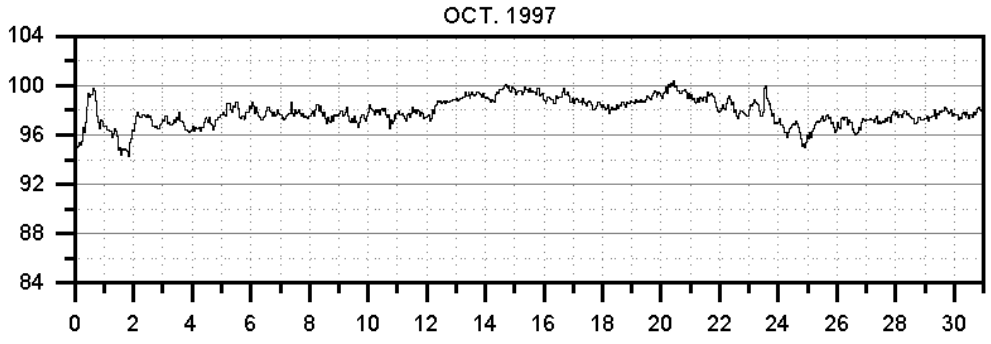
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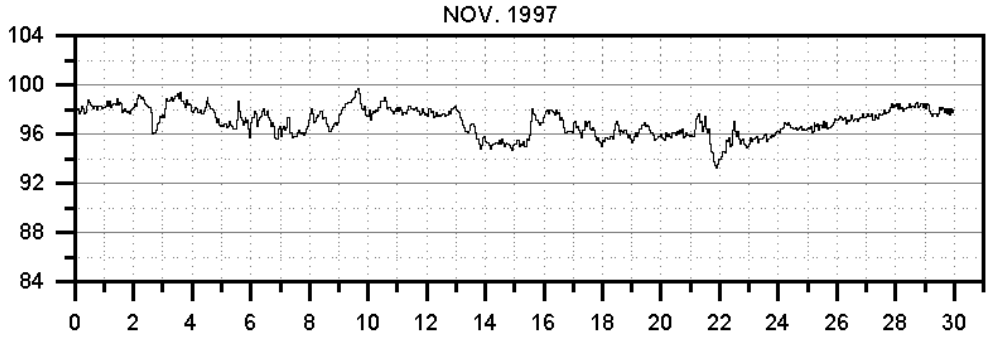
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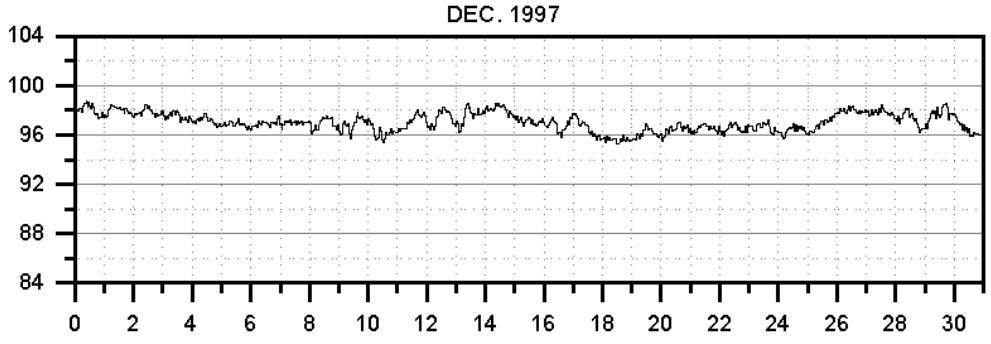
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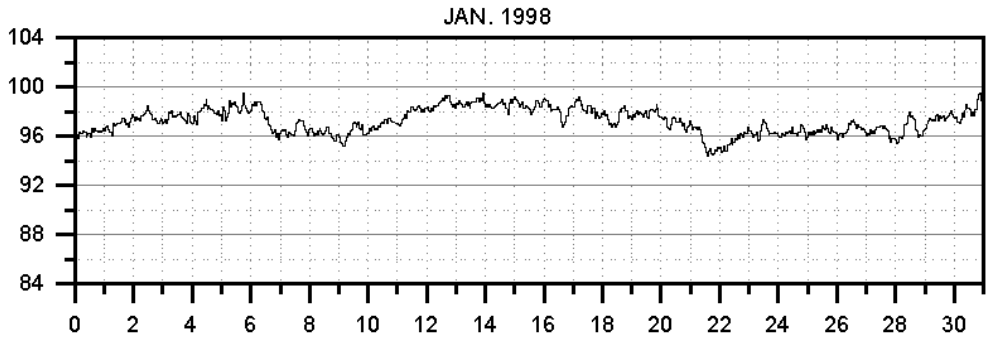
