

WELCOME TO
WORLD RADIATION DATA CENTER
(WRDC)

2008: - 44 Years of Activity.



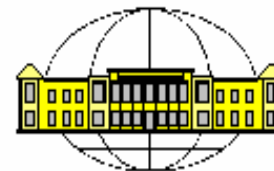
WMO



GAW



ROSHYDROMET



Main Geophysical
Observatory.
Founded in 1849

MGO



PRINCIPAL RESOLUTIONS REGULATING the WRDC ACTIVITIES

Resolution 12 of the WMO Executive Committee (EC–XIV), 6 April 1964. Commitments taken by the GOSKOMHYDROMET “*On solar radiation data collection and publication*”.

Resolution 6 of the WMO Executive Council, Geneva, 6–23 June, 1984 – “*International solar radiation data collection and publication*”.

GOSKOMHYDROMET Document 18 July 1986 “*On the foundation of the World Radiation Data Centre at the Voeikov Main Geophysical Observatory*”.



MAIN DIRECTIONS OF WRDC ACTIVITY

- **Central collection and processing of data flow;**
- **Data Quality Control;**
- **Communication with NWS' s submitting the data;**
- **Publication of periodic bulletins “Solar Radiation and Radiation Balance. The World Network”;**
- **Development of special software for data processing and for WRDC server;**
- **Dissemination of bulletins and data subsets;**
- **Archiving and Time Series Analysis;**
- **Participation of the WRDC in the GAW Program.**



Data recommended by the WMO for central collection at the WRDC

Global Solar Radiation, G

Diffuse (or Sky), Solar Radiation, D

Direct (Normal) Solar Radiation, I

Bright Sunshine Duration, S

Radiation Balance, L⁺, L⁻, or/and Q⁺, Q⁻, or/and Q^{*}

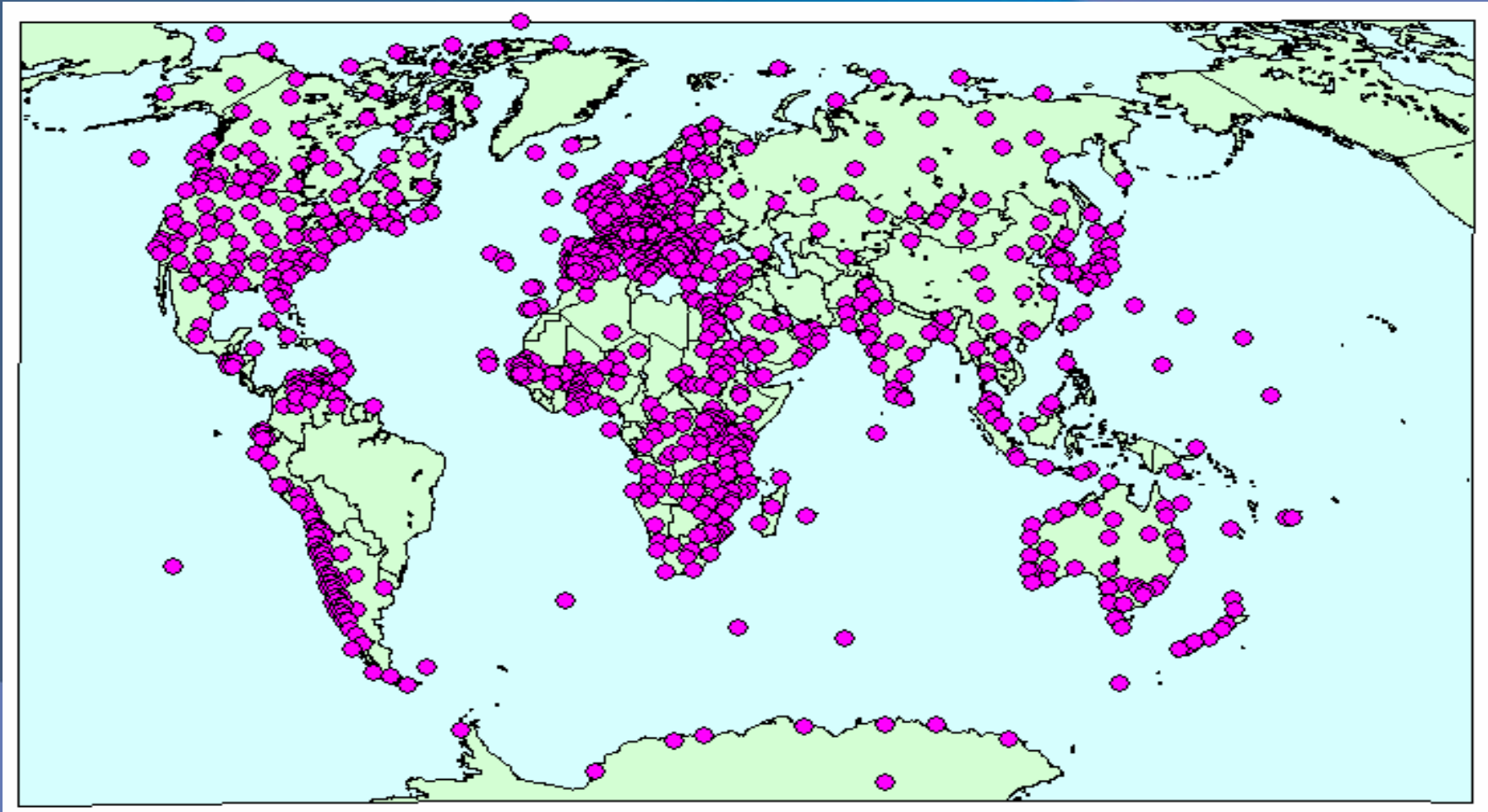
Long-wave Atmospheric Radiation (Downward), L⁺

Terrestrial Long-wave Radiation (Upward), L⁻

Reflected Global Solar Radiation, R

Solar Spectral Radiation, I^{*}

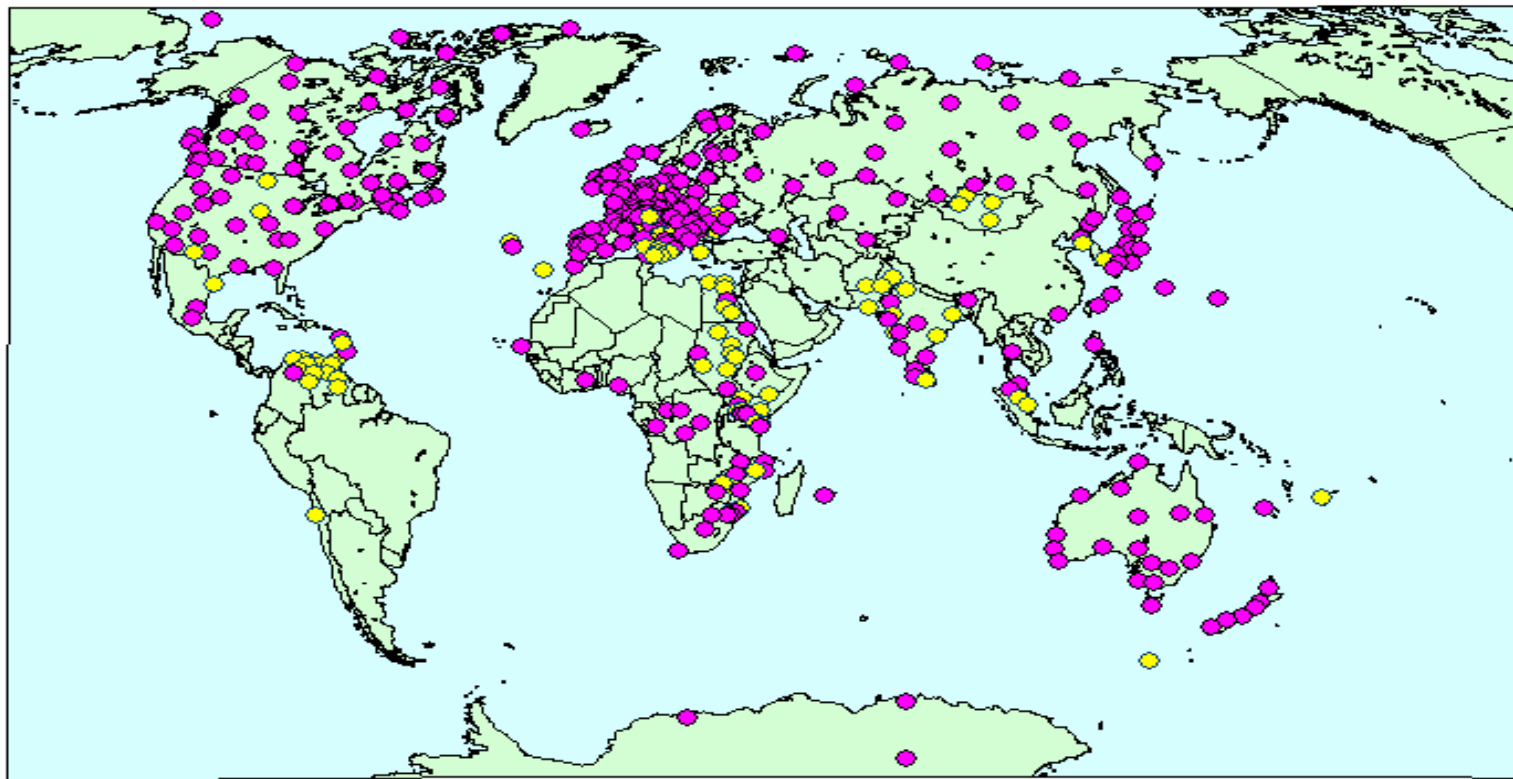
Network of Actinometric Sites in WRDC Archive (Global Radiation, 1964-2007).



Total Number of Sites in WRDC Archive - 1118



Homogeneous and Not-Homogeneous Global Radiation at the WRDC (Period of Observations > 30 Yrs.)

