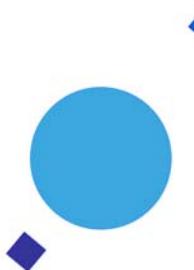


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ISTITUTO NAZIONALE DI ASTROFISICA  
NATIONAL INSTITUTE FOR ASTROPHYSICS

## **SVIRCO DATA: 21 May - 31 December 1997**

Fabrizio Signoretti, Francesco Re,  
Marisa Storini and Mario Parisi

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**ISTITUTO DI FISICA DELLO SPAZIO INTERPLANETARIO**

**AREA DI RICERCA ROMA - TOR VERGATA**

**Via del Fosso del Cavaliere, 100 - 00133 Roma (ITALIA)**



## **SVIRCO OBSERVATORY AND TERRESTRIAL PHYSICS LABORATORY**

### **SVIRCO DATA: 21 May - 31 December 1997**

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#### **Abstract**

*The pressure corrected intensity of the nucleonic component, produced by primary cosmic rays and recorded by the Rome Neutron Monitor, is reported for the period from 21 May to 31 December 1997, together with the barometric pressure data, in tabular and graphic form.*





# S.V.I.R.CO. Observatory

Rome

Italy





## THE SVIRCO OBSERVATORY

During the 1<sup>st</sup> International Geophysics Year (1957) an international network of "ground-based detectors" for continuous cosmic ray measurements was world-wide established.

The cosmic ray station of Rome joined this network with the purpose to study the time variations of primary cosmic rays (**S**tudio **V**ariazioni **I**ntensità **R**aggi **C**osmici: **S.V.I.R.CO.**) and their modulation in the heliosphere.

From July 1957 to April 1997 the SVIRCO station (now observatory) performed uninterrupted measurements at the Physics Department "G. Marconi" of "La Sapienza" University of Rome (41.90° N, 12.52° E, altitude about 60 m a.s.l.)

In May 1997 the Rome detector (a standard 17-NM-64 Neutron Monitor consisting of four 3-counter and one 5-counter units) was moved into the Physics Department "E. Amaldi" of "Roma Tre" University.

The relocation was carried out in subsequent steps in order to evaluate the efficiency change of the detector. At the beginning of May two sections (one 3-counter and one 5-counter units) were transferred to "Roma Tre" University, meanwhile the other three sections (three 3-counter units) continued operating at the former location of "La Sapienza" University for another half a month.

Moreover, for a better accuracy of the detector re-calibration, the counting rates in each stage of the relocation process were compared with the ones of a mobile detector. This instrument (a standard 3-NM-64) was already operating in a site near Rome, after have been previously employed in Antarctic Surveys.

On May 21, 1997 the whole detector started up and, since then, it has been continuously running at the new location of Roma Tre University (41.86° N, 12.47° E, altitude about s.l.).

The detector was housed in a reserved building fitted with a double air conditioning system. The inner temperature was restrained in a range of 23°-28° C, meanwhile the relative humidity was kept down 57%. Either the environmental parameters were continuously checked by digital sensors.

Each of the 17 BF3 proportional counters (BP-28 type) was equipped with a smart amplifier/discriminator circuit complete with a spectrum stabilizer. This new electronic unit, developed in our laboratory, holds firmly the pulse height spectrum of the amplifier output (within a range of more than 150 volts around the operating voltage), providing the counter with a great immunity against high voltage variations.

However, systematic and exhaustive tests of the counters were accomplished. The output pulses of the amplifiers, discriminated by the threshold gates, were collected and stored into a multi-channel analyzer. Through the analysis of the height distribution (spectrum) of the amplifier pulses coinciding with the discriminator ones, it was possible to verify the efficiency of each counter together with the amplifier gain and the discriminator threshold level.

In addition to the amplifier/discriminator circuits, a large part of the electronic instrumentation working in the observatory was designed and realized in our laboratory, as well as the software for data acquisition and pre-elaboration.

During 1997 the data acquisition was performed by a "HP-VXI" system remotely controlled by a dedicated computer equipped with a special measurement co-processor. The equipment ran according to a timing of 5' minute and recorded the counting rate of each section of the monitor as well as the atmospheric pressure, measured by means of not less than three barometers.

These instruments, achieving a resolution up to 0.01 hPa, were constantly checked out each other for the best measuring accuracy and reliability. Furthermore these devices had been selected with different types of transducer such as vibrating cylinder, force balance and quartz, therefore, throughout their different features and behaviours, it was possible to rule out any occurrence of short or long-term drift. More details of the complete acquisition system for 1997 can be found on the included block diagram.

The overall stability of the monitor was controlled by means of the section ratios. The hourly counting rate of each section, divided by the total rate, was plotted on a daily diagram.

Furthermore the daily averages were plotted in a monthly histogram. The annual series of histograms shows the long-term stability of each section.

Finally, in order to verify the coherence between the time variations of the nucleonic intensity recorded by Rome and by another such a similar observatory, a comparative data analysis was performed with the neutron monitor data of Hermanus (South Africa - 34.43° S, 19.23° E, altitude 26 m a.s.l.). This observatory was chosen because of its data availability and threshold rigidity, which is equal to 4.45 GV (1995).

Both data sets were normalized to their respective average of the period from May 21 to December 31, 1997 and then plotted, for such period, together with their ratio, on daily basis and also in a regression form.

We acknowledge the Unit for Space Physics of North-West University (Potchefstroom-South Africa) for Hermanus Neutron Monitor data.

## DATA PRESENTATION

The intensity data of the secondary nucleonic component of cosmic ray detected in Rome, at the SVIRCO observatory, were corrected for pressure variations at a reference level of 1009.25 hPa with an attenuation coefficient of 0.70% / hPa.

### a) Tables

The hourly corrected data have been reported in tabular form for each month together with the daily section ratios  $R_i$  ( $i = 1, \dots, 4$ ). The  $R_i$  ratios (%) were computed as rate of each section (channel  $i$ ) divided by total rate. Only  $n - 1$  section ratios have been provided, being  $n$  the number of sections.

The hourly and daily averages of the atmospheric pressure, measured in hPa at the Observatory, have been presented in monthly tables too.

Furthermore, the monthly averages of the values, reported either in the corrected-data tables or in the pressure ones, have been shown below them.

### b) Graphs

The hourly-corrected data were multiplied by a suitable normalization factor and plotted in monthly graphs. The normalization was evaluated as percentage of the counting rate average in the period from January to February 1997, during which the Monitor had been operating at the previous location of "La Sapienza" University. The reference counting rate level (100%), computed for such a referential period, is equal to 554946 counts/hour. The set of normalized graphs has been provided for long-term analysis.

The monthly graphs of the atmospheric pressure have been reported too.

## CONDITIONS FOR SVIRCO DATA USE

You are welcome to use SVIRCO neutron monitor data of IFSI/INAF-UNIRomaTre collaboration under the following conditions:

-You agree to acknowledge our financial supports in any published use of the data.

Example: "**SVIRCO NM is supported by the INAF - UNIRomaTre collaboration**"

-You are kindly requested to send a copy of any published work derived from our data to:

Dr. Marisa STORINI

Head of SVIRCO Observatory & TPL

Istituto di Fisica dello Spazio Interplanetario - Area di Ricerca Tor Vergata

Via del Fosso del Cavaliere, 100 - 00133 Roma, Italy

[storini@fis.uniroma3.it](mailto:storini@fis.uniroma3.it) or [storini@ifsi-roma.inaf.it](mailto:storini@ifsi-roma.inaf.it)

## **HOURLY RECOVERED DATA - YEAR 1997**

**( From May 21 to December 31 )**

When the whole counting rate of the Neutron Monitor was lost for less than a 15 min interval (\*) or a section was inoperative (°), the hourly data were recovered as reported in the table.

Month	Day	Time (UT)
05	21	00 - 24 (°)
05	22	00 - 12 (°)
07	22	08 - 09 (°)
09	29	08 - 09 (*)

## **RELEVANT MONITOR AND DATA CHARACTERISTICS FOR 1997**

**( From May 21 to December 31 )**

Cosmic Ray Observatory Rome or SVIRCO  
Geographic coordinates 12.47°E, 41.86°N  
Altitude Sea level  
Threshold rigidity (year) 6.27 GV (1995)  
Instrument 17 NM - 64 (*four 3-counter and one 5-counter units*)  
Scaling factor 1  
Pressure coefficient 0.70 % / hPa  
Pressure reference level 1009.25 hPa (*level used to maintain data continuity from 1957*)

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Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2006-13, June 2006

F. Signoretti, F. Re:

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Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2006-14, July 2006

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**“SVIRCO Prompt Report: July 2006”**

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F. Signoretti, F. Re:

**“SVIRCO Prompt Report: August 2006”**

Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2006-16, September 2006

F. Signoretti, F. Re:

**“SVIRCO Prompt Report: September 2006”**

Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2006-17, October 2006

F. Signoretti, F. Re:

**“SVIRCO Prompt Report: October 2006”**

Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2006-19, November 2006

F. Signoretti, F. Re:

**“SVIRCO Prompt Report: November 2006”**

Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2006-22, December 2006

F. Signoretti, F. Re, M. Storini:

**“SVIRCO Prompt Report: December 2006”**

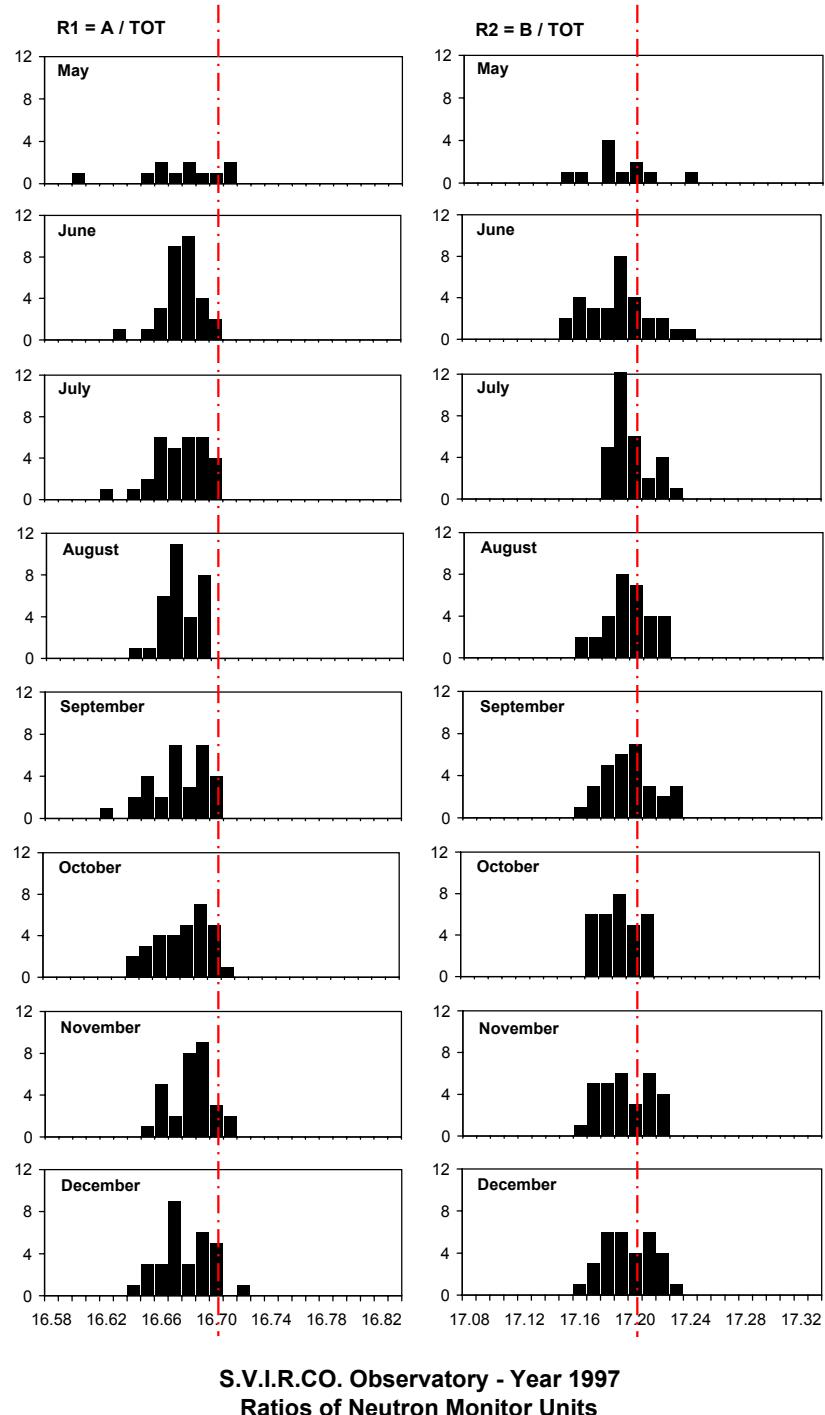
Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2007-1, January 2007