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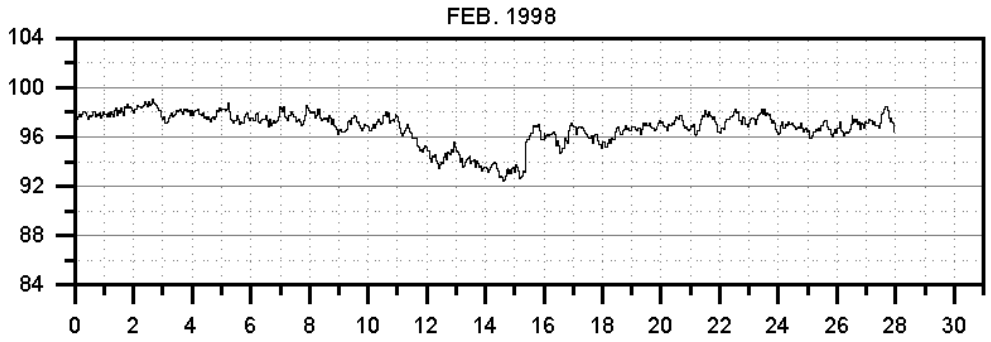
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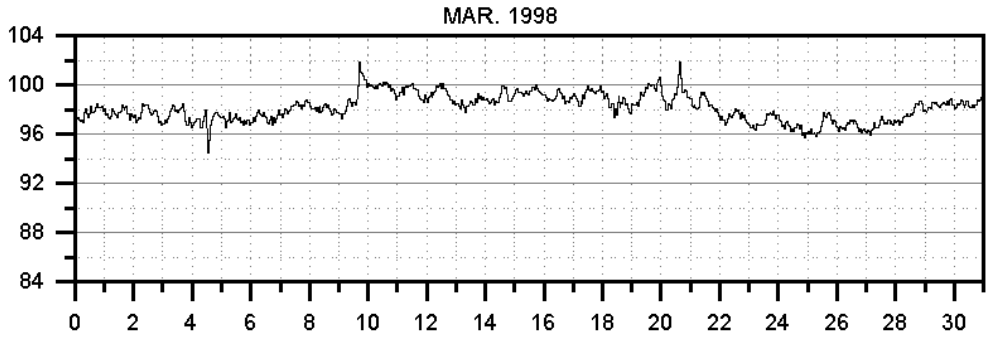
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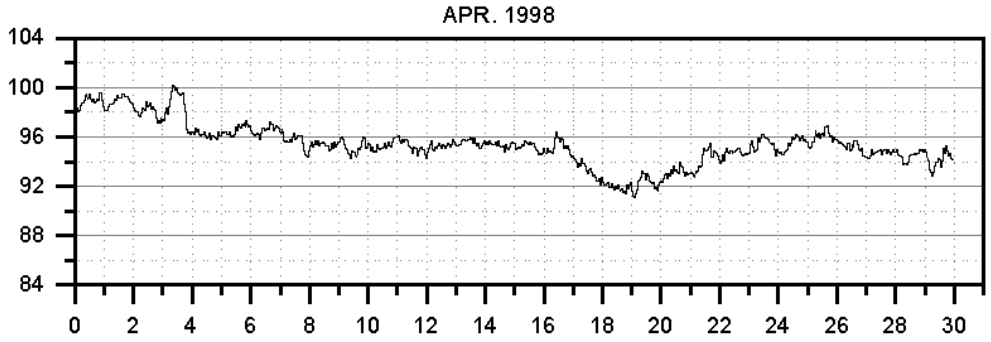