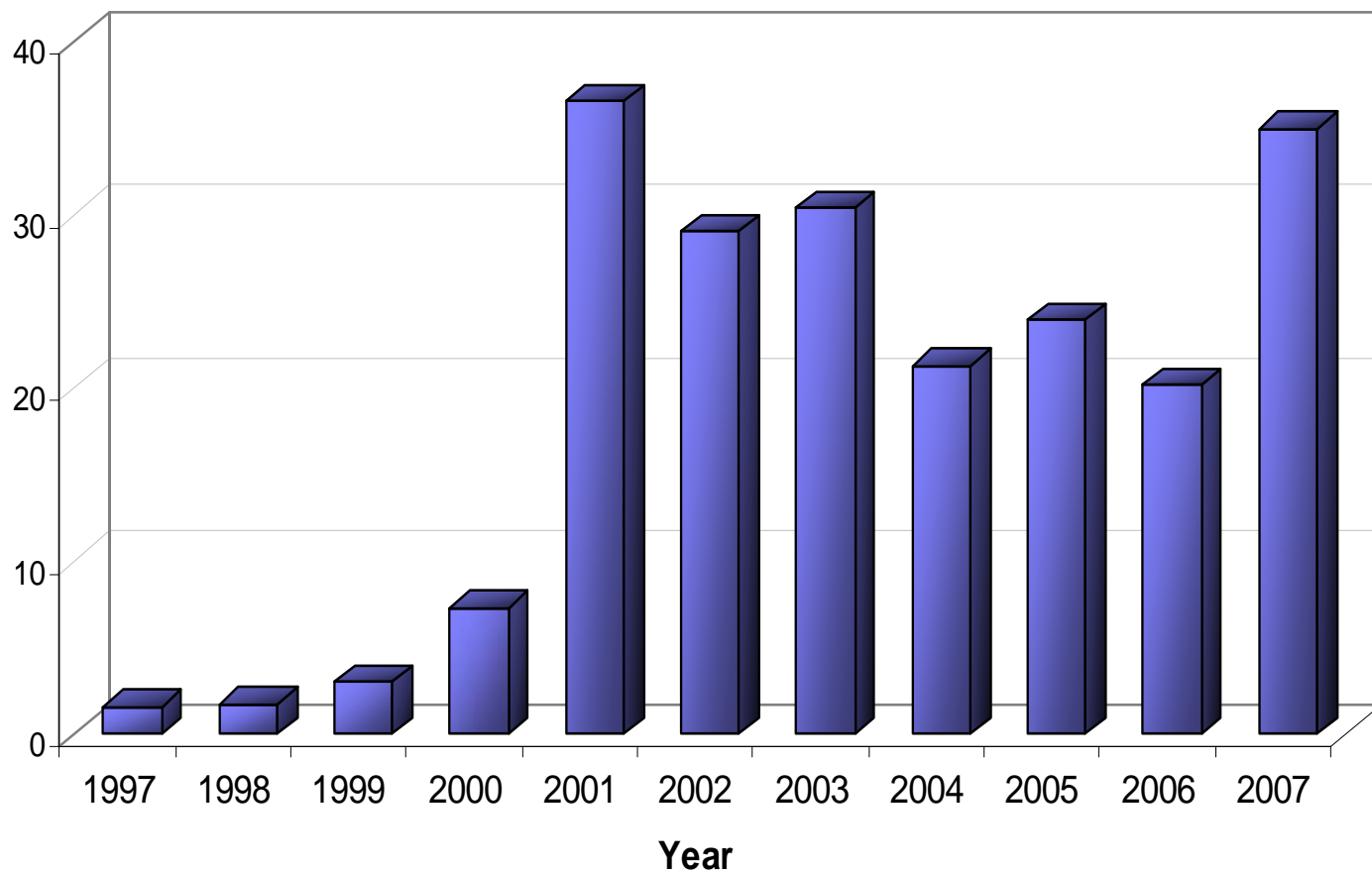




WRDC Archiving Activity

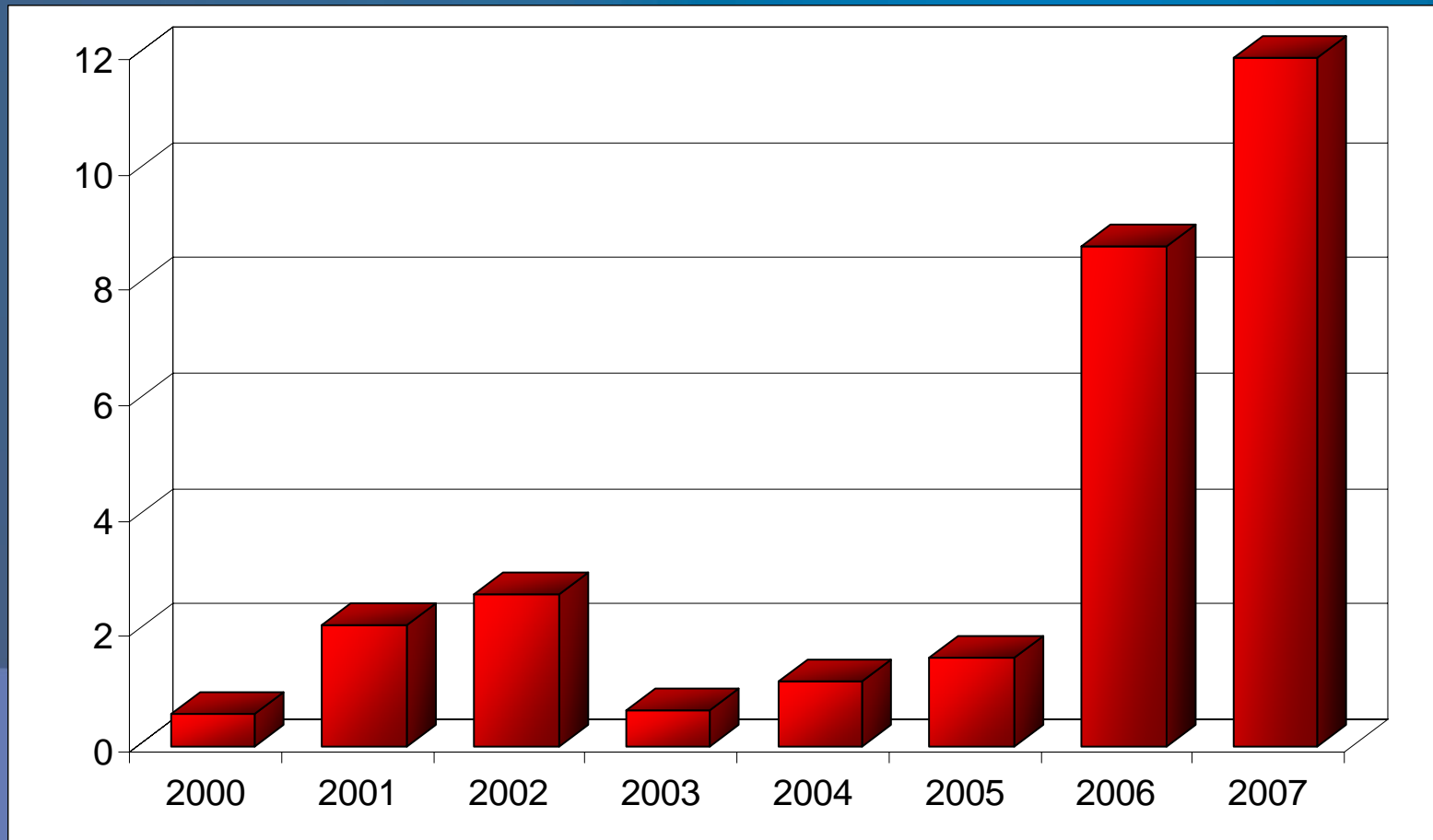


Data Flow to WRDC in Mb





Data Submitted from GAW Sites in Mb





World Radiometric Reference (WRR)

Since January 1980.

First Published in January 1981,
Second – in December 1984.



WRDC QC Europe Stations

Anatoly V. Tsvetkov
World Radiation Data Centre
Voeikov Main Geophysical Observatory

COST 726 MCM11
“La Sapienza” University. Rome
18 September 2008

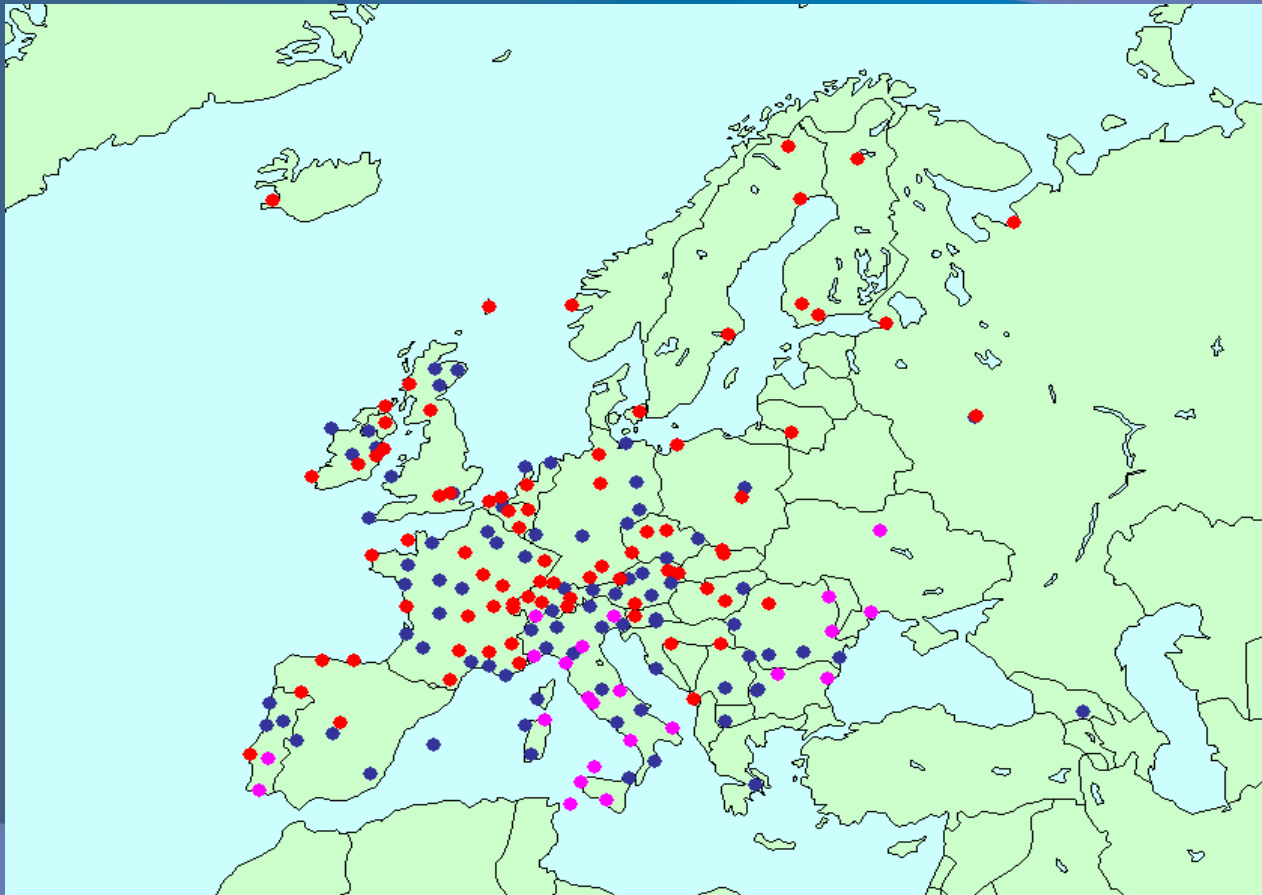


Quality Checks at the WRDC

- *Physically meaningful boundaries*
- Control of following up the WRDC rules of daily and monthly totals calculations
- Checking of calculated and actual totals
- *Automated checks of hourly and daily values in the within setup ranges:*
- Control of exceedings above TOA values
- Control of values higher than those of probabilistic and climatological levels
- Automated Control of Correlations between parameters, data of neighbour sites
- Homogeneity and trend Analysis
- *Expert assessment*