F. Signoretti, F. Re:

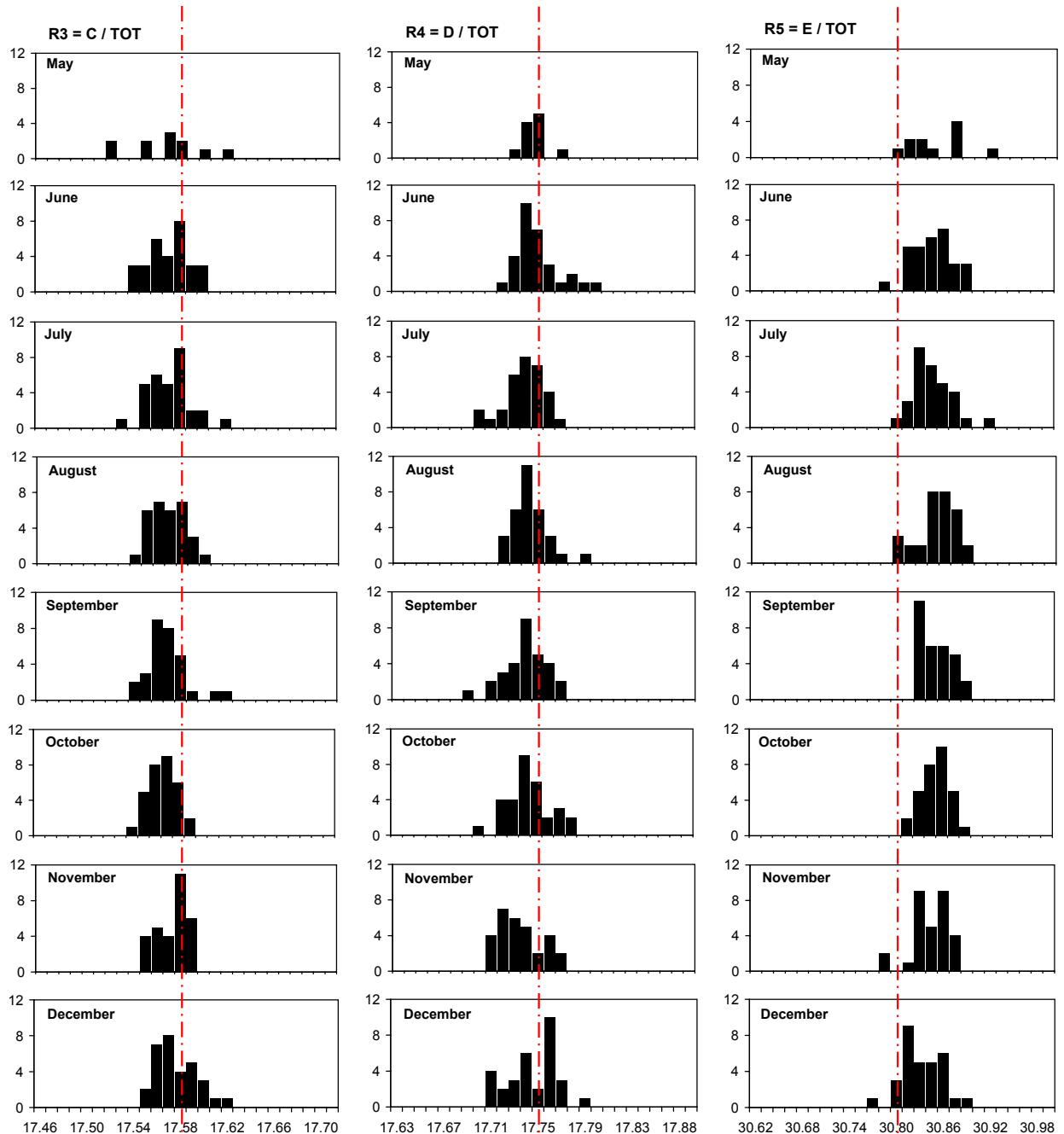
**“SVIRCO Prompt Report: January 2007”**

Istituto di Fisica dello Spazio Interplanetario - INAF, Report IFSI-2007-4, February 2007





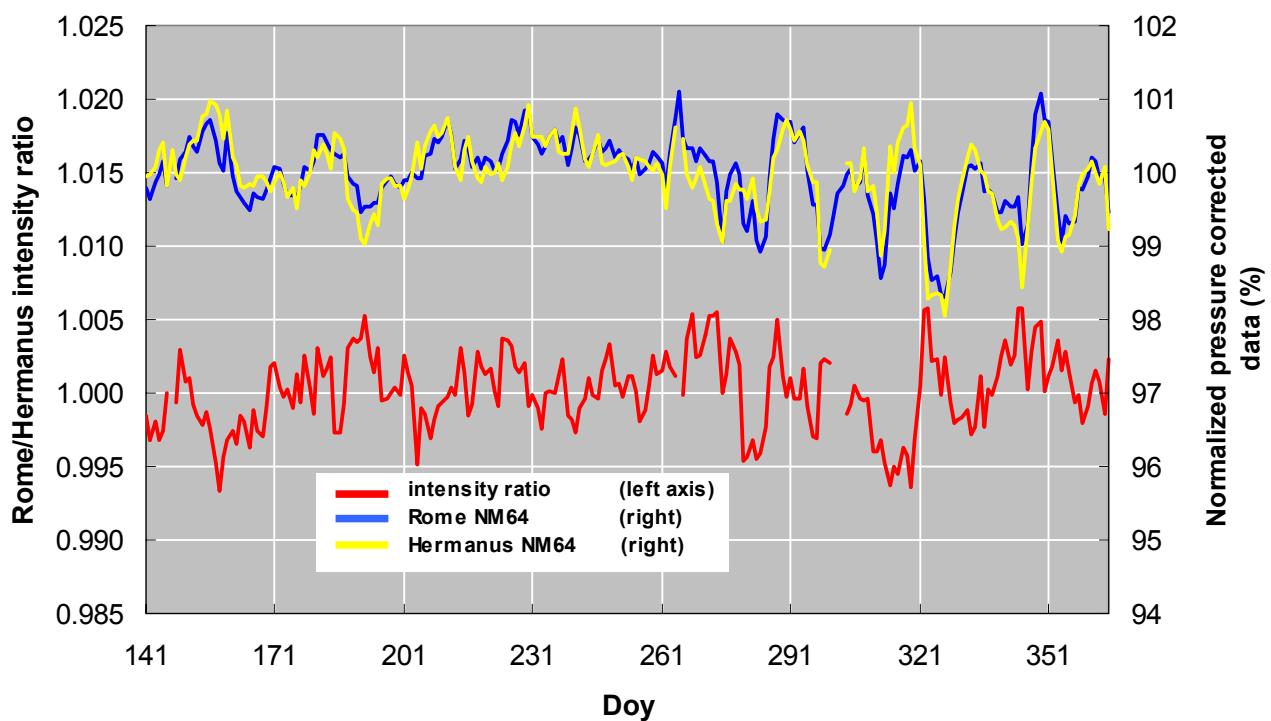
**S.V.I.R.CO. Observatory - Year 1997**  
**Ratios of Neutron Monitor Units**



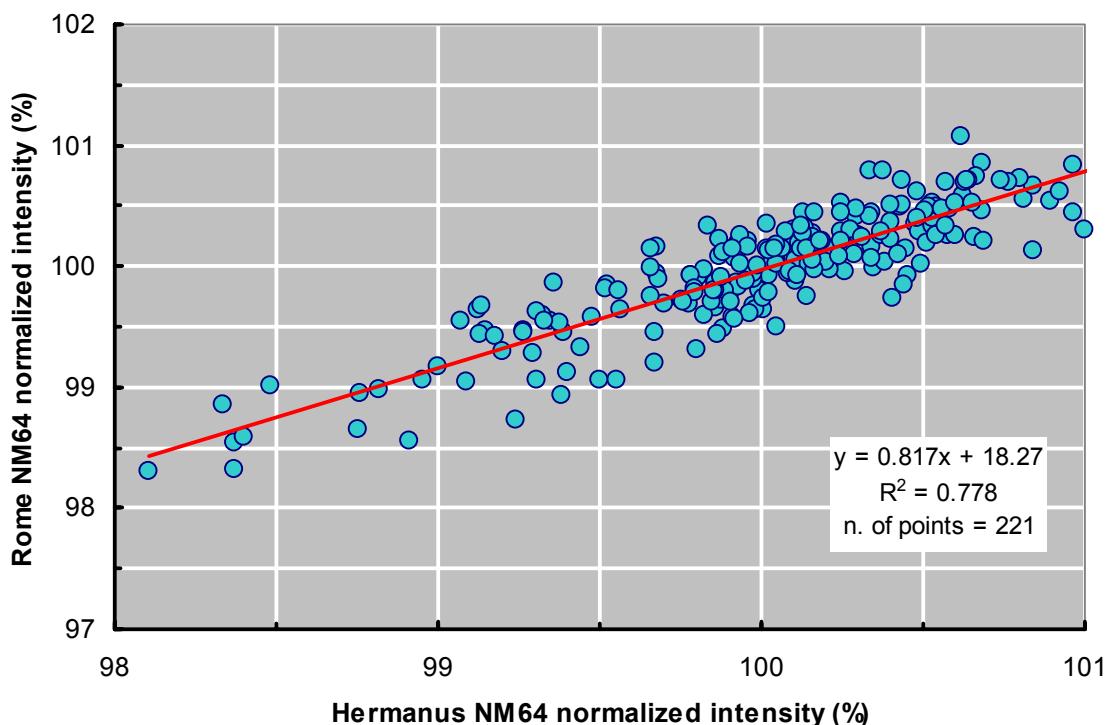
**S.V.I.R.CO. Observatory - Year 1997**  
**Ratios of Neutron Monitor Units**