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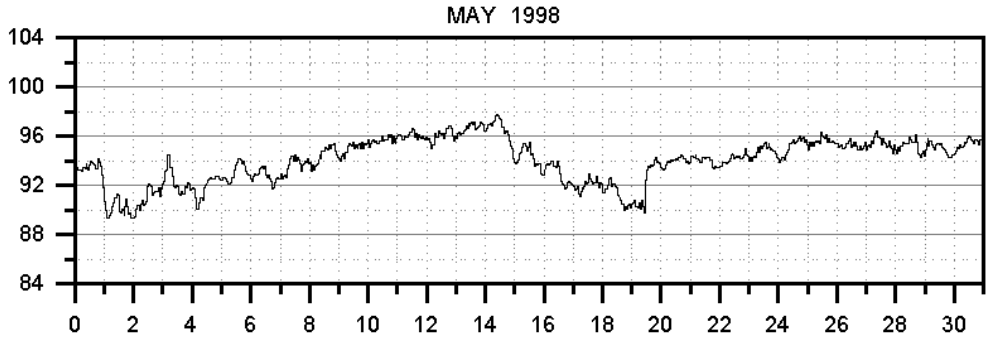
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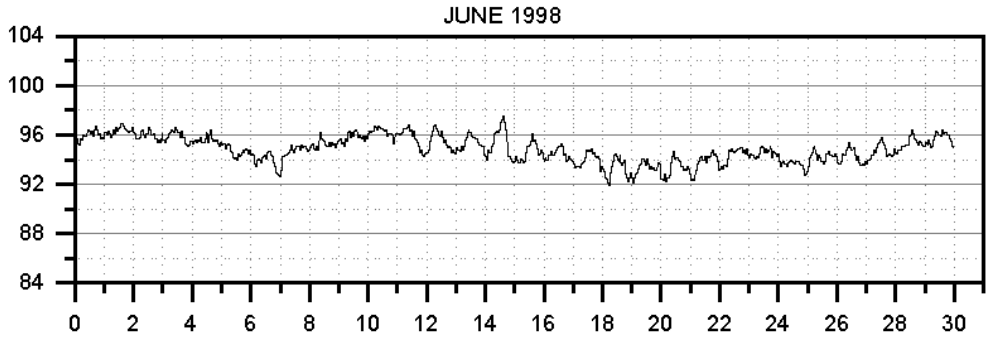
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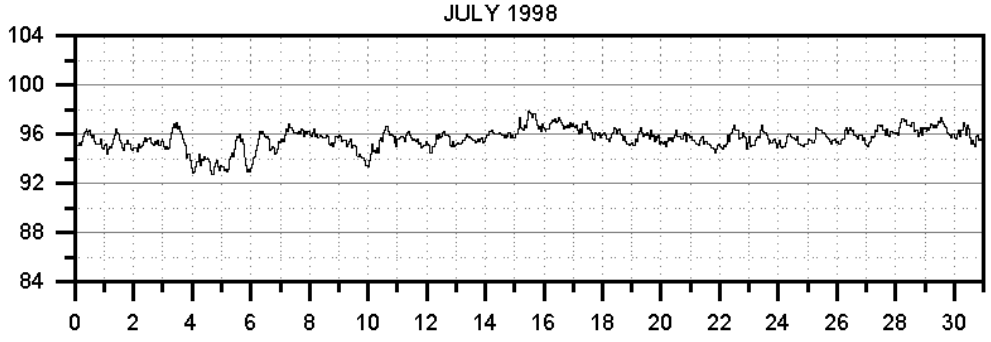
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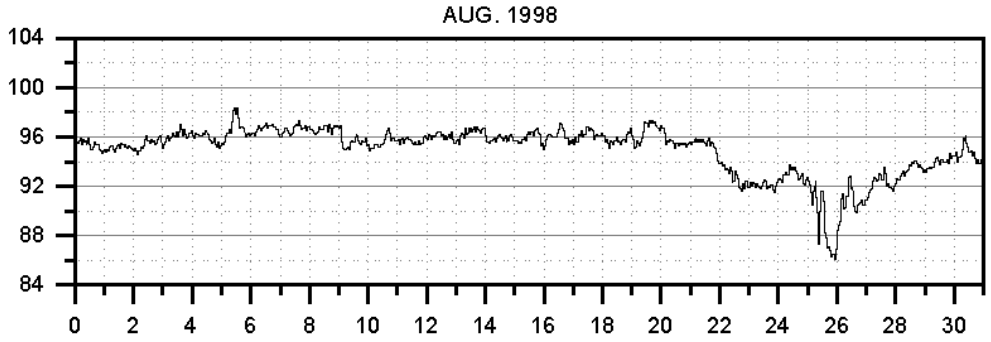