Europe sites. Global radiation for more than 20 years



- Stations with good quality data
- Stations with questionable monthly averaged values
- Stations with non-homogeneity in time series

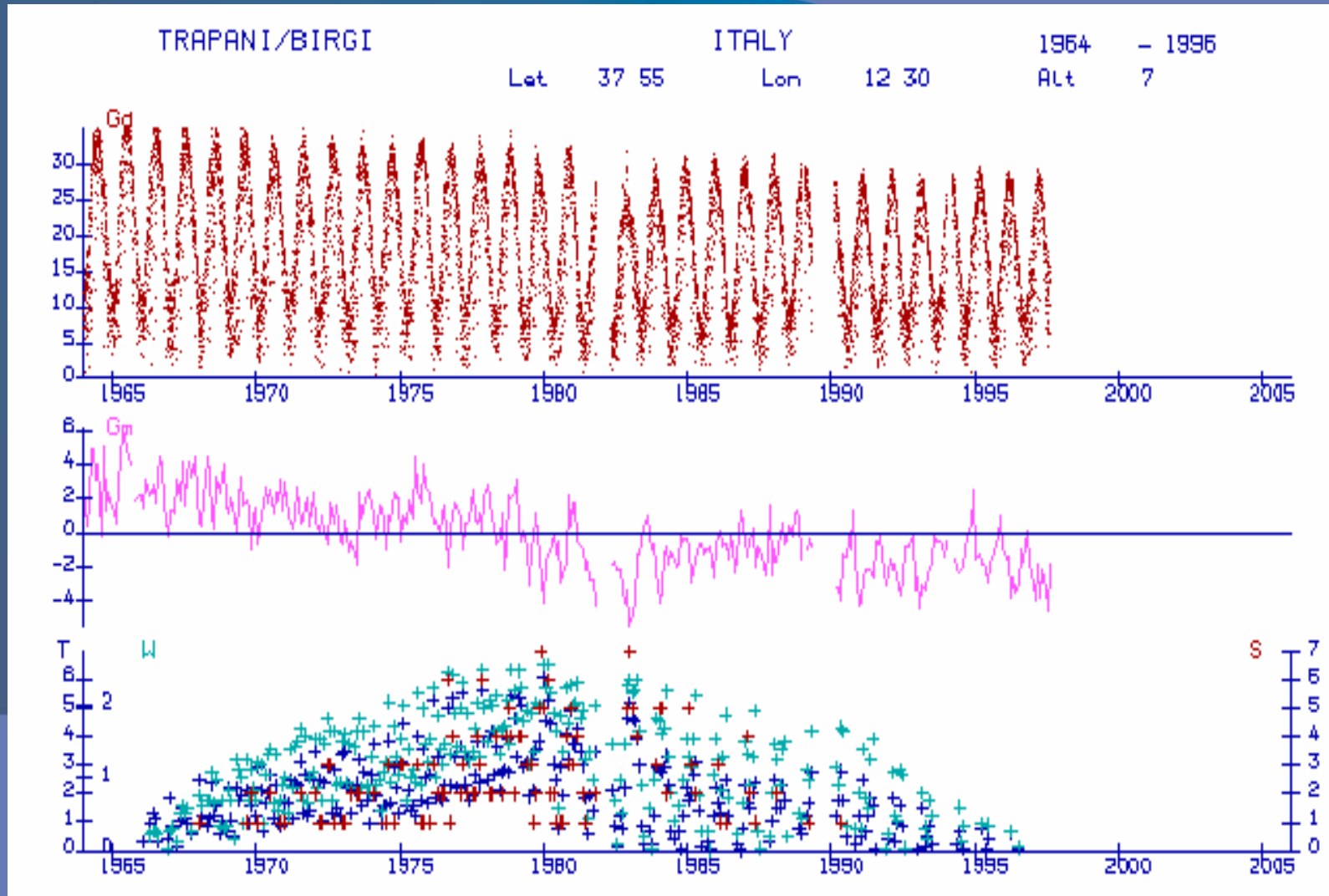


Current Results of WRDC Archive Global Radiation QC (before QA at NWS' s)