**Rome and Hermanus NM64 data - May to December 1997**  
 Rome 100% = 475778 - Hermanus 100% = 440293



**Regression plot of daily values - May to December 1997**

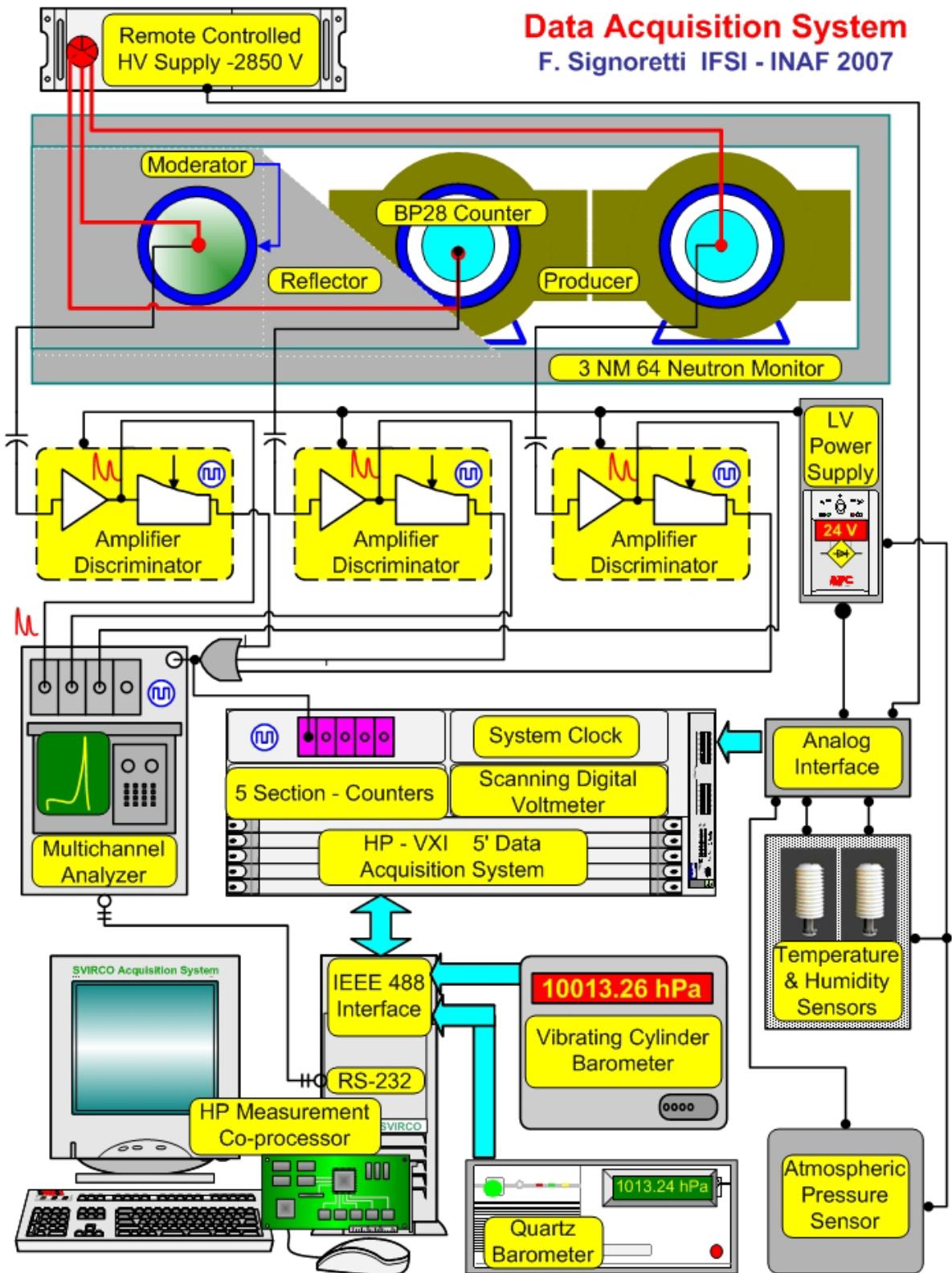




**S.V.I.R.CO. 1997**

**Data Acquisition System**

F. Signoretti IFSI - INAF 2007





S.V.I.R.CO. Observatory - Rome ( 41.86° N - 12.47° E, s.l. )  
 Pressure corrected data - May 1997

UT DAY	1 13	2 14	3 15	4 16	5 17	6 18	7 19	8 20	9 21	10 22	11 23	12 24	DAILY AVG	R1	R2	R3	R4
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21	475345	473427	471848	472951	471801	473695	473966	472177	473967	474068	473687	475163					
	474479	472721	473182	473563	473668	474402	476290	475865	475917	475151	478014	475376	474197	16.591	17.147	17.611	17.740
22	475420	475110	475046	473440	474068	473219	473176	476235	475391	475803	475872	476382					
	473734	475136	475091	475763	474271	474142	475180	473952	474808	474751	474734	473882	474775	16.701	17.193	17.546	17.748
23	475737	476539	474976	474320	474502	475104	476538	476813	474111	476590	475573	473848					
	475016	472749	476708	474818	476460	476188	475102	474339	475073	475312	475575	474721	475280	16.656	17.181	17.548	17.745
24	475463	474445	474864	474270	475033	474171	474603	473859	474929	476328	475105	475884					
	474269	475434	474643	474349	475917	476967	477963	477214	475505	480556	477533	477969	475720	16.678	17.173	17.567	17.748
25	478759	477175	478757	477426	477930	476561	480364	477984	476779	476798	477574	474890					
	474417	475721	478312	474869	474506	475981	475933	475354	473298	475694	476797	474231	476505	16.689	17.174	17.570	17.748
26	475517	474654	473679	475321	475694	474584	476813	478236	477999	476863	474522	474272					
	474944	478860	473396	472026	473010	475901	473216	474620	472823	473418	474759	473960	474962	16.679	17.155	17.570	17.736
27										479547	477669	477731					
	476965	476341	477085	476024	479576	479543	478352	476045	477688	479115	478905	476992	477838	16.647	17.208	17.511	17.769
28	474856	476407	476216	476555	478172	474813	477229	475596	476582	477317	478659	475348					
	475300	476161	473803	474420	475628	476178	473608	474866	473672	474461	474928	474049	475618	16.658	17.233	17.571	17.727
29	477479	476693	477022	475707	476620	478349	476107	476505	477534	475375	477120	477790					
	478504	479975	476311	475684	475911	474695	475723	476240	477488	476026	474398	475800	476627	16.707	17.177	17.516	17.734
30	478218	474655	476542	477085	474921	476861	479066	477028	478774	478021	476598	477692					
	476156	477783	478382	477515	478019	476890	476278	476669	477621	476661	477240	476672	477139	16.699	17.180	17.598	17.734
31	476936	477785	476729	478127	478887	478172	475232	479380	480379	478762	478380	478123					
	478248	478162	479885	480007	478024	479404	479212	477609	478550	477737	477340	476977	478252	16.670	17.197	17.567	17.746
MONTHLY	476373	475689	475568	475520	475763	475553	476309	476381	476645	476861	476433	476102					
AVG	475639	476277	476072	475367	475908	476390	476078	475707	475677	476262	476384	475512	476083	16.670	17.183	17.562	17.743









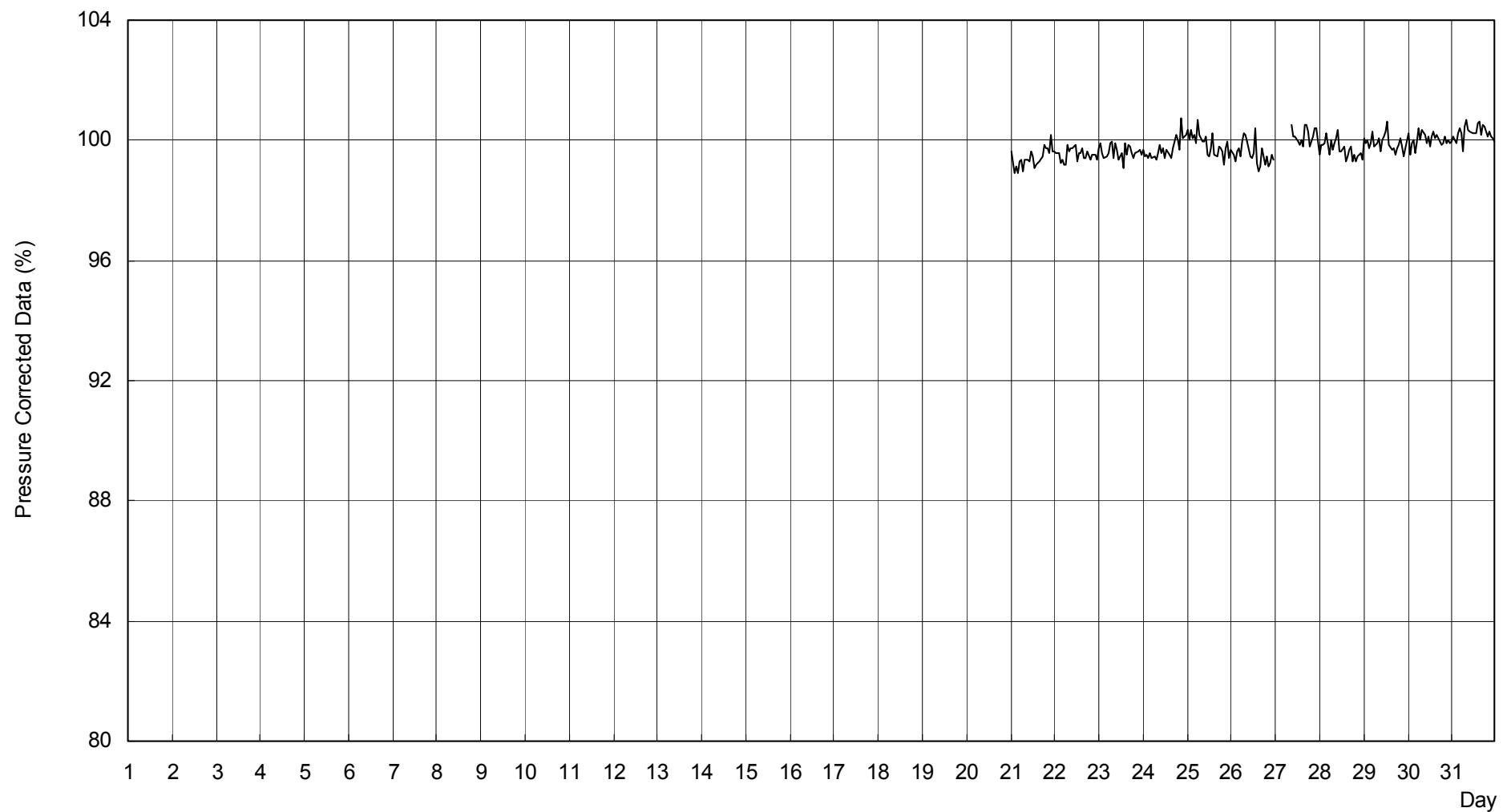


S.V.I.R.CO. Observatory - Rome (41.86° N - 12.47° E, s.l.)