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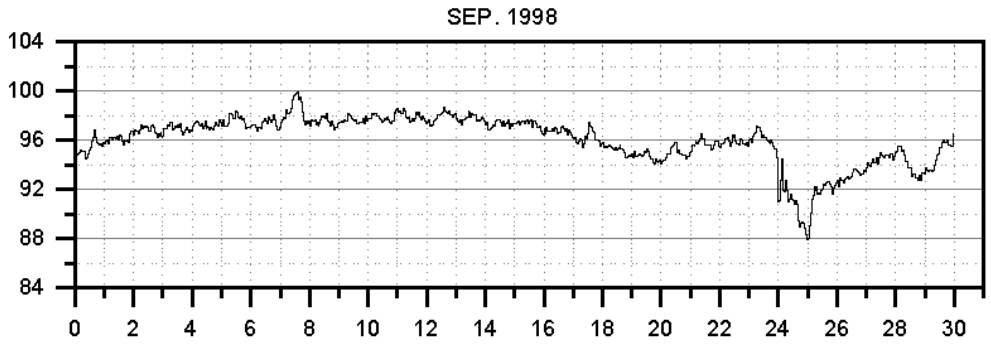
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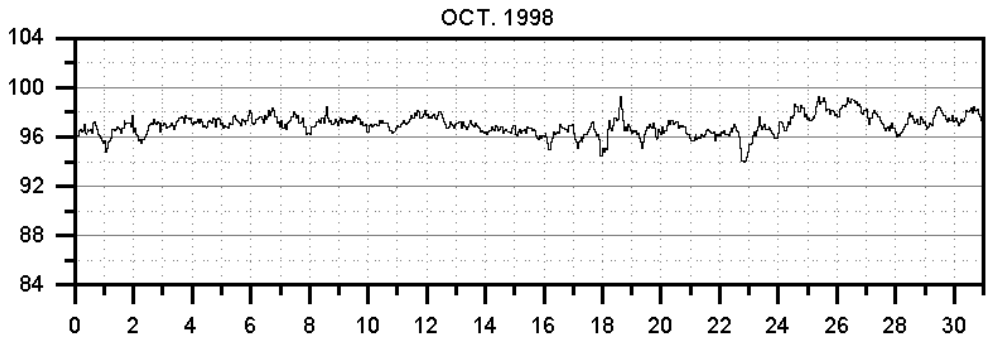
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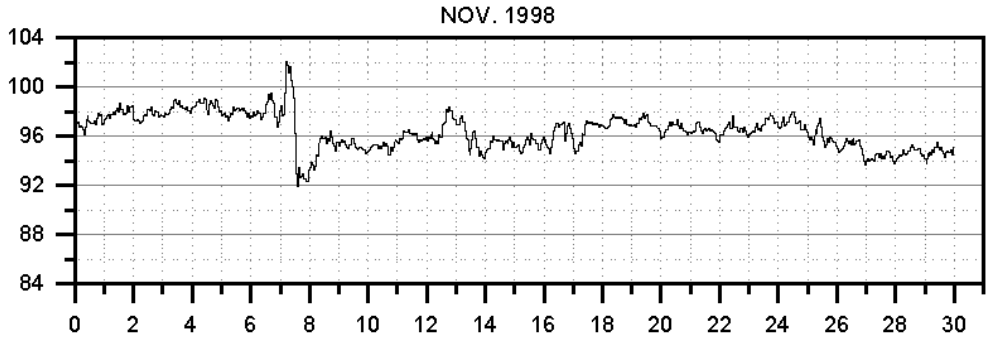