Slides Below:
Are Selected Examples



Daily totals of global radiation



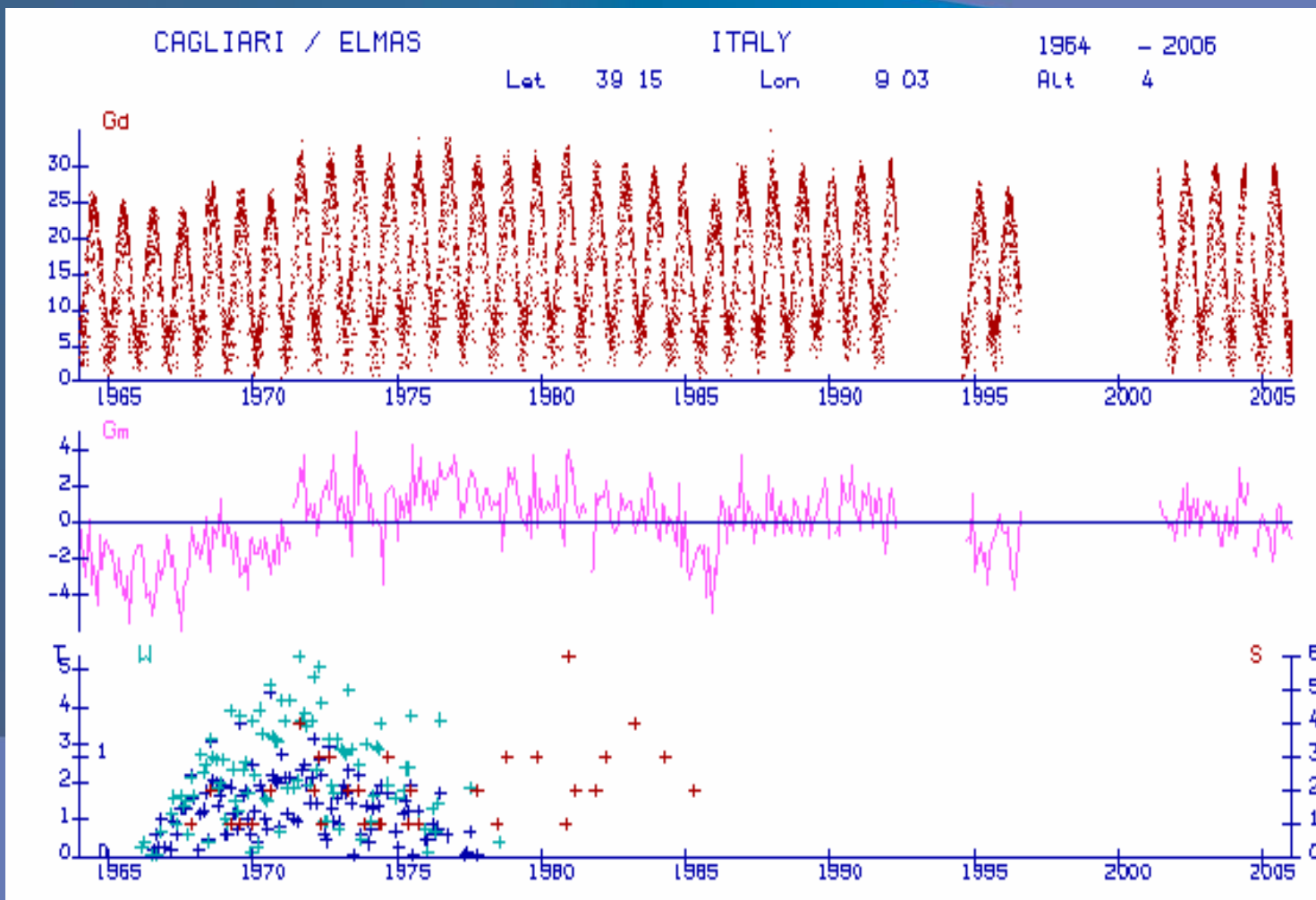
Gd – daily totals

Gm – monthly means

W, S, T – statistical criteria



Global radiation, G



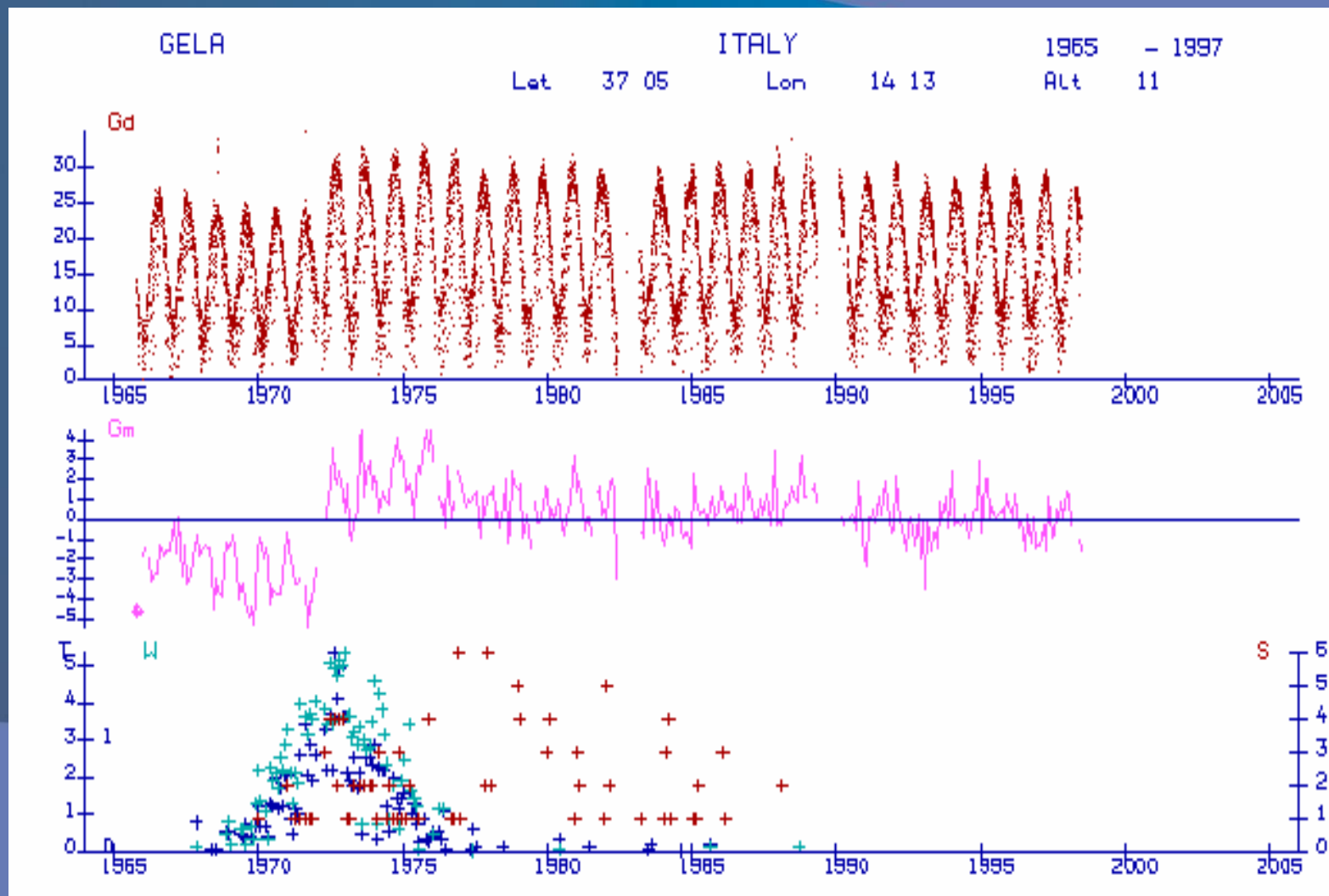
Gd – daily totals

Gm – monthly means

W, S, T – statistical criteria



Global radiation





Global radiation

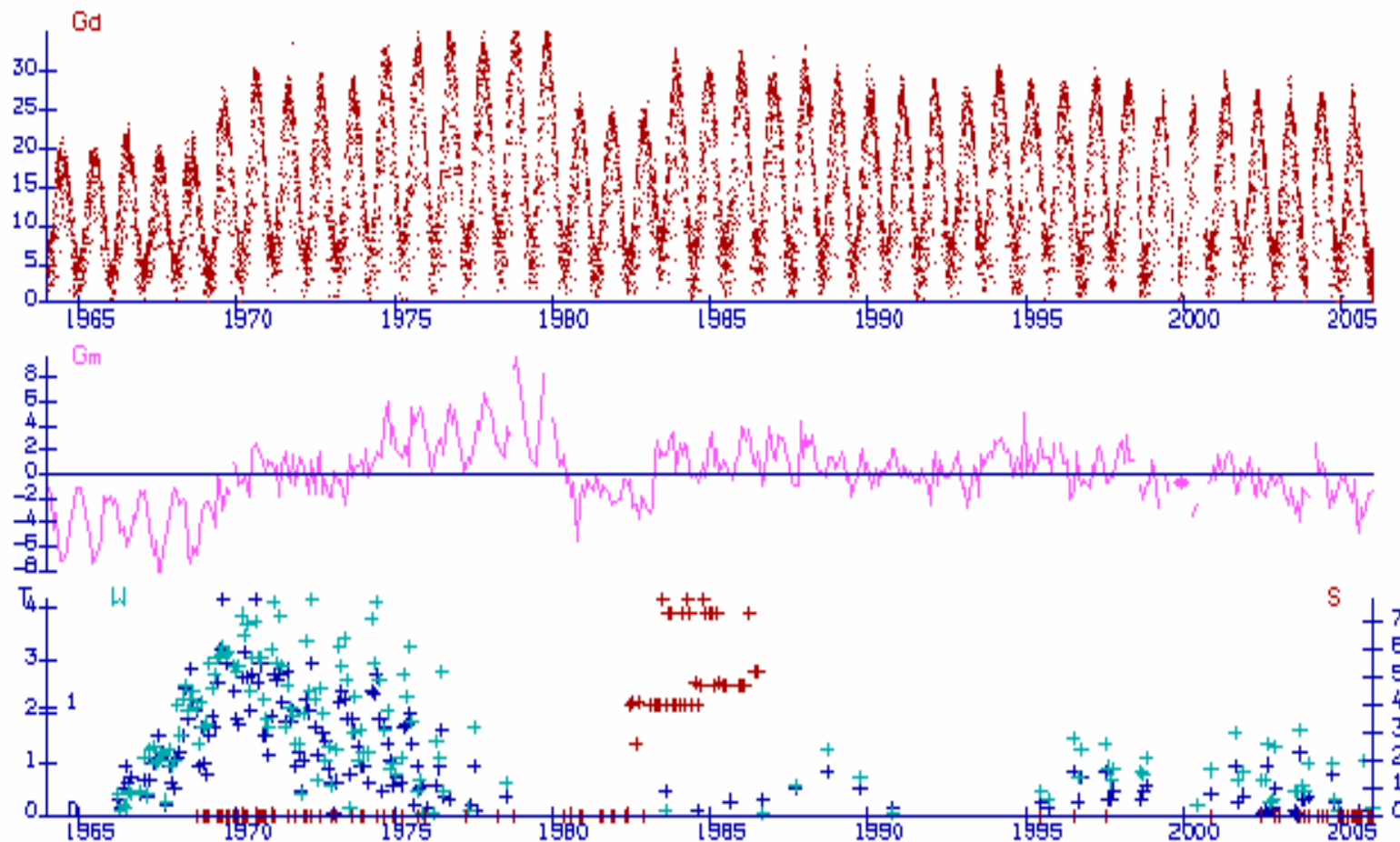
BRINDISI

ITALY

1964 - 2006

Lat 40 39 Lon 17 57

Alt 15





Global radiation