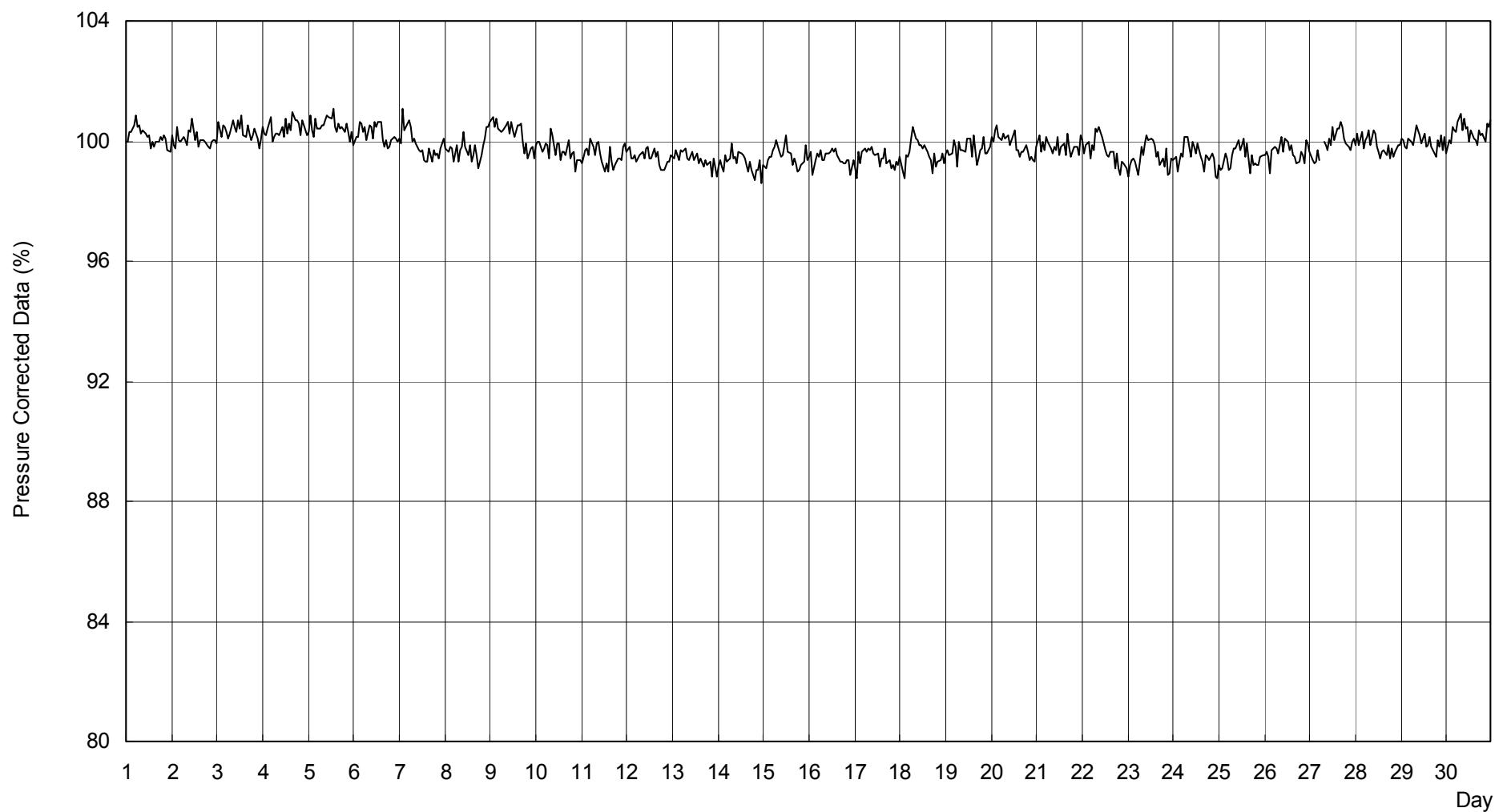
Pressure corrected data - November 1997



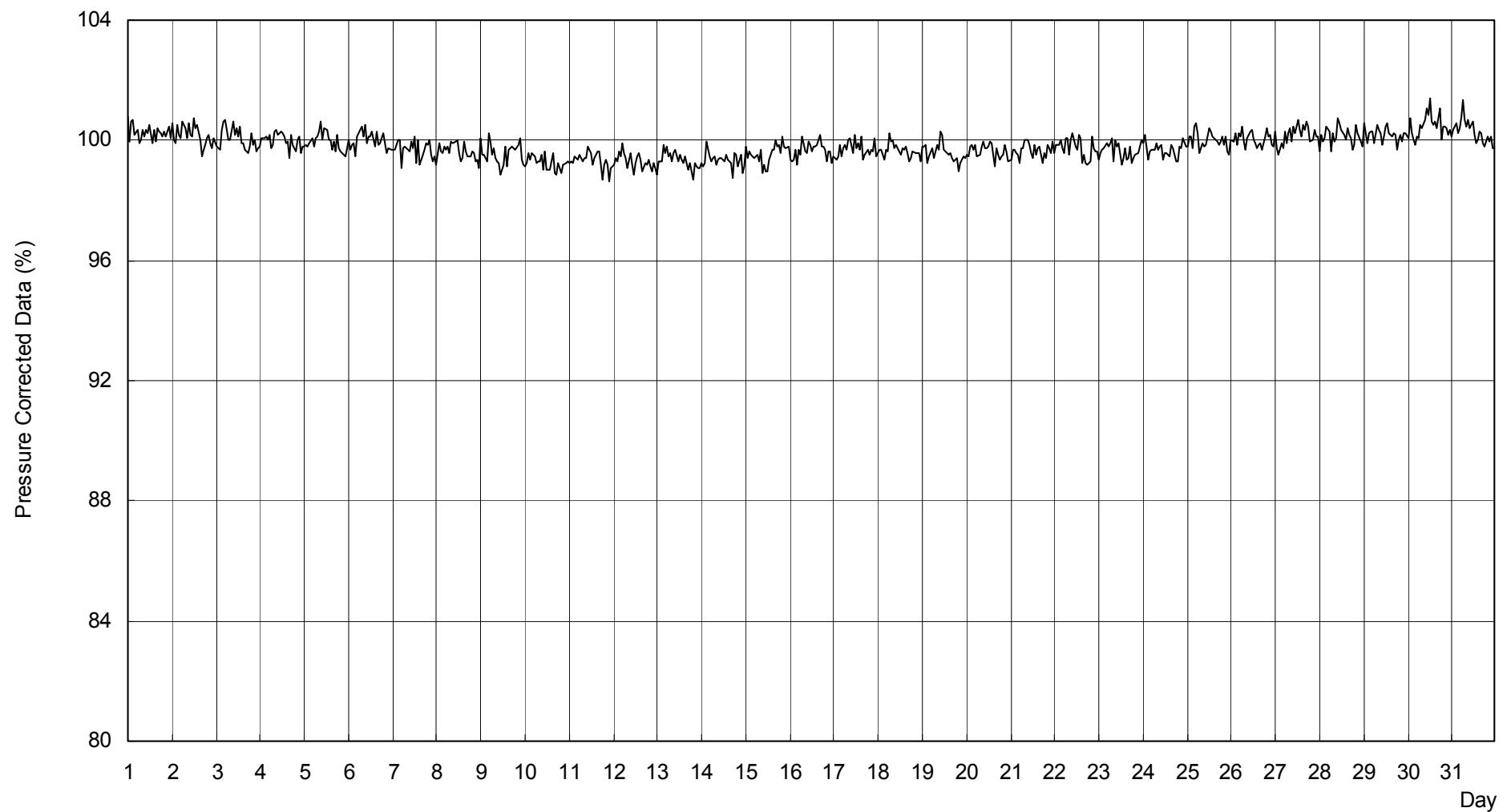
S.V.I.R.CO. Observatory - Pressure Corrected Data - May 1997



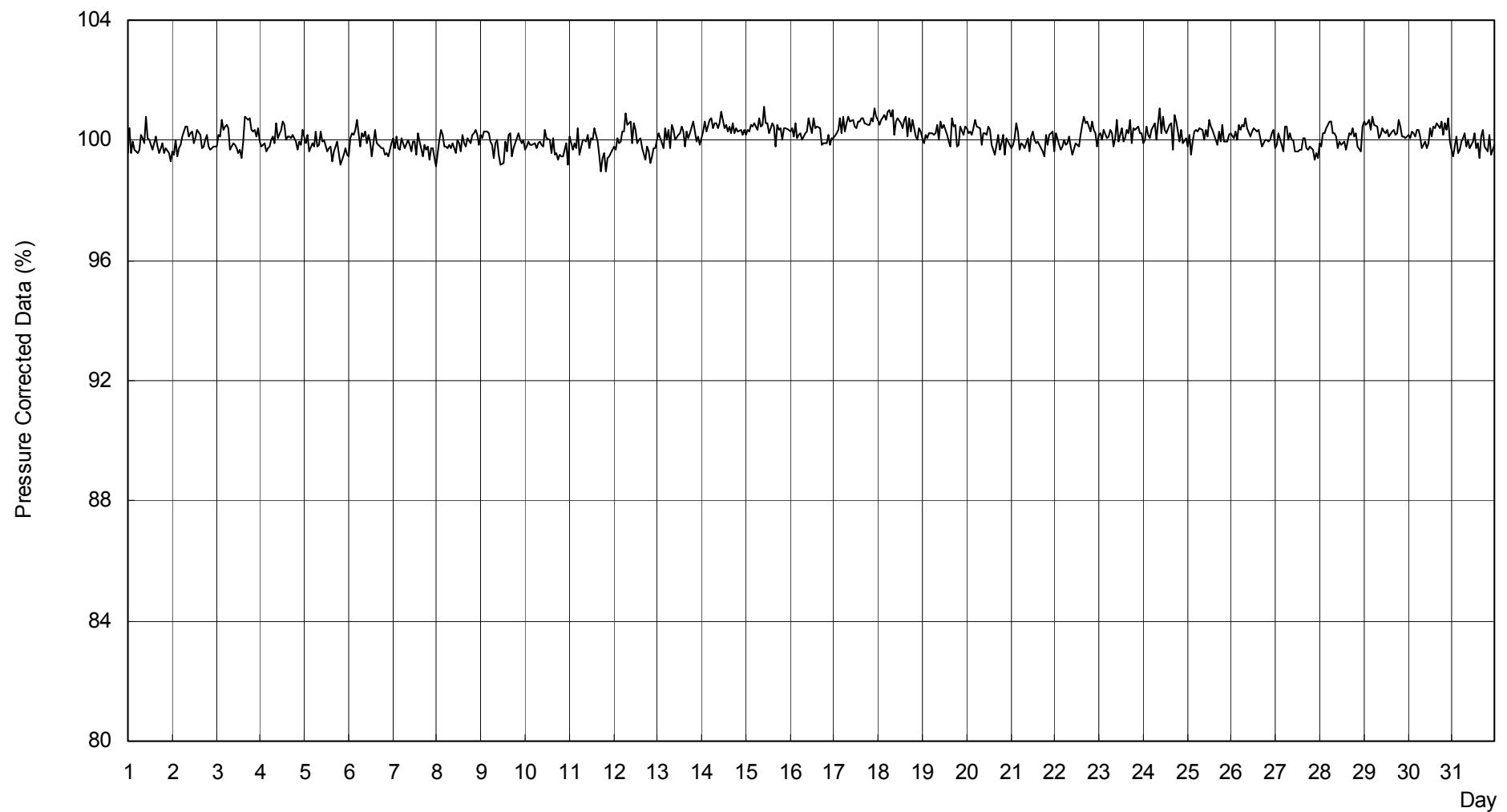
S.V.I.R.CO. Observatory - Pressure Corrected Data - June 1997