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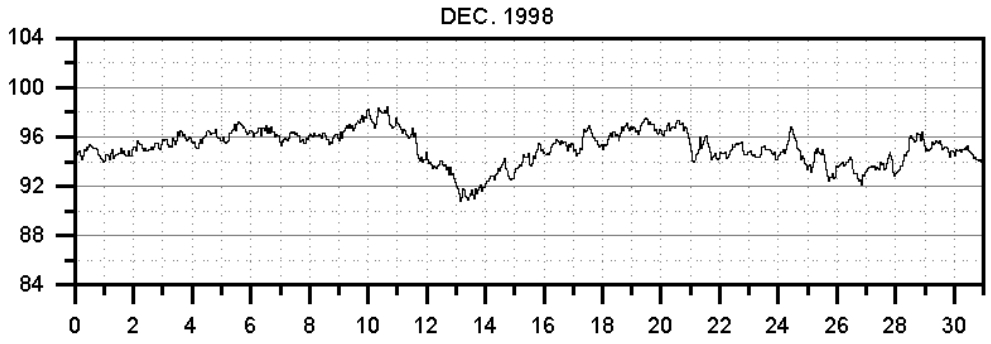
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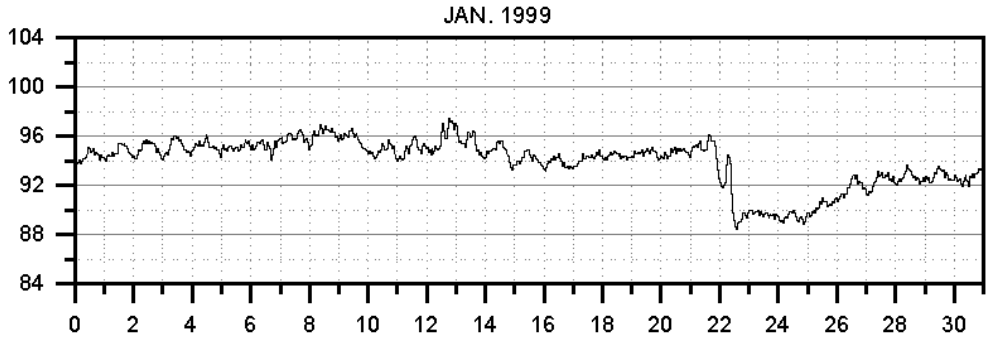
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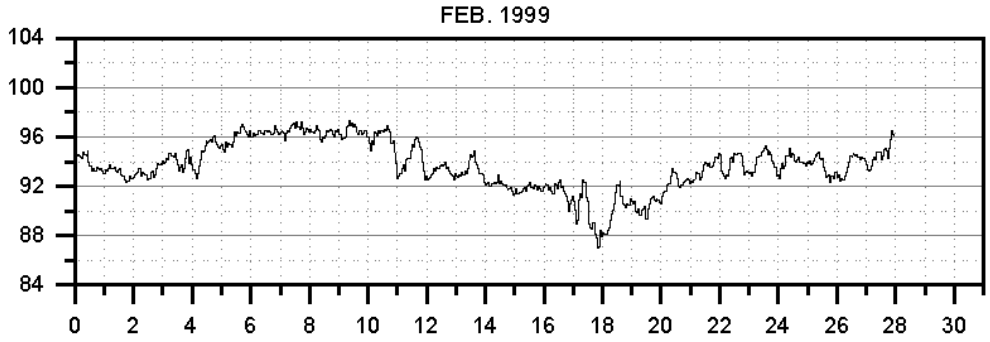