ROMA / CIAMPINO

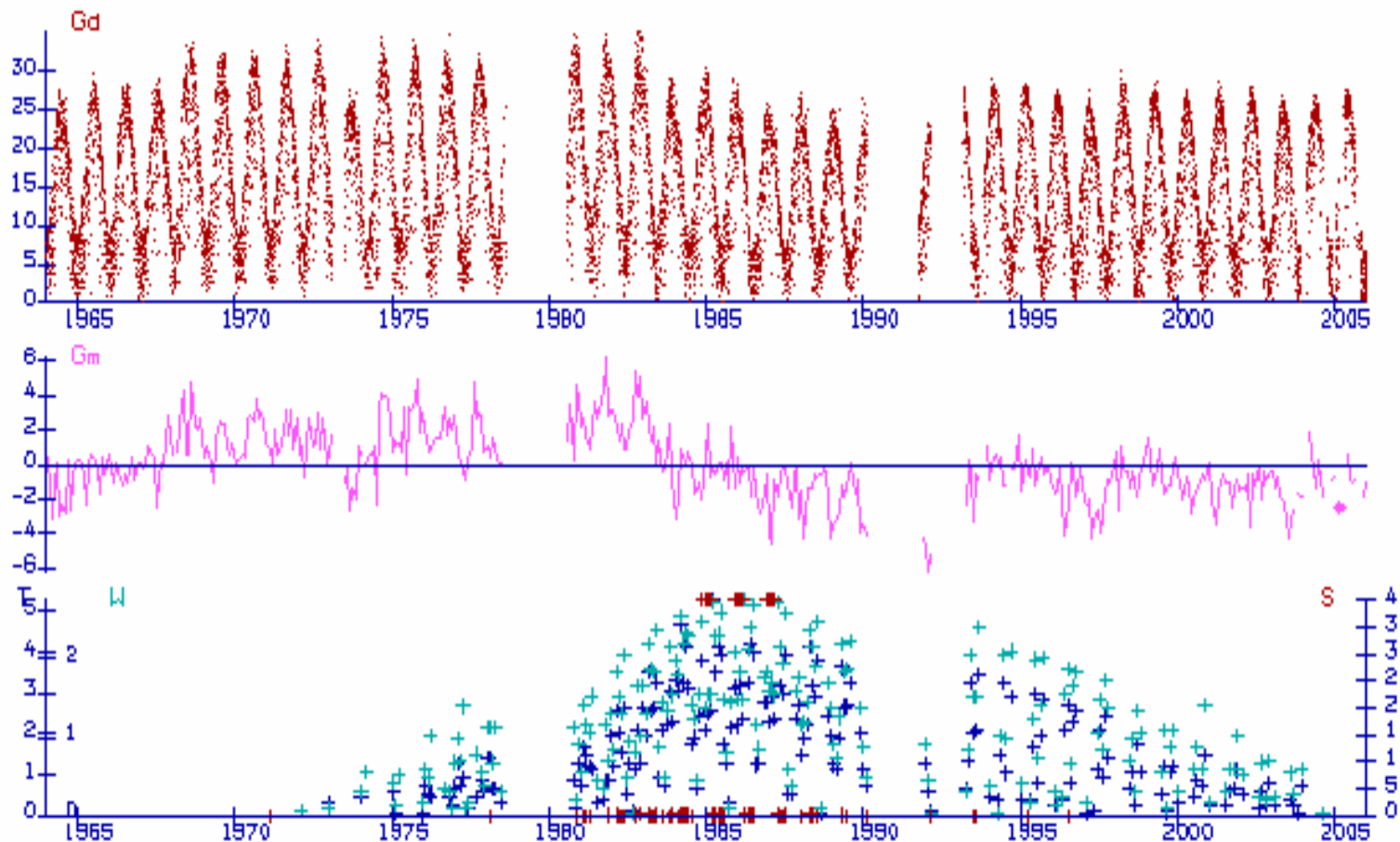
ITALY

1954 - 2006

Lat 41 48

Lon 12 33

Alt 129





Global radiation

AMENDOLA

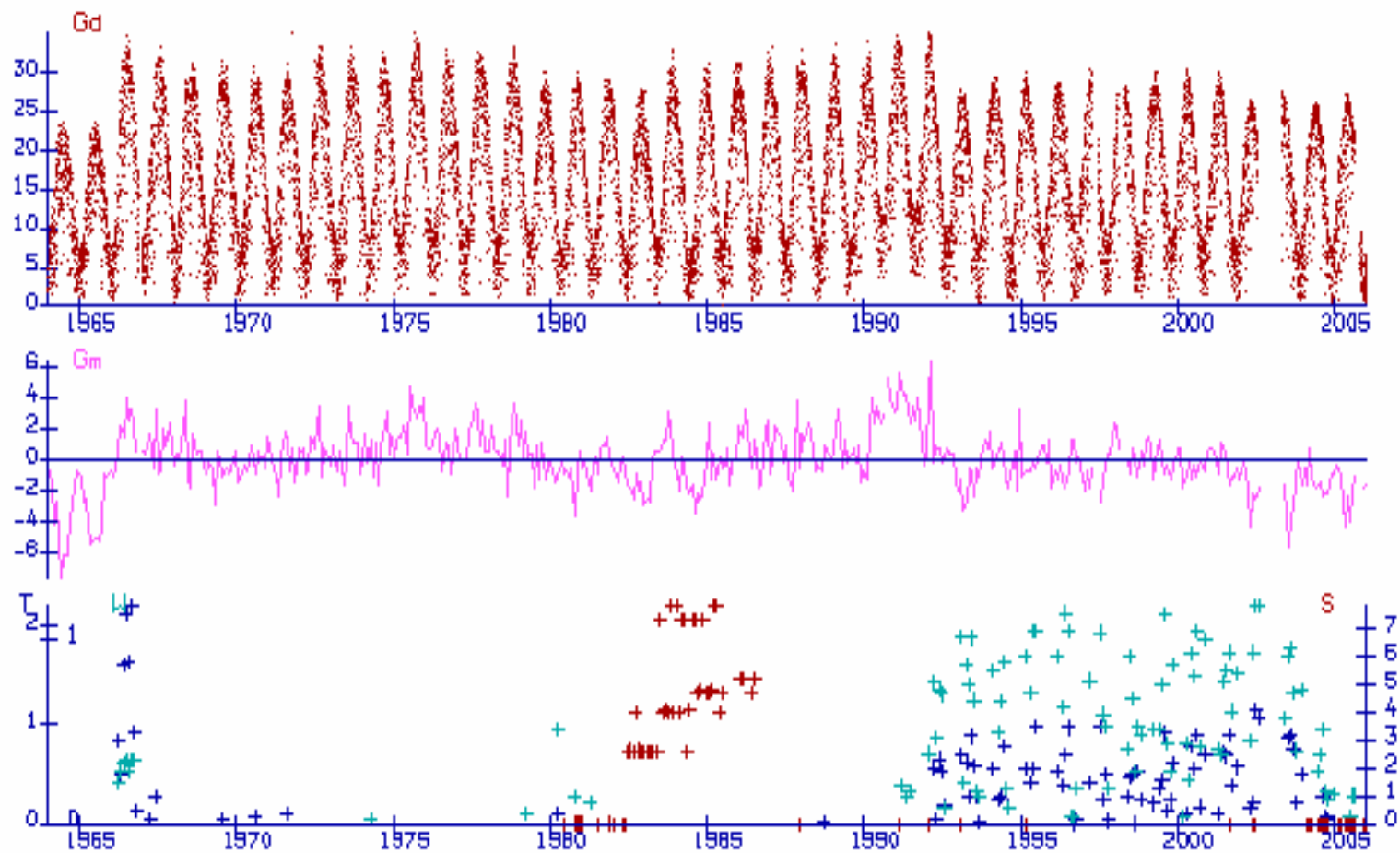
ITALY

1964 - 2006

Lat 41 32

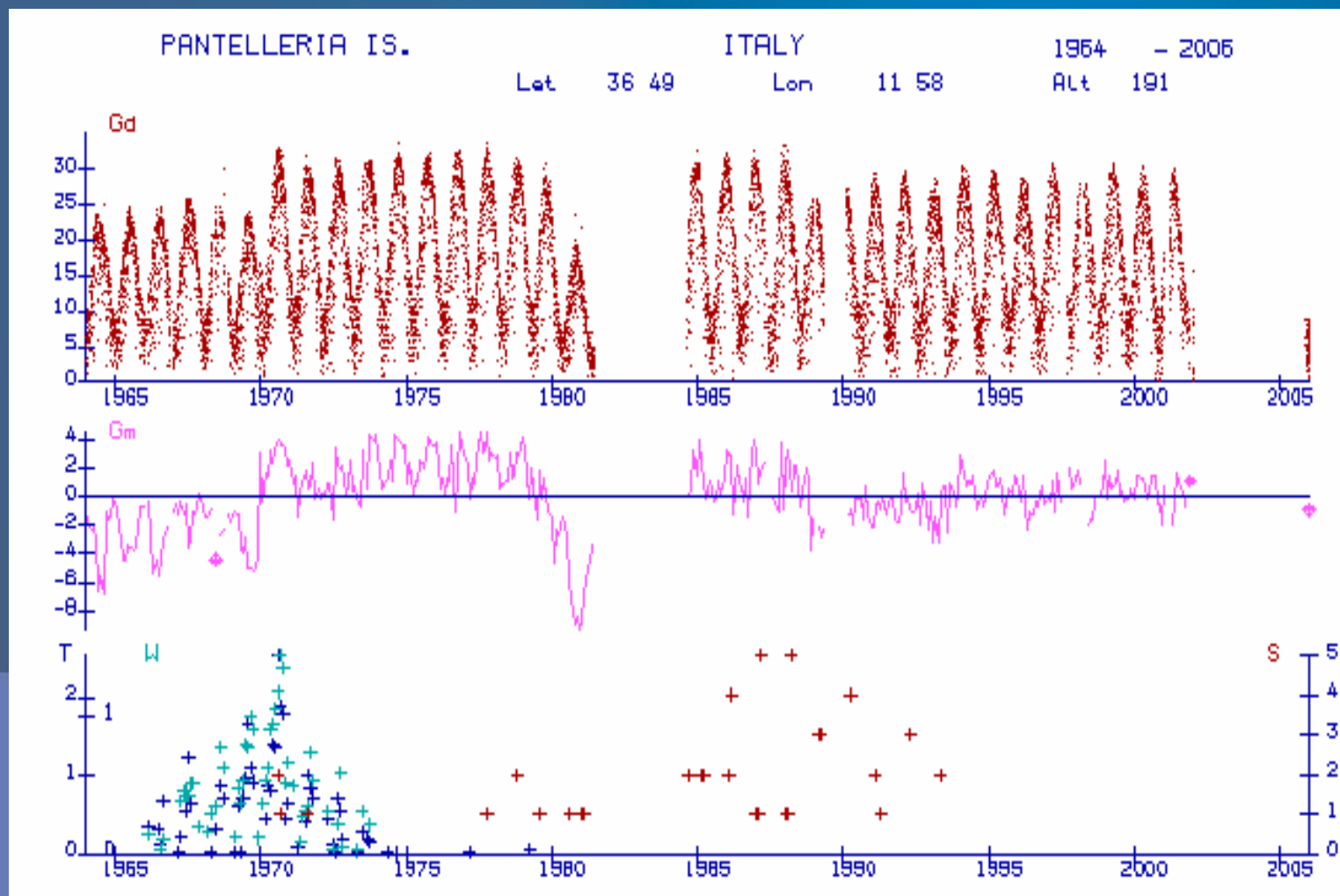
Lon 15 43

Alt 57



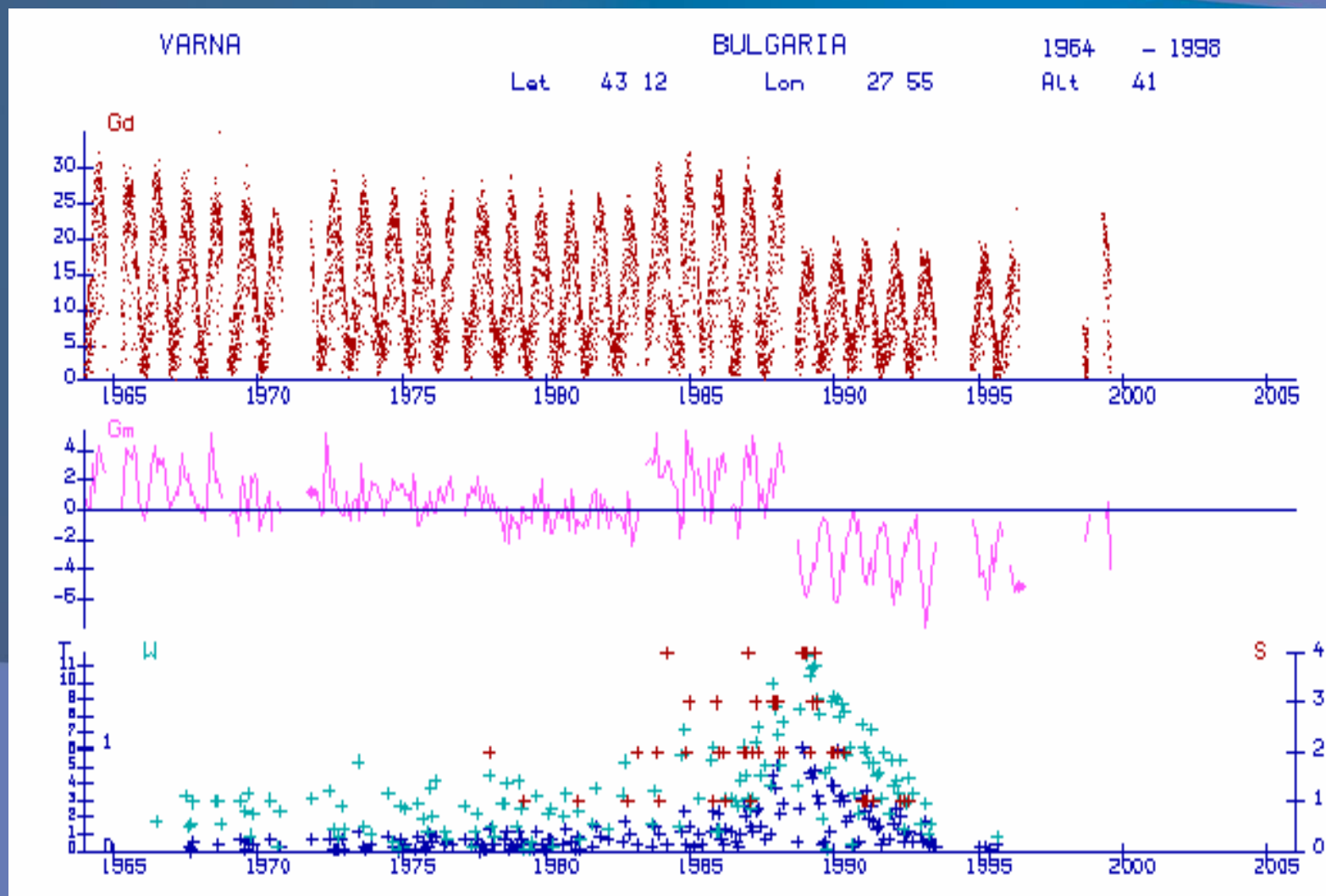


Global radiation



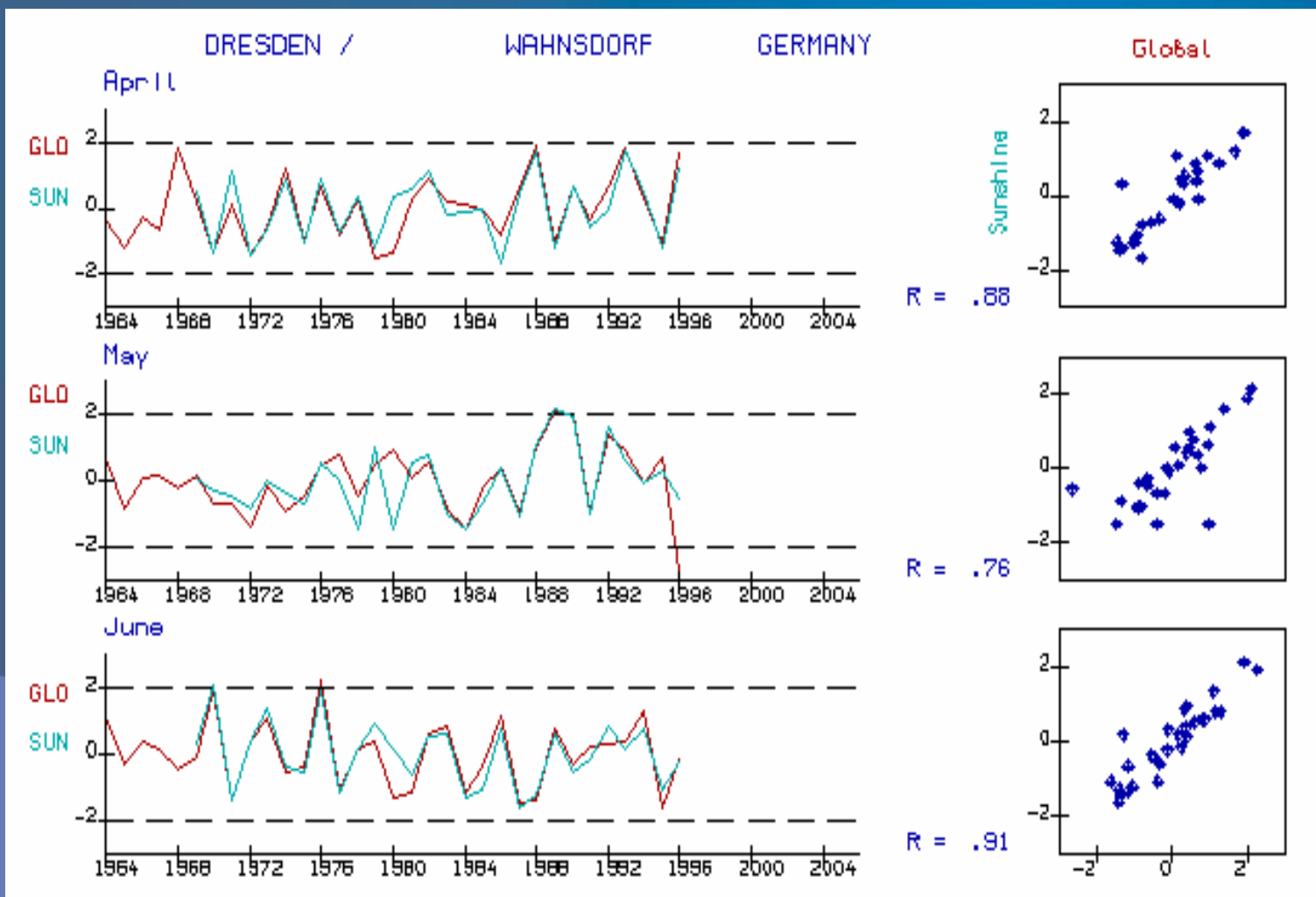


Global radiation





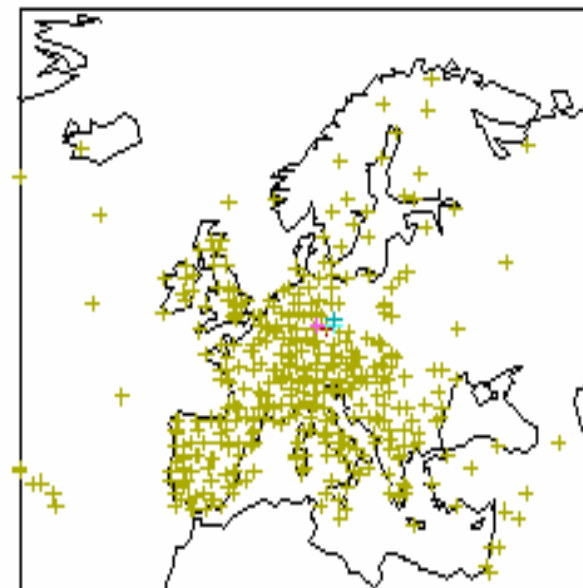
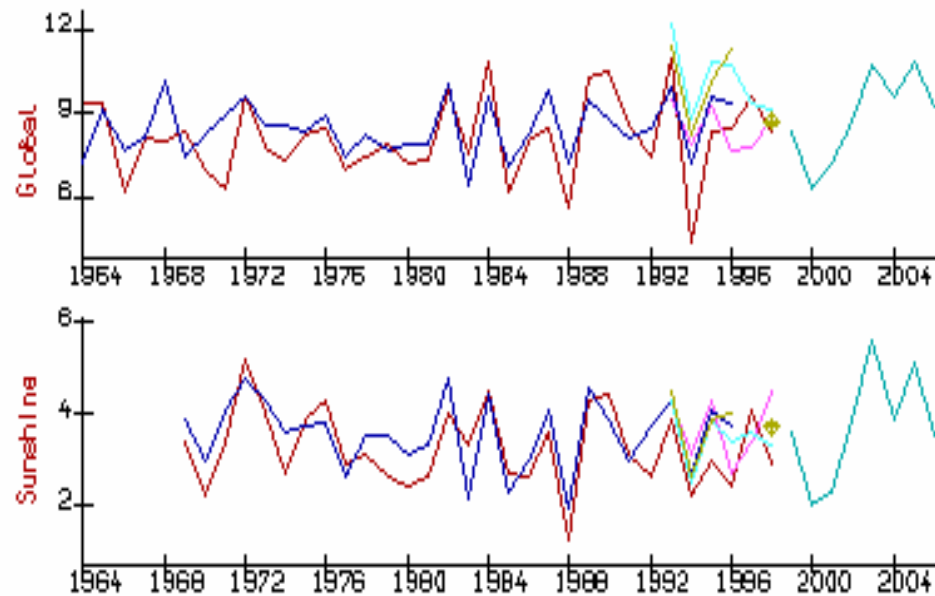