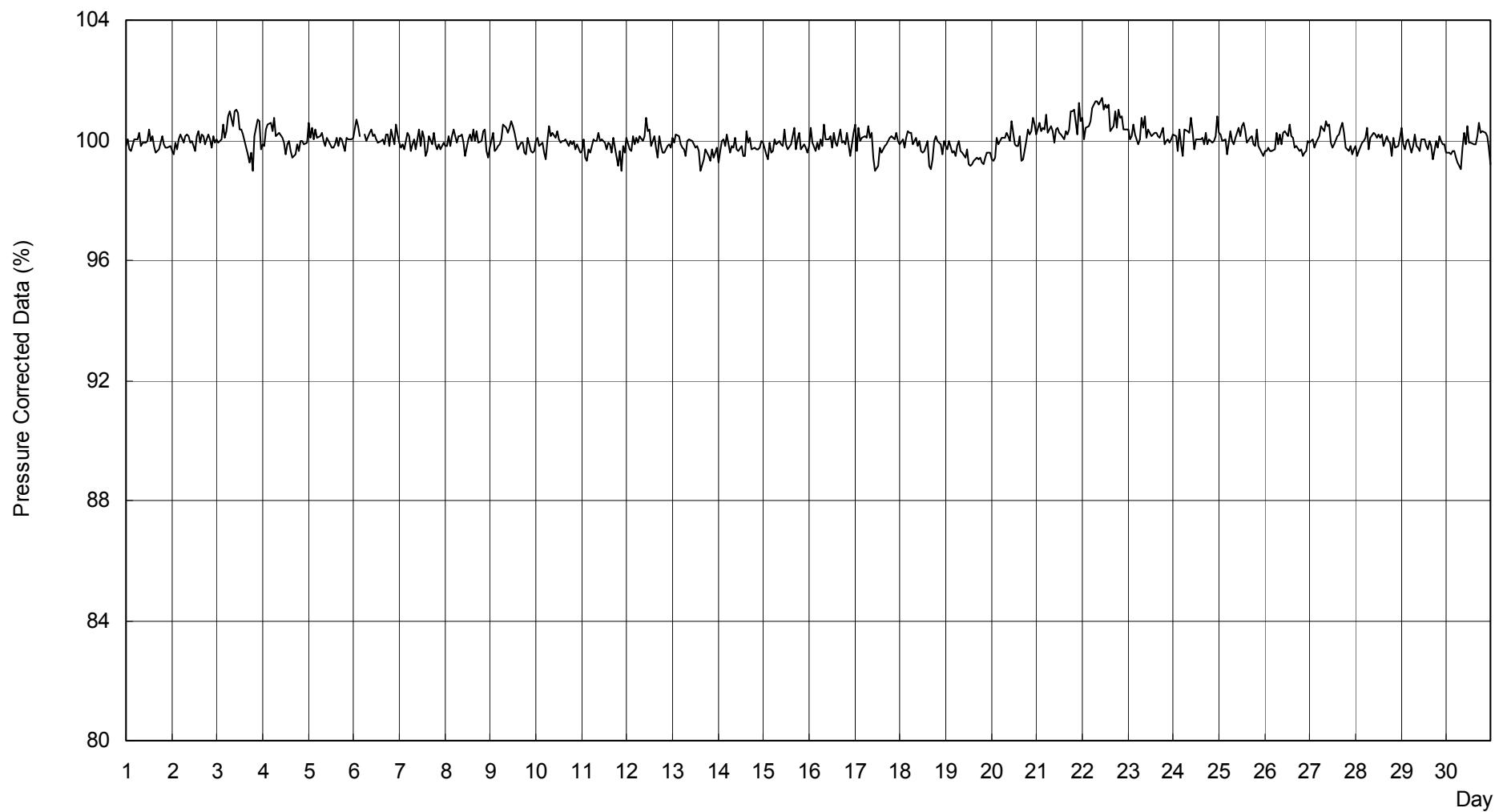
S.V.I.R.CO. Observatory - Pressure Corrected Data - July 1997



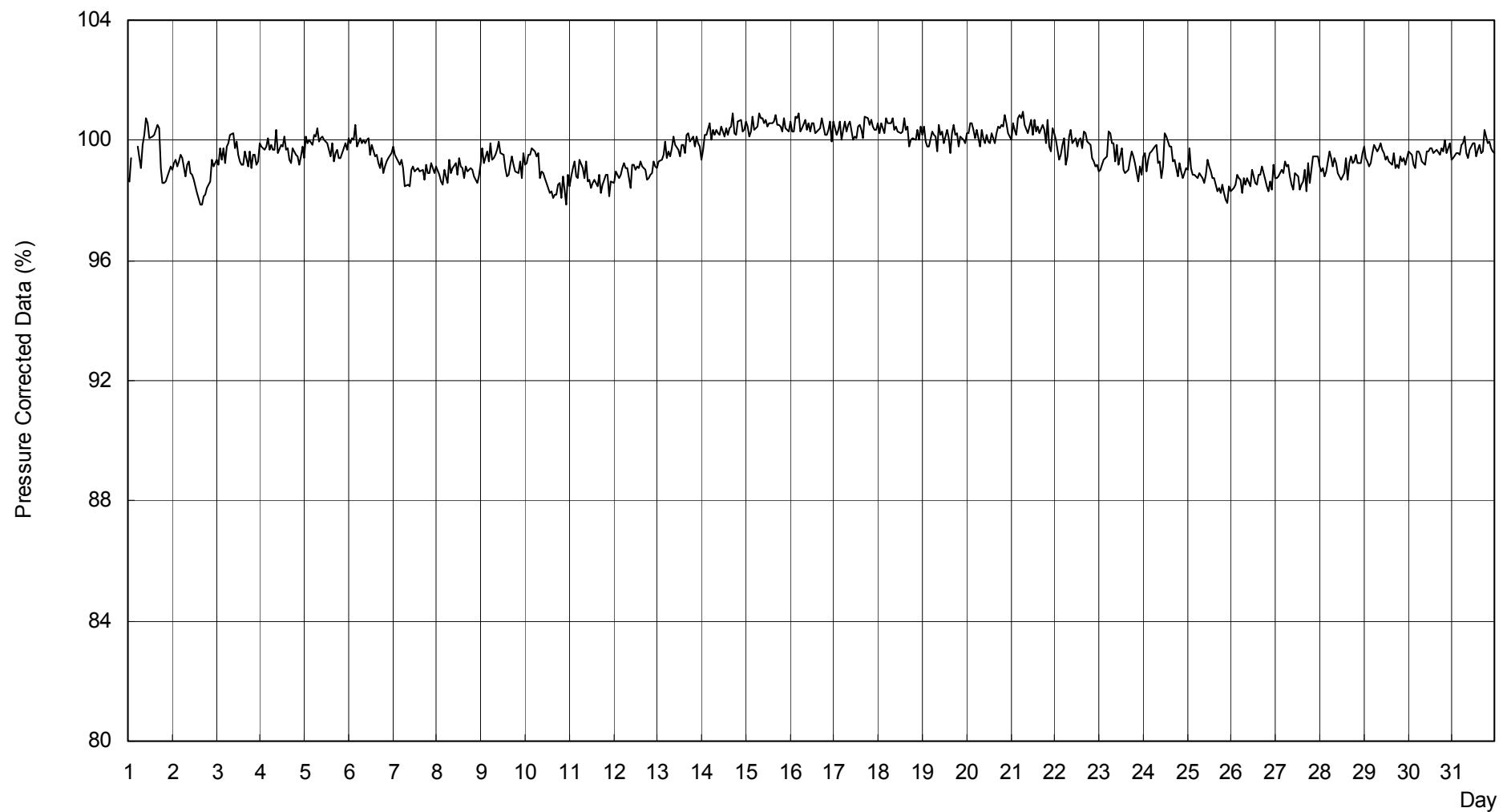
S.V.I.R.CO. Observatory - Pressure Corrected Data - August 1997



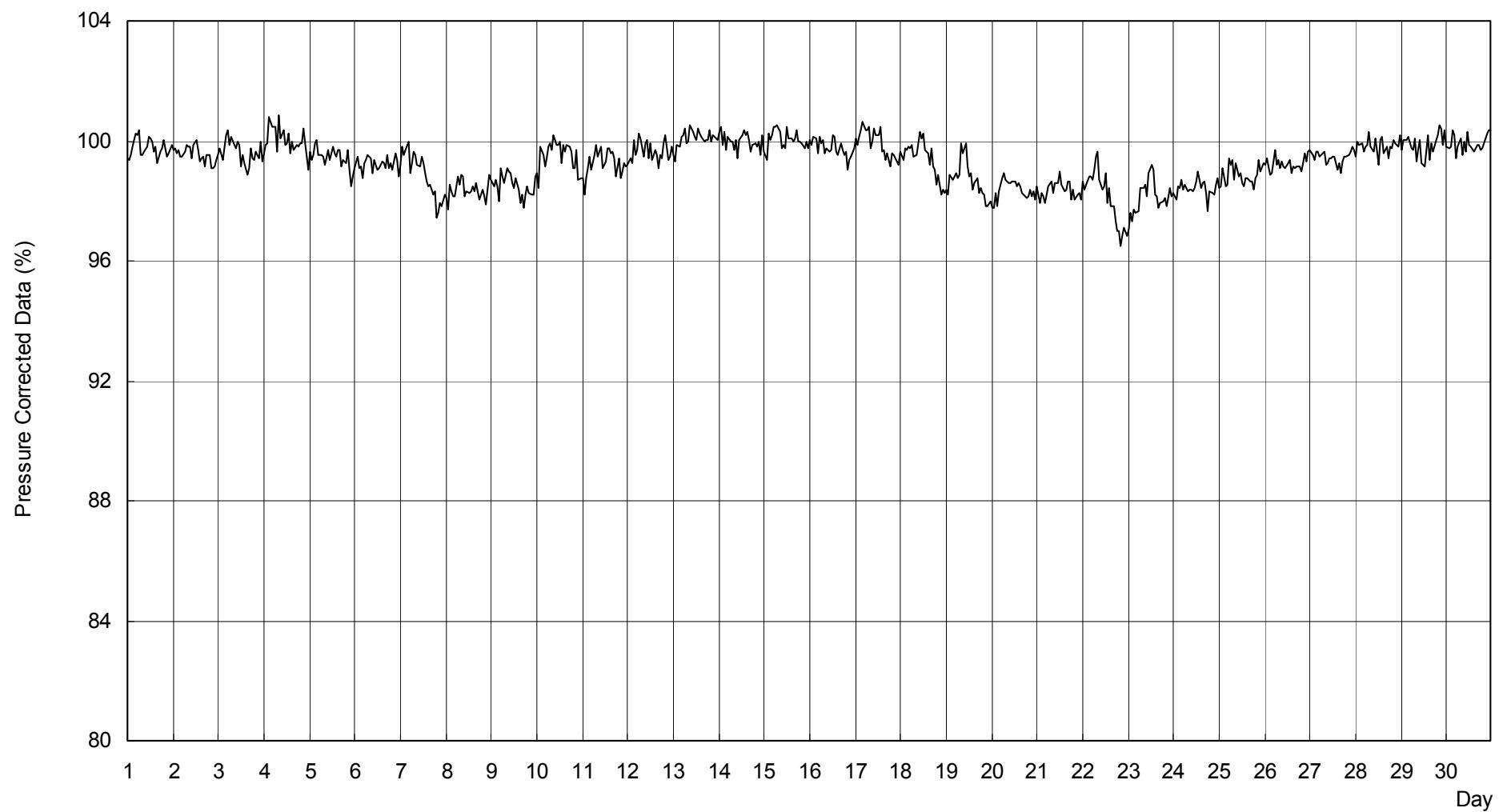
S.V.I.R.CO. Observatory - Pressure Corrected Data - September 1997