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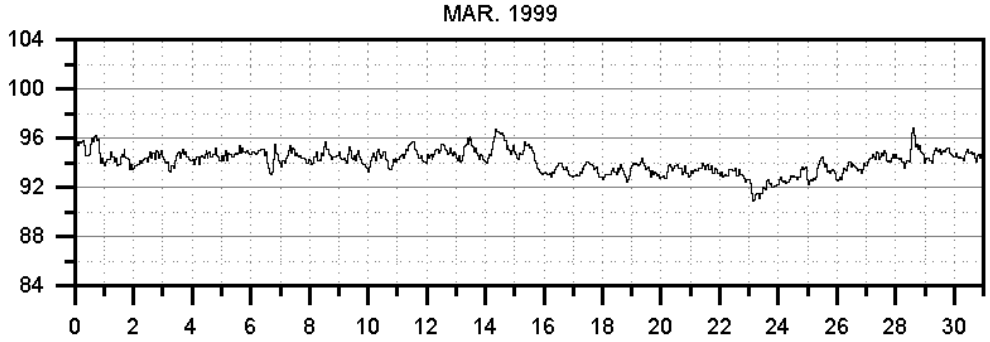
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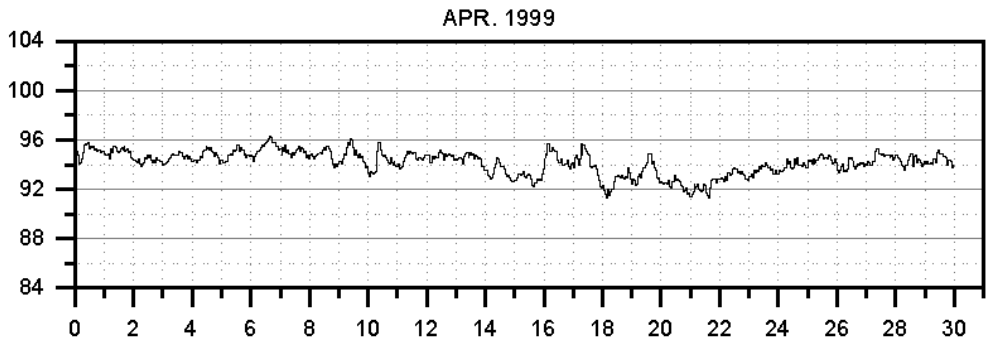
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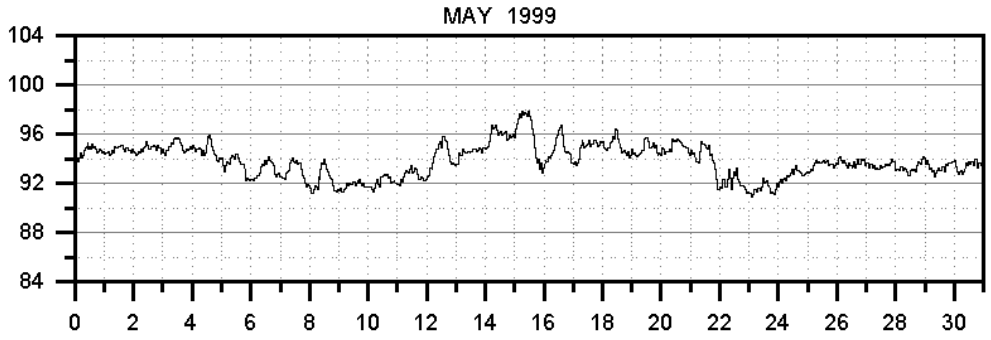
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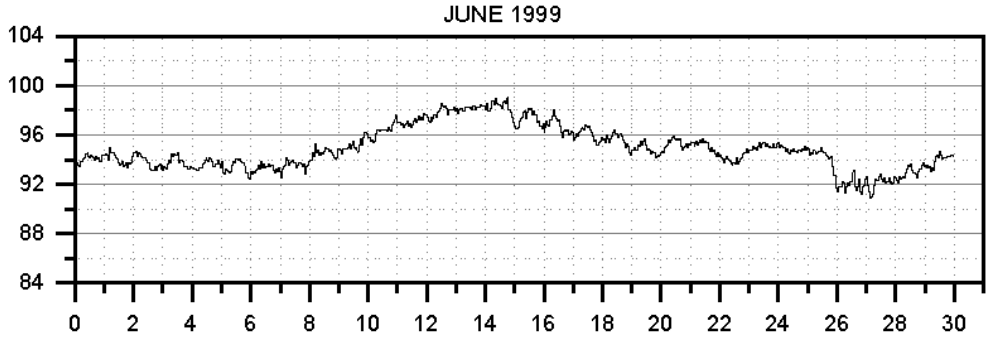