Monthly means of global radiation and sunshine duration



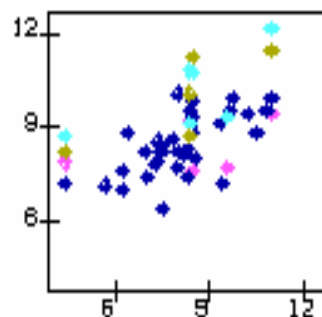


Monthly means of global radiation and sunshine duration

March

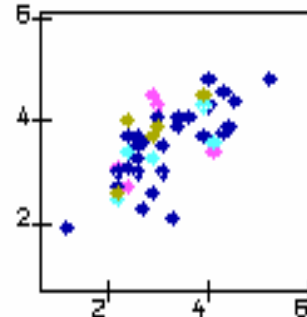


Global



R =
R = .68
R = .63
R =
R = .45

Sunshine



R =
R = .73
R = .75
R =
R = .41

* FICHELBERG

* CHEMNITZ

* ZINNWALD

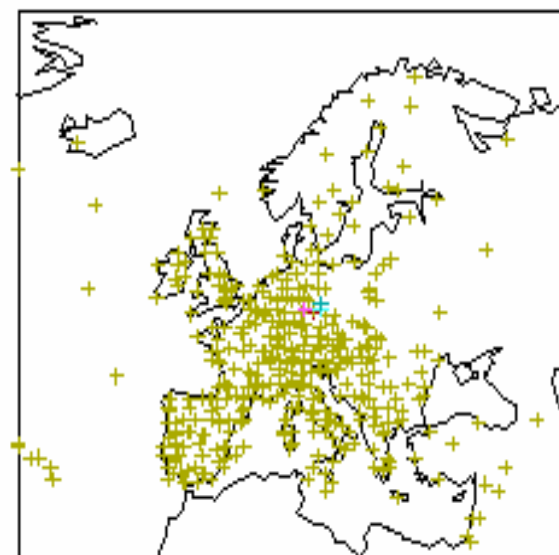
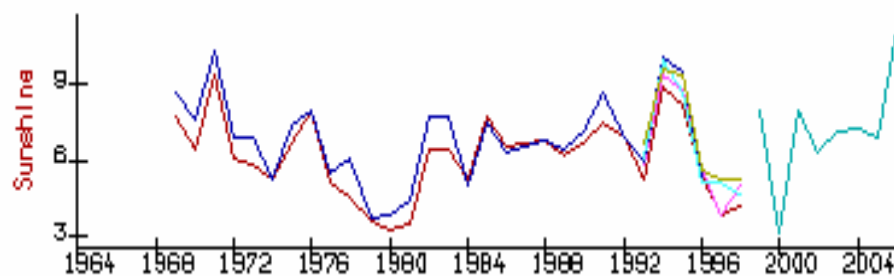
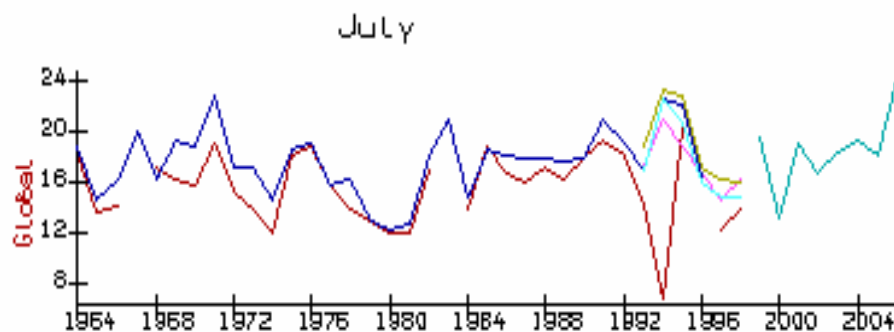
* DRESDEN /