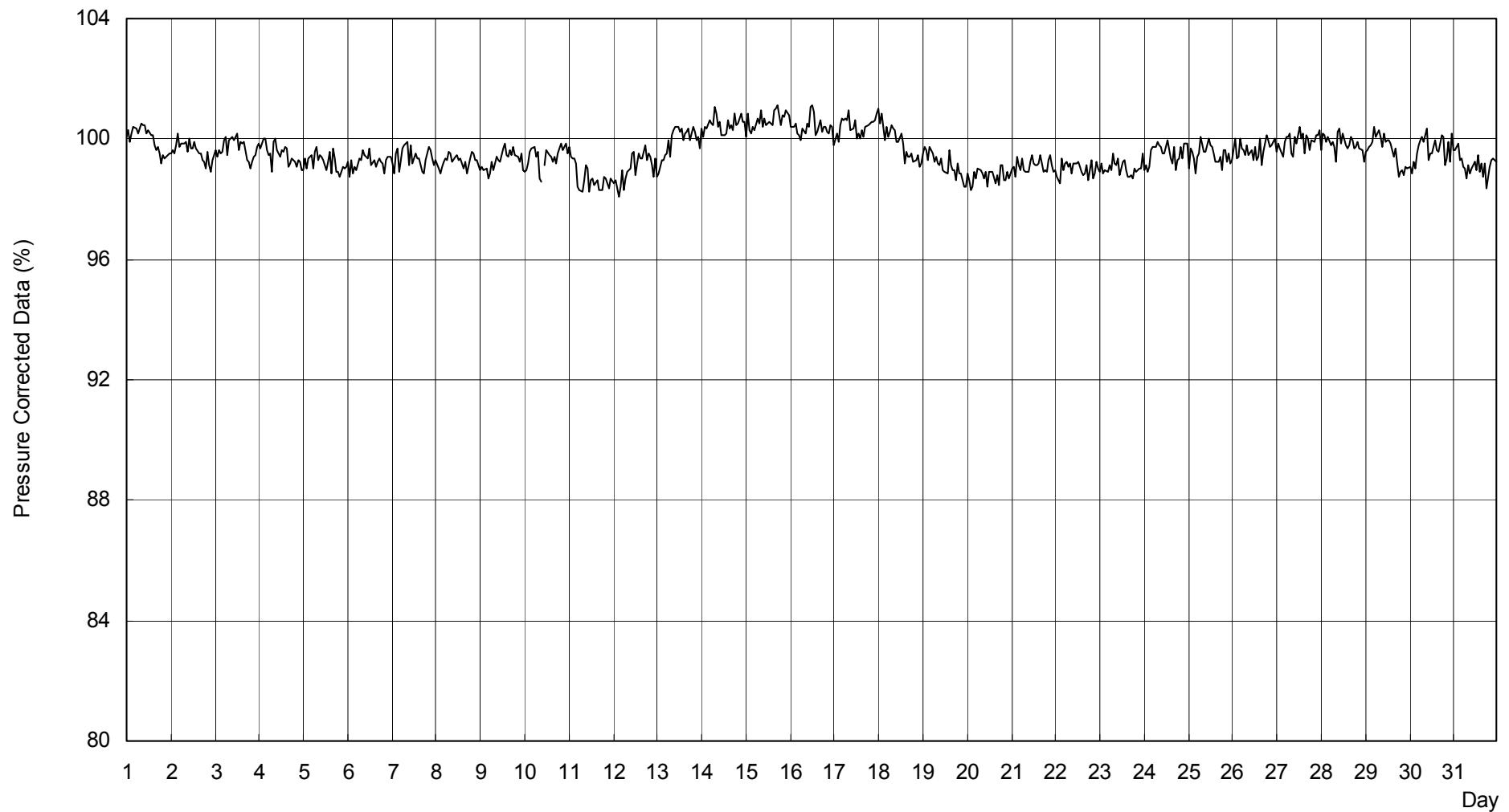
S.V.I.R.CO. Observatory - Pressure Corrected Data - October 1997



S.V.I.R.CO. Observatory - Pressure Corrected Data - November 1997



S.V.I.R.CO. Observatory - Pressure Corrected Data - December 1997



S.V.I.R.CO. Observatory - Rome ( 41.86° N - 12.47° E, s.l. )  
 Pressure in hectoPascal - May 1997

UT DAY	1 13	2 14	3 15	4 16	5 17	6 18	7 19	8 20	9 21	10 22	11 23	12 24	DAILY AVG
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21	1010.67 1010.65	1010.45 1010.16	1010.16 1009.77	1009.93 1009.69	1010.28 1009.51	1010.61 1009.83	1010.67 1010.07	1010.48 1011.32	1010.06 1011.34	1010.50 1011.31	1011.88 1010.95	1012.07 1011.41	1010.57
22	1011.04 1012.51	1010.85 1012.28	1010.83 1012.09	1010.87 1012.01	1011.20 1011.97	1011.29 1012.51	1011.53 1012.97	1011.74 1013.78	1011.88 1014.18	1012.08 1014.17	1012.39 1014.08	1012.61 1014.01	1012.29
23	1014.02 1015.03	1014.03 1015.00	1014.06 1014.75	1014.24 1014.88	1014.78 1014.93	1015.15 1015.43	1015.52 1015.60	1015.42 1016.01	1015.27 1016.27	1015.33 1016.19	1015.18 1016.08	1015.11 1016.15	1015.18
24	1016.37 1016.64	1016.29 1016.67	1016.24 1016.49	1016.17 1016.32	1016.35 1016.14	1016.72 1016.38	1017.17 1016.65	1017.37 1016.84	1017.32 1017.06	1017.21 1017.20	1016.94 1017.17	1016.76 1016.94	1016.73
25	1016.99 1017.53	1016.92 1017.05	1016.71 1016.79	1016.93 1016.53	1017.35 1016.54	1017.64 1016.68	1017.82 1016.59	1018.01 1016.76	1017.98 1017.03	1017.88 1016.96	1017.91 1016.87	1017.88 1016.72	1017.17
26	1016.50 1015.67	1016.50 1015.42	1016.45 1015.31	1016.43 1015.07	1016.42 1014.88	1016.35 1015.11	1016.47 1015.29	1016.66 1015.55	1016.55 1015.73	1016.41 1015.81	1016.06 1015.74	1015.83 1015.61	1015.91
27													
	1014.00 1012.61	1013.51 1012.30	1013.00 1011.88	1012.98 1011.41	1012.86 1011.15	1012.88 1010.79	1013.08 1010.64	1013.37 1010.54	1013.49 1010.40	1013.53 1010.19	1013.45 1009.91	1013.04 1009.65	1013.51
	1009.31 1015.69	1009.47 1015.87	1009.66 1016.21	1009.69 1016.65	1009.64 1017.16	1010.00 1017.47	1010.91 1017.71	1011.75 1017.97	1012.93 1017.04	1014.10 1018.25	1014.96 1018.43	1015.42 1018.12	1011.22
	1017.60 1018.94	1017.19 1018.77	1016.97 1018.71	1016.99 1018.78	1017.35 1018.90	1017.67 1018.80	1017.95 1018.57	1018.32 1018.37	1018.88 1018.29	1019.31 1018.22	1019.38 1017.74	1019.08 1016.72	1017.68
	1015.99 1015.09	1015.71 1015.06	1015.70 1014.74	1015.47 1014.59	1015.21 1014.33	1015.22 1014.33	1015.31 1014.39	1015.70 1014.59	1015.91 1014.45	1015.68 1014.11	1015.54 1013.55	1015.29 1013.27	1016.98
	1013.63 MONTHLY	1013.55 1014.79	1013.40 1014.60	1013.15 1014.60	1012.98 1014.79	1012.98 1014.91	1013.16 1015.05	1013.46 1015.12	1013.54 1015.02	1013.54 1014.98	1013.73 1014.95	1013.67 1014.77	1013.89
	AVG	1014.41	1014.18	1013.99	1013.89	1013.82	1014.06	1014.33	1014.80	1015.12	1015.25	1015.27	1014.65