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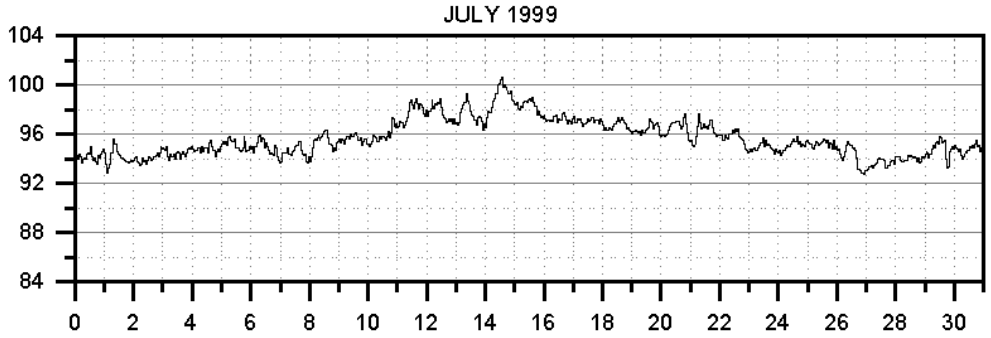
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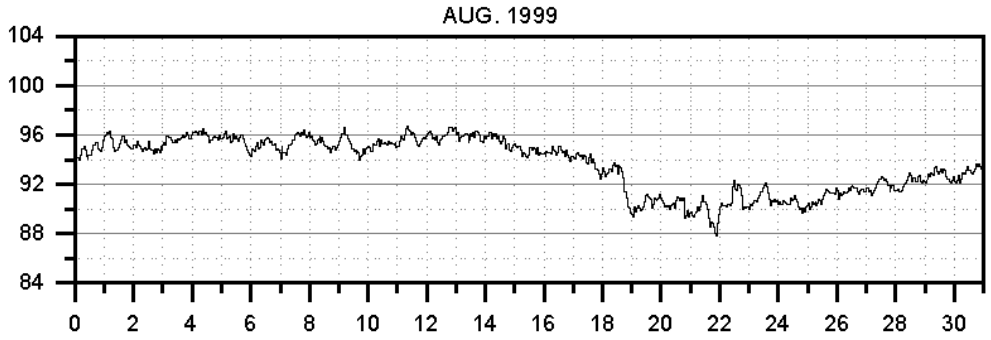
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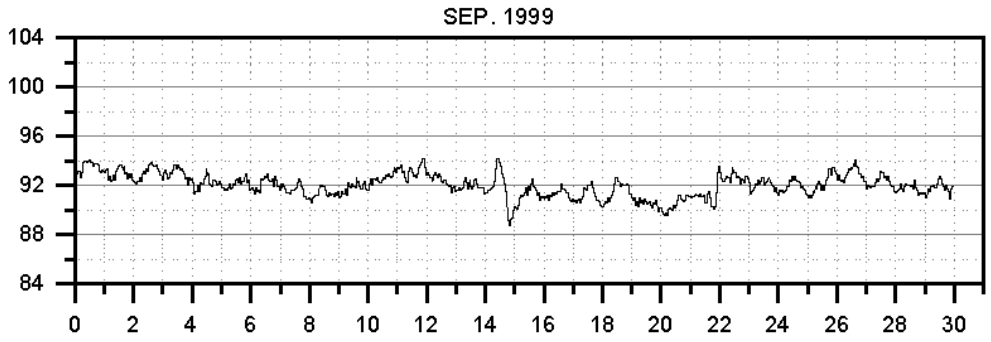