* DRESDEN/KLOTZSCHE

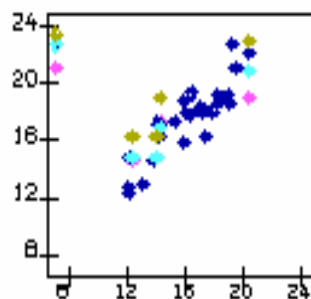
* WEIMAR



Monthly means of global radiation and sunshine duration

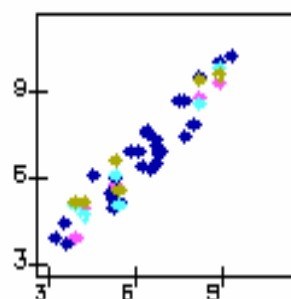


Global



R =
R =
R = .47
R =
R =

Sunshine



R = .98
R = .97
R = .94
R =
R = .99

* FICHELBERG

* CHEMNITZ

* ZINNWALD

* DRESDEN /

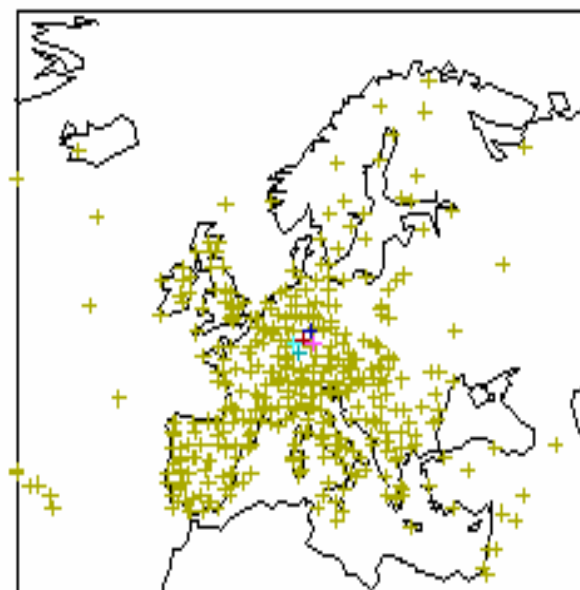
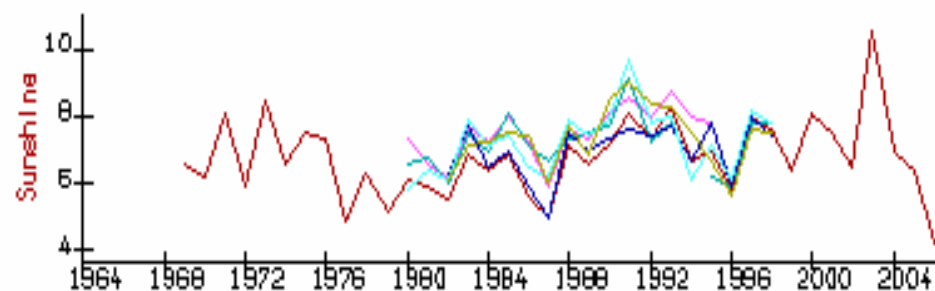
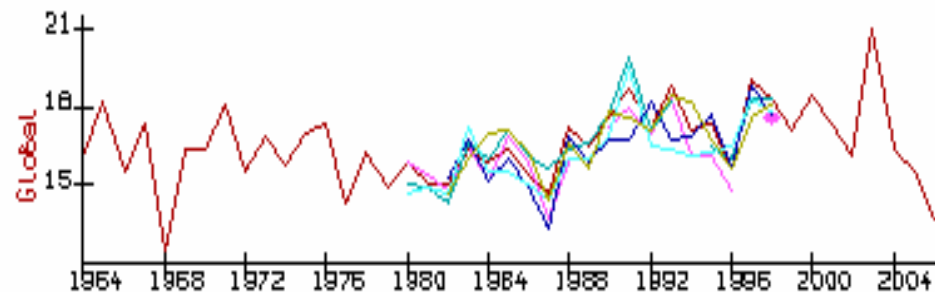
* DRESDEN/KLOTZSCHE

* WEIMAR

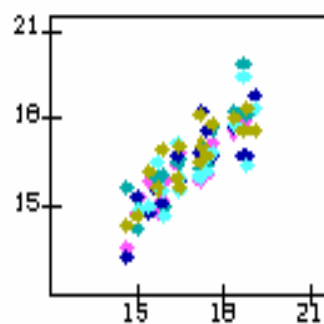
Monthly means of global radiation and sunshine duration



August

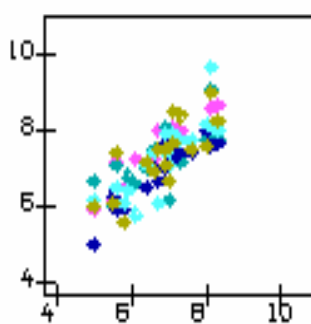


Global



R = .84
R = .83
R = .83
R = .89
R = .90

Sunshine



R = .78
R = .84
R = .90
R = .73
R = .94

* WUERZBURG

* WEISSENBURG

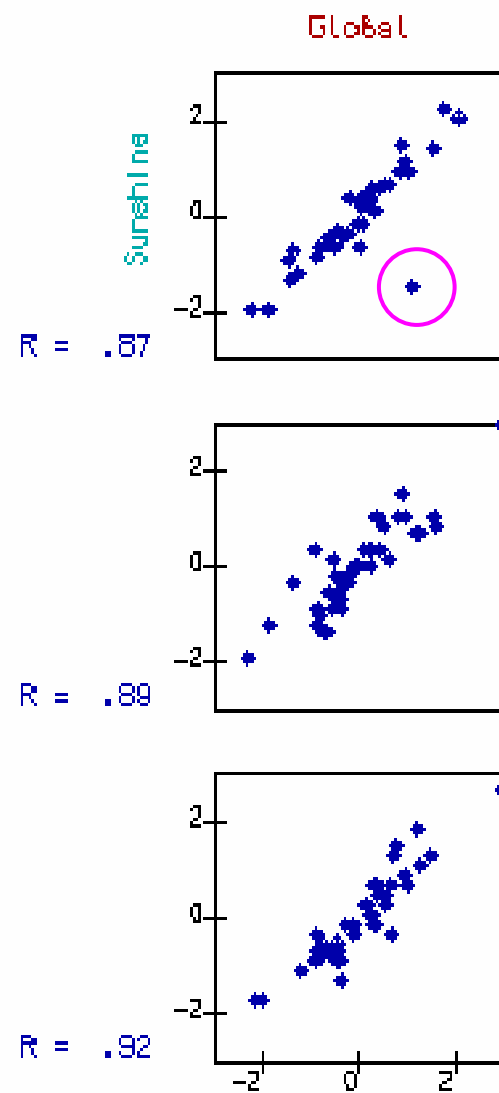
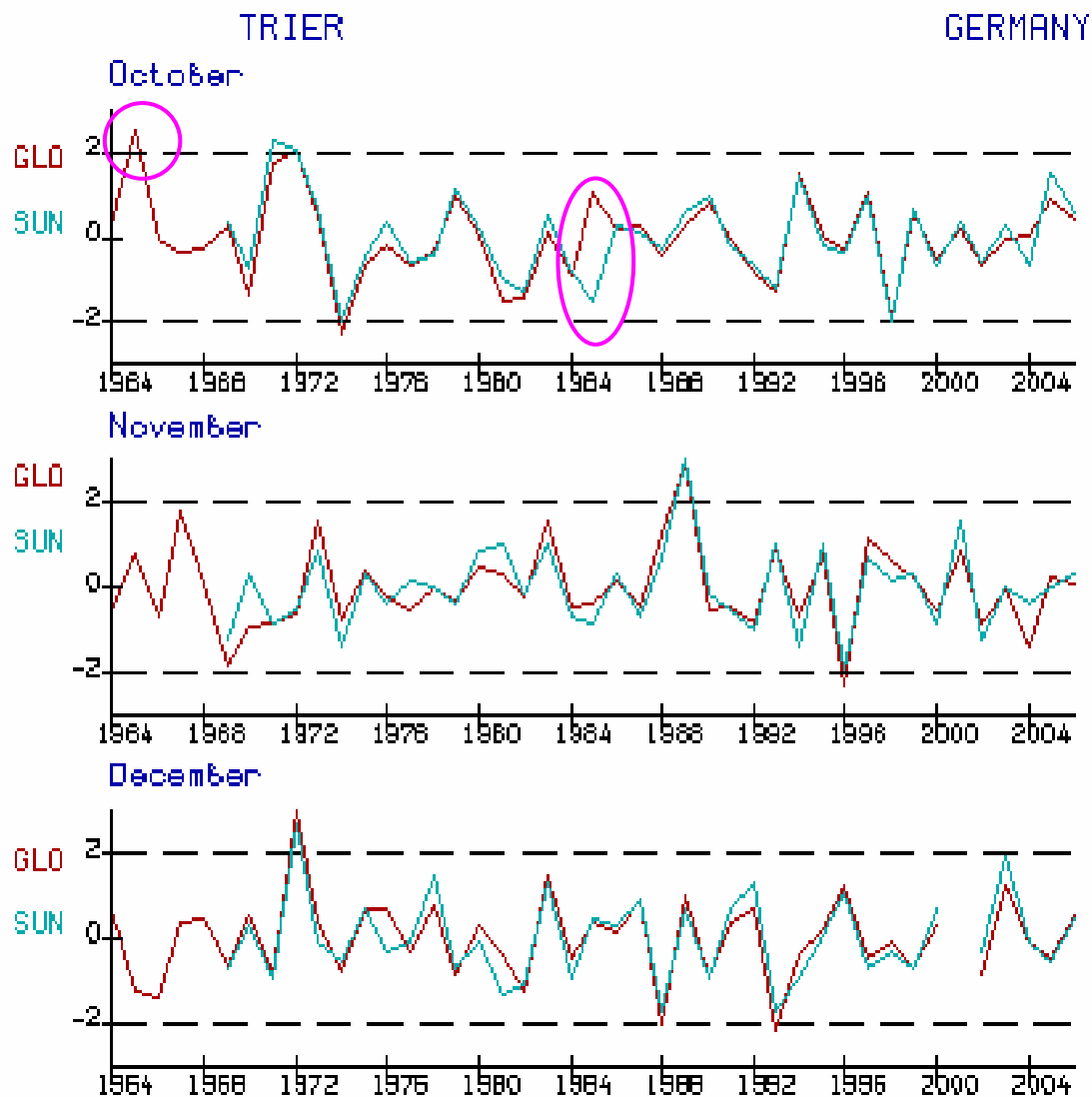
* MANNHEIM