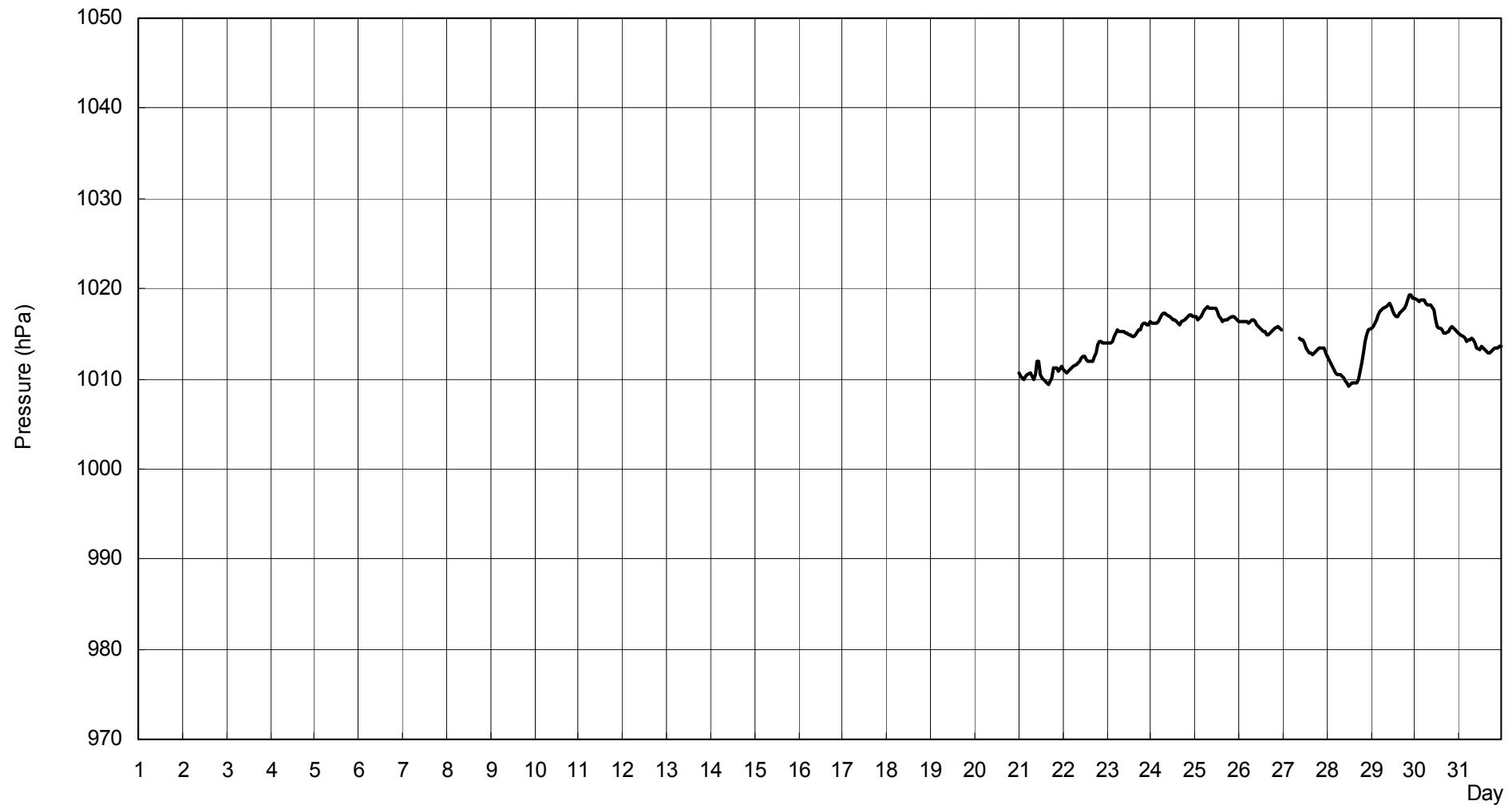




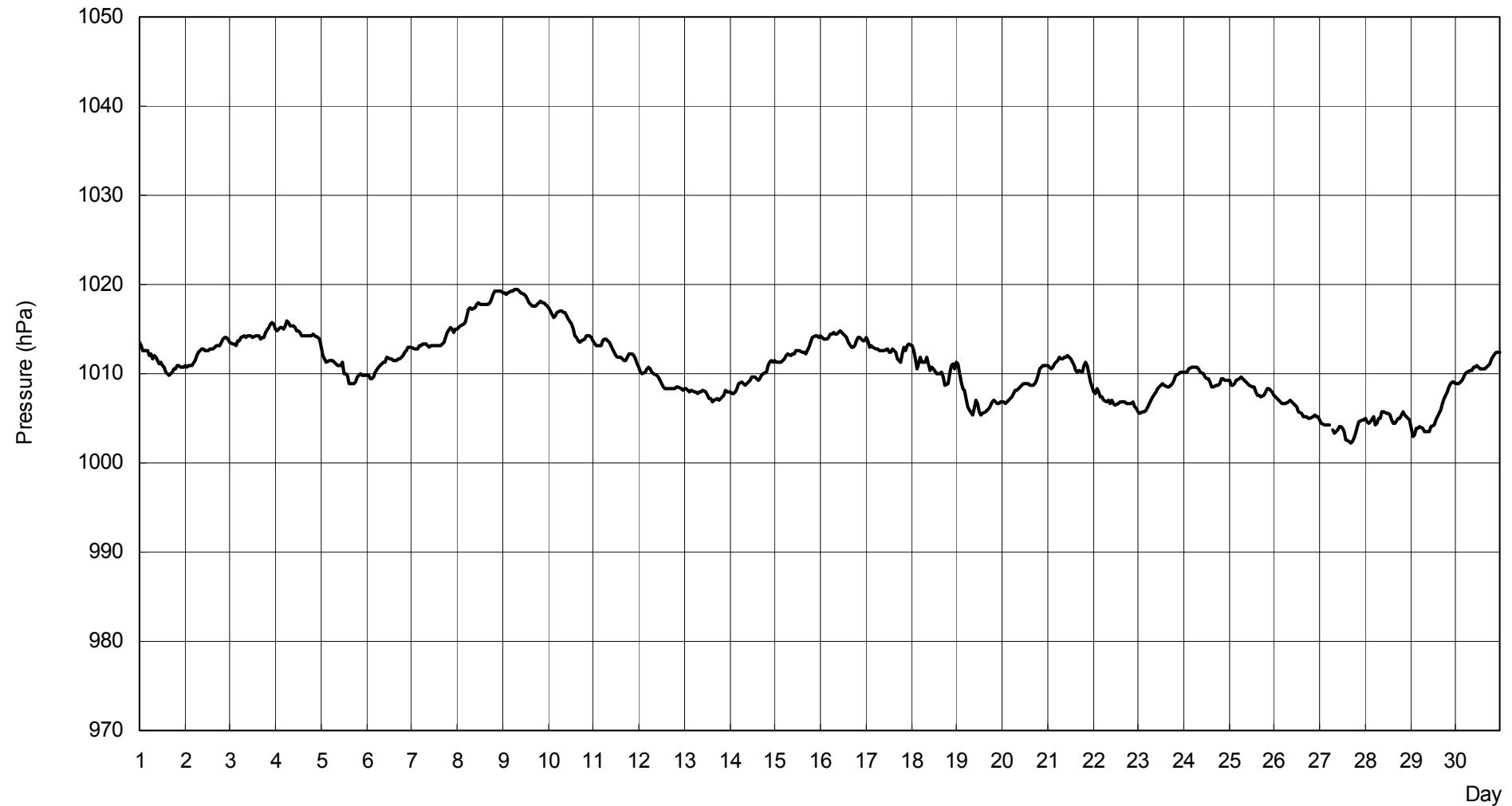




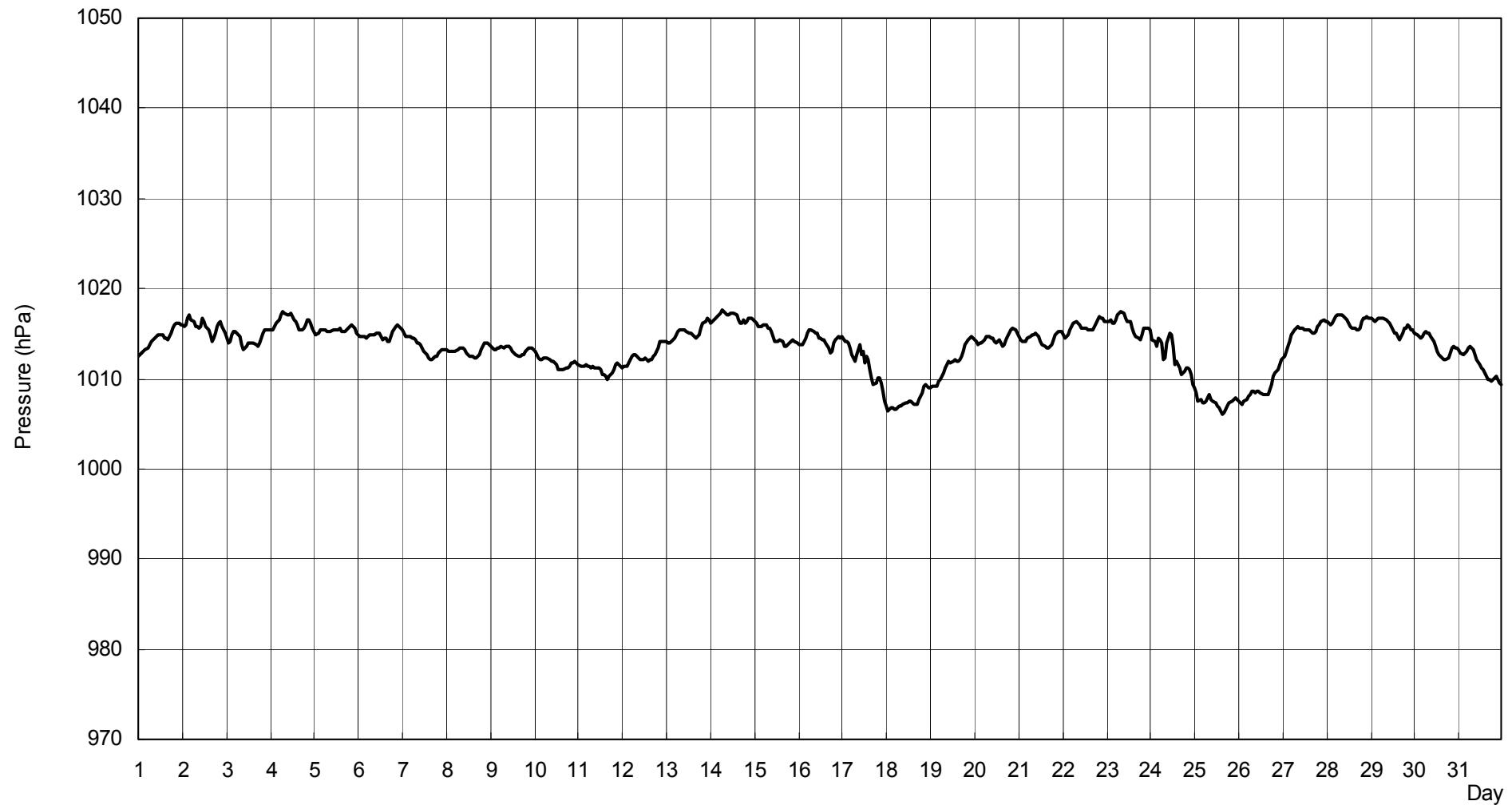
S.V.I.R.CO. Observatory - Pressure in hectoPascal - May 1997



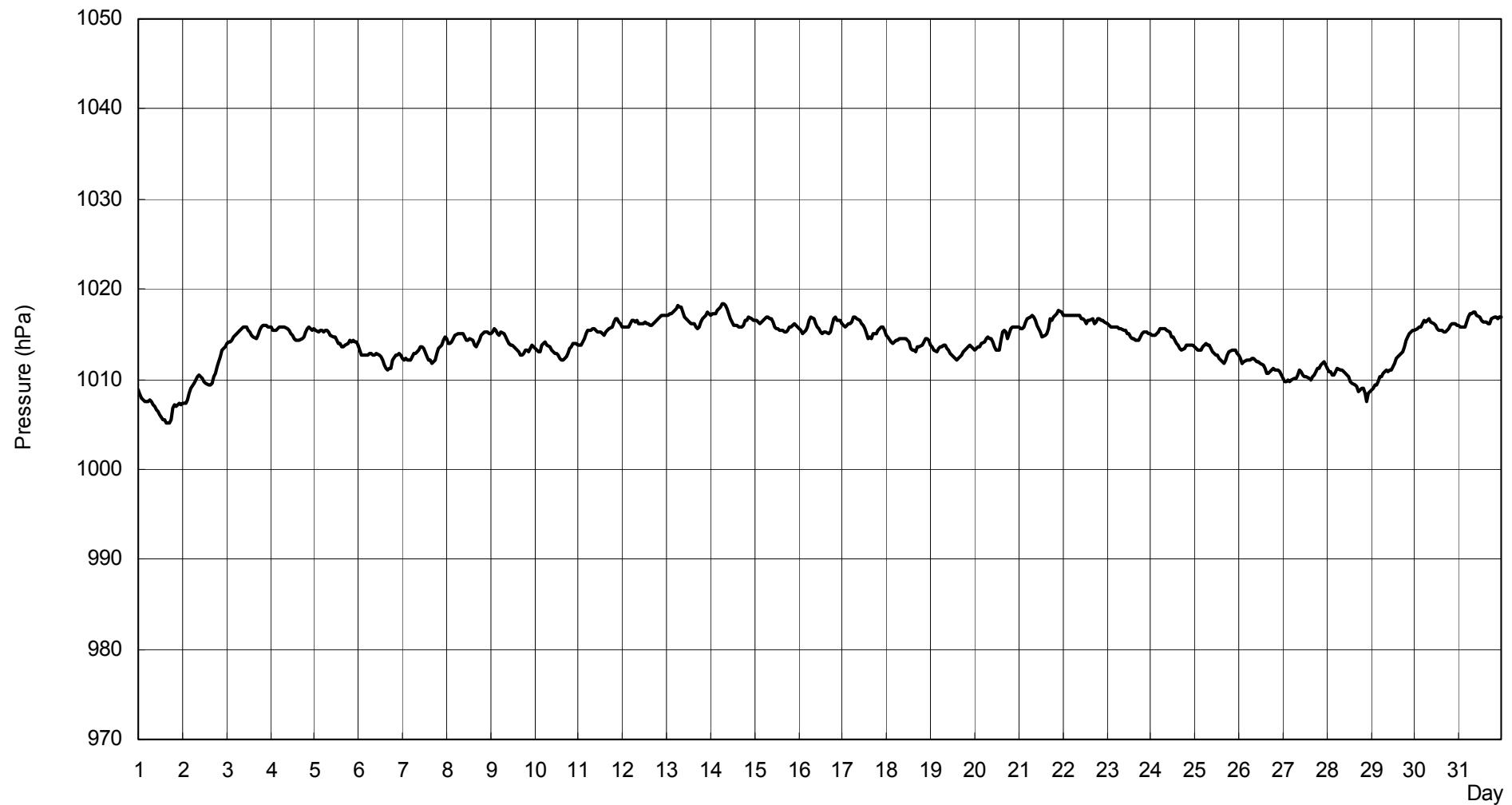
S.V.I.R.CO. Observatory - Pressure in hectoPascal - June 1997