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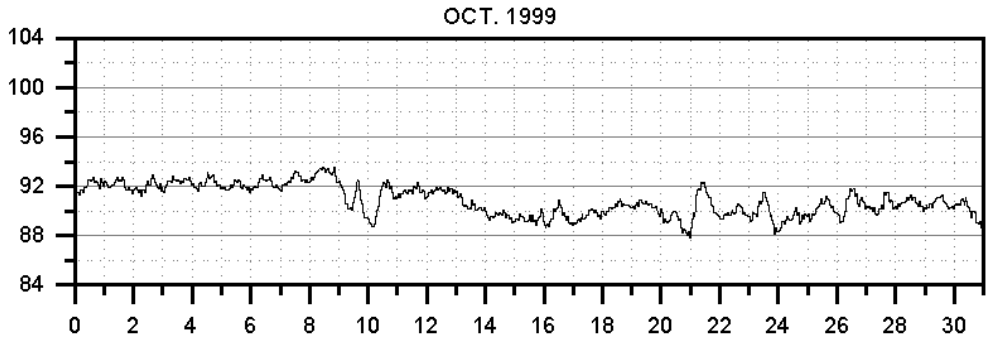
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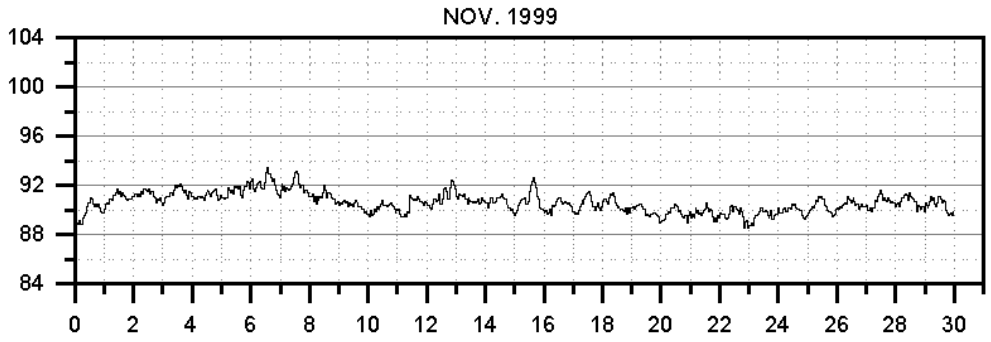
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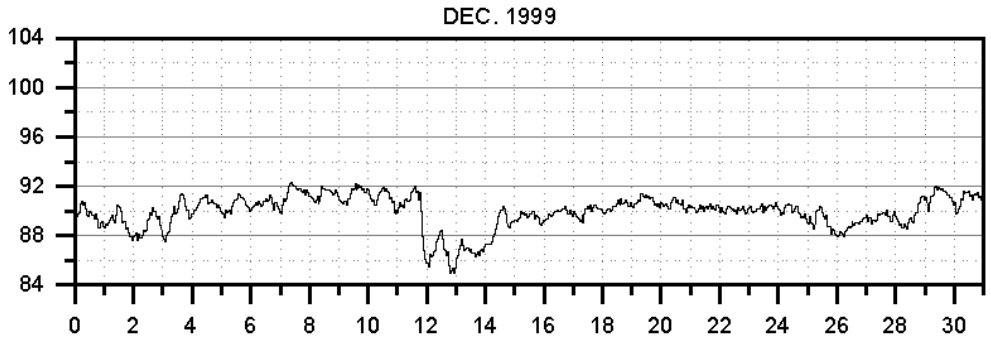
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