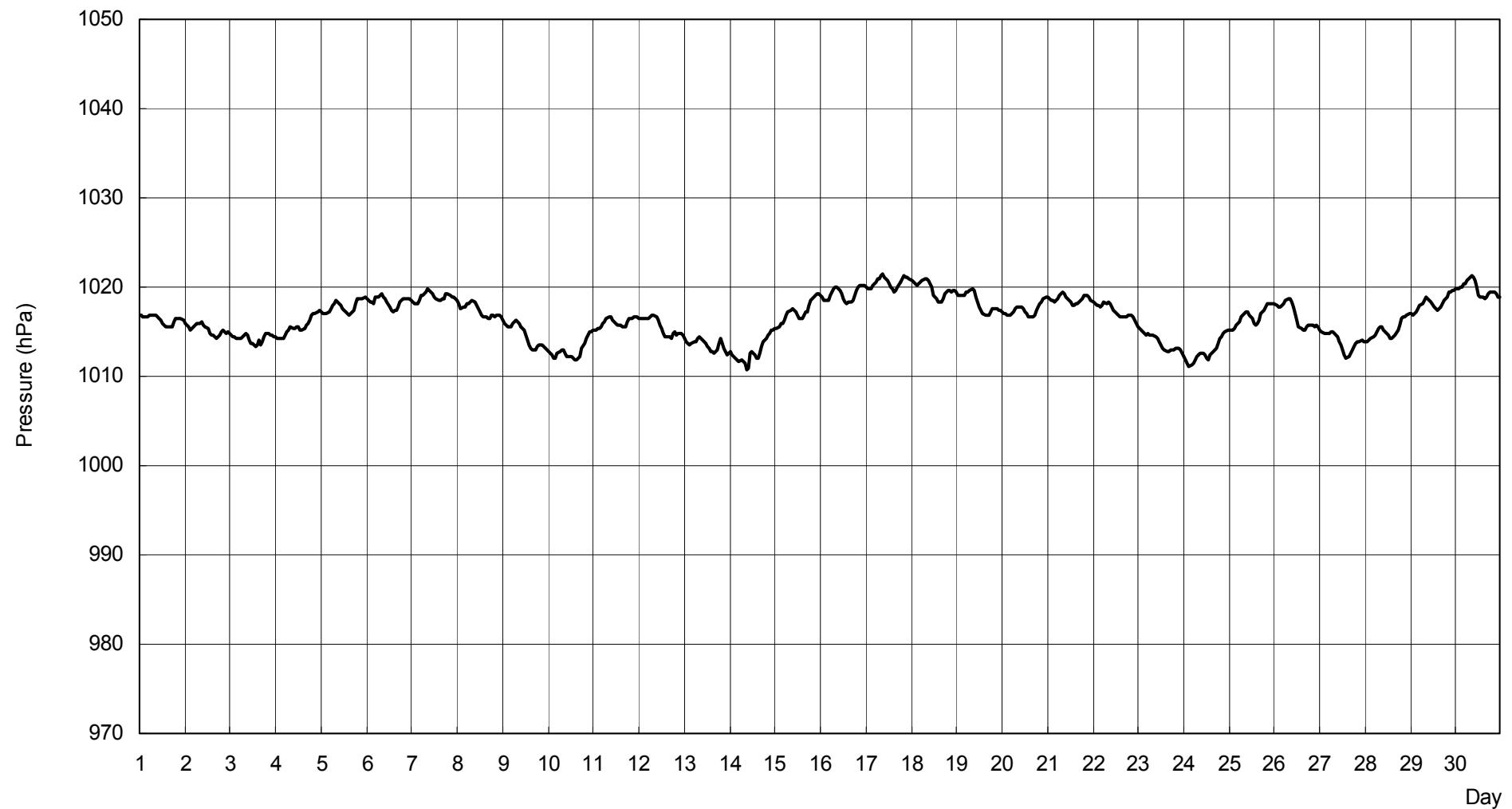
S.V.I.R.CO. Observatory - Pressure in hectoPascal - July 1997



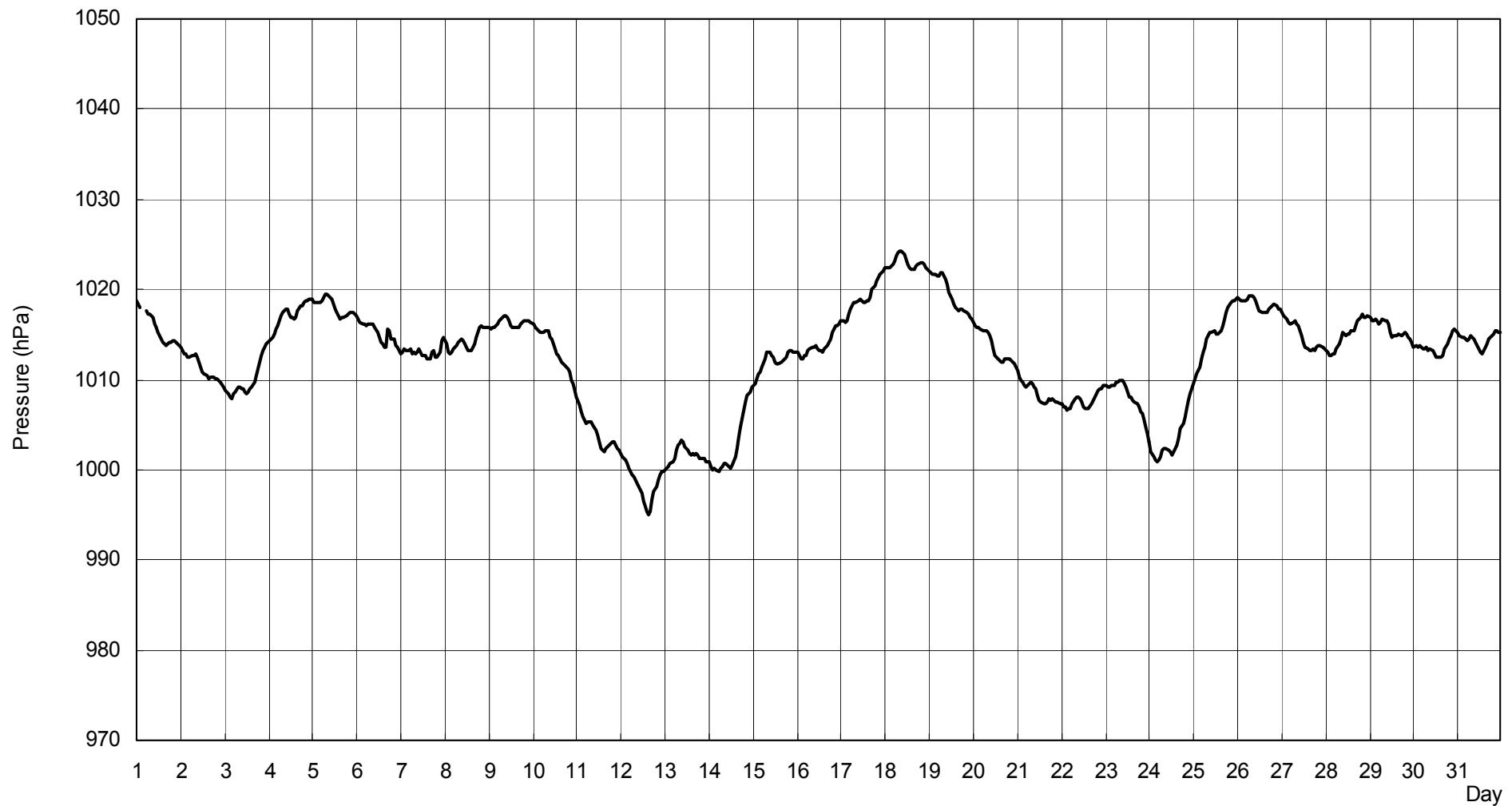
S.V.I.R.CO. Observatory - Pressure in hectoPascal - August 1997



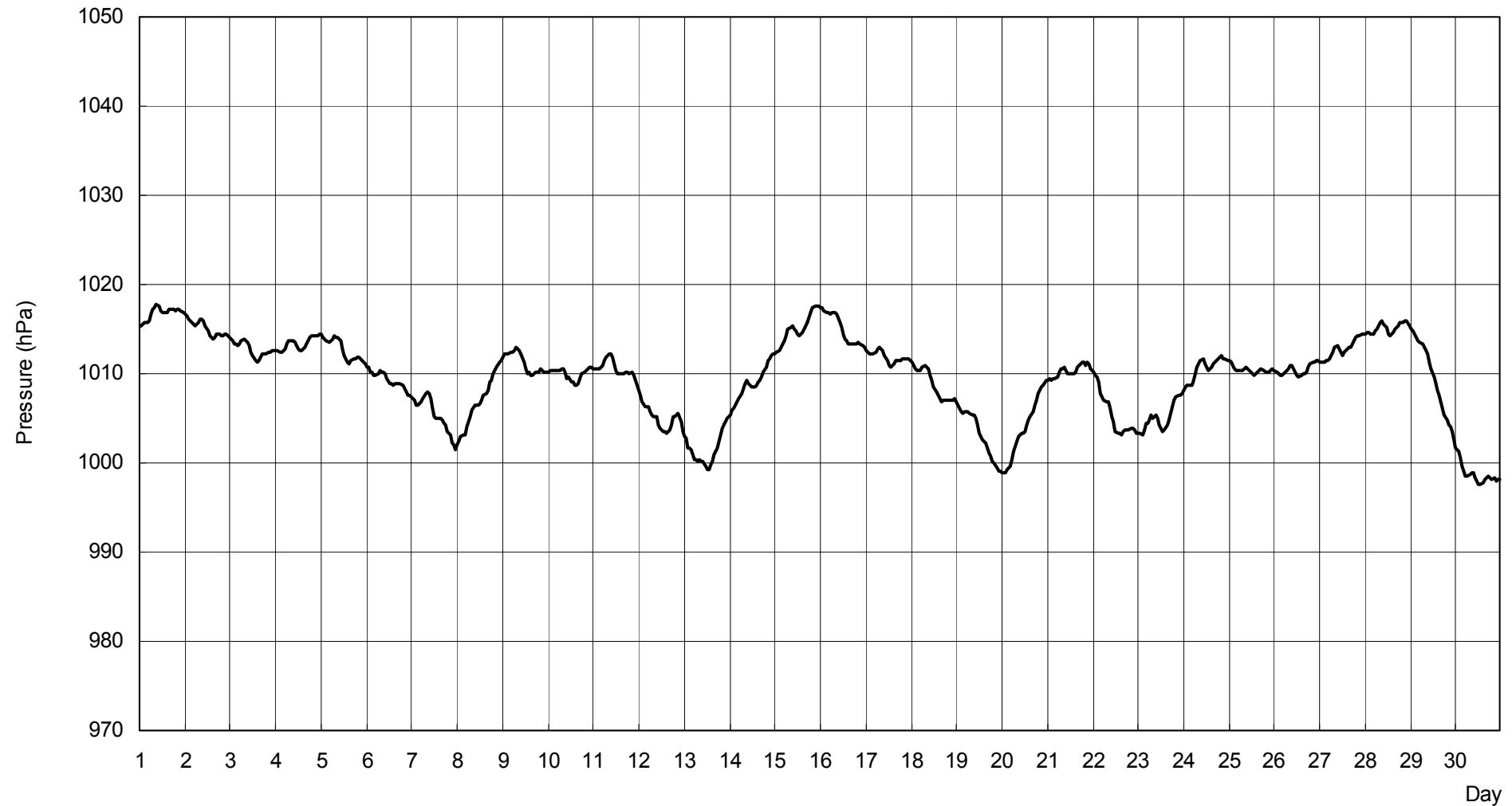
S.V.I.R.CO. Observatory - Pressure in hectoPascal - September 1997



S.V.I.R.CO. Observatory - Pressure in hectoPascal - October 1997



S.V.I.R.CO. Observatory - Pressure in hectoPascal - November 1997



S.V.I.R.CO. Observatory - Pressure in hectoPascal - December 1997