* COBURG

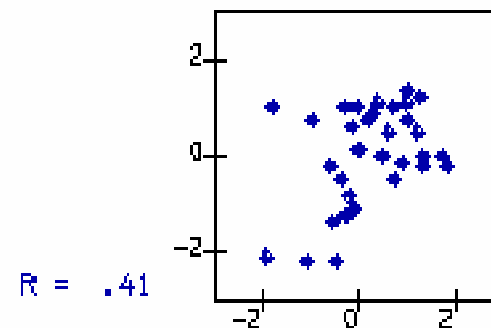
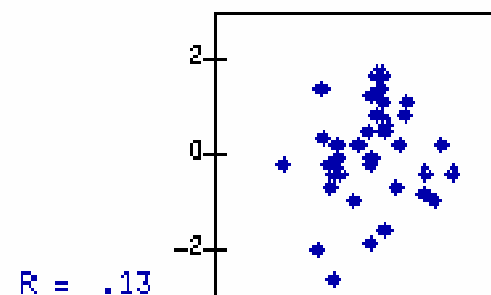
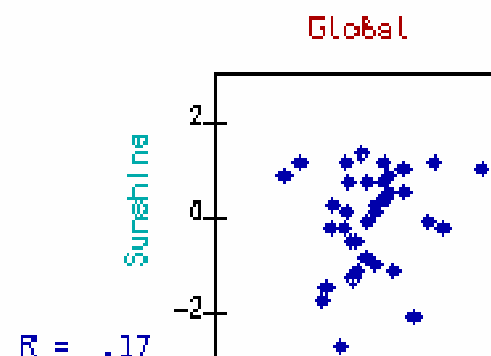
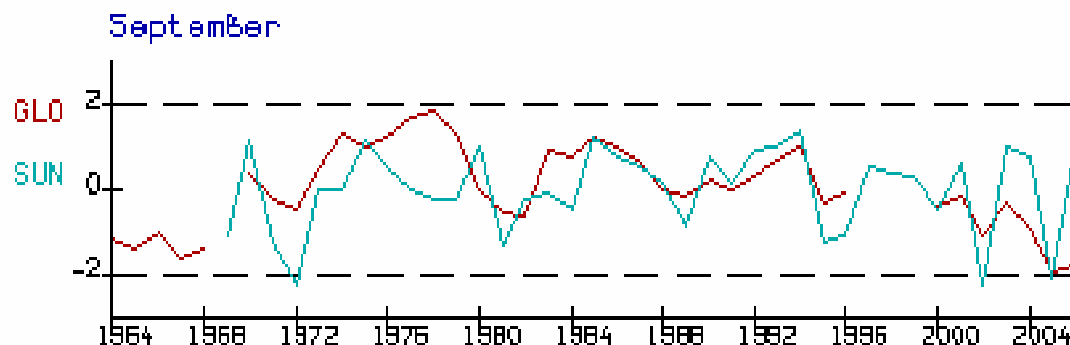
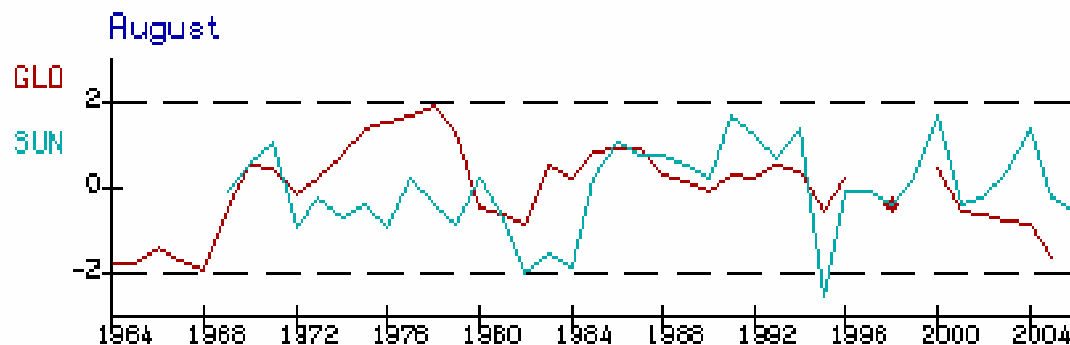
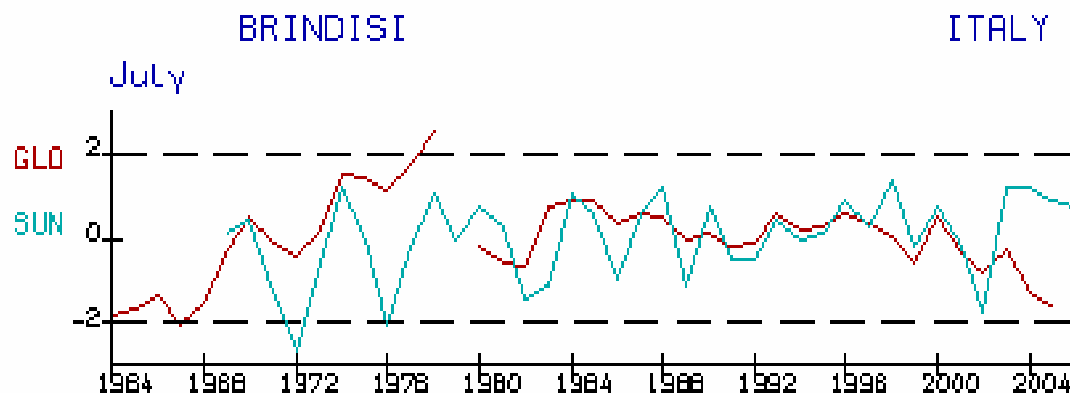
* STUTT GART

* NUERNBERG

Monthly means of global radiation and sunshine duration

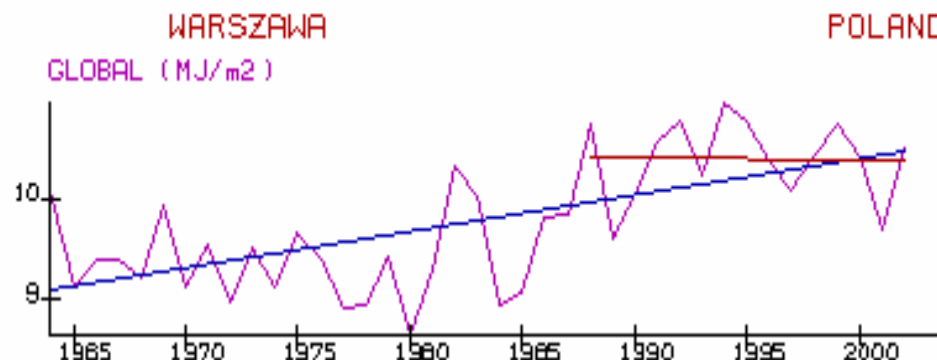


Monthly means of global radiation and sunshine duration





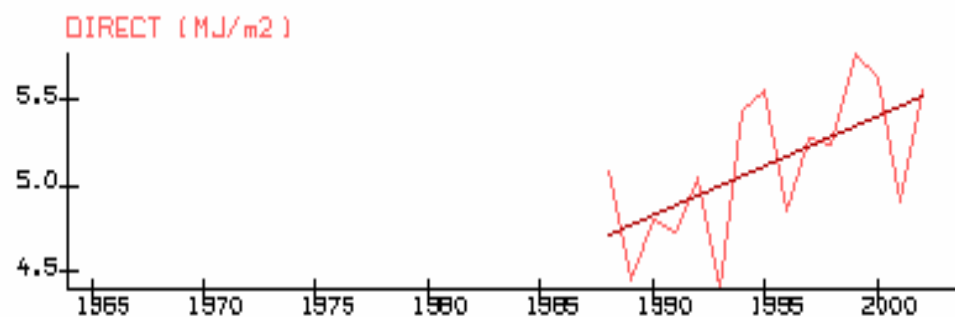
Long-term linear trends



YEAR	
1964-2002	1988-2002
A = 9.05	10.41
B = .04	.00
dX= 3.9	-.2
P = 100	10



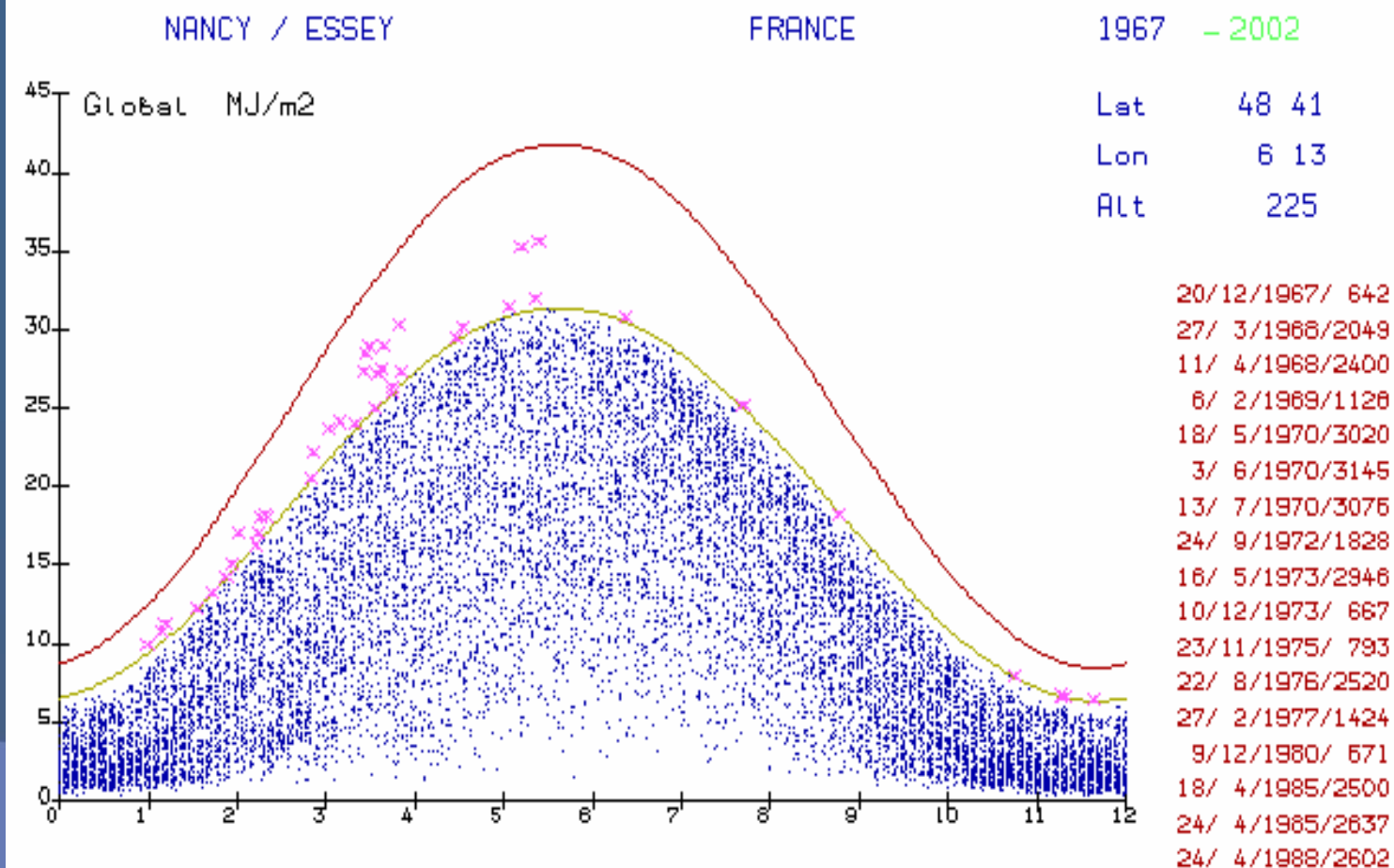
1988-2002
A = 5.75
B = -.06
dX= -9.8
P = 100



1988-2002
A = 4.65
B = .06
dX= 11.5
P = 98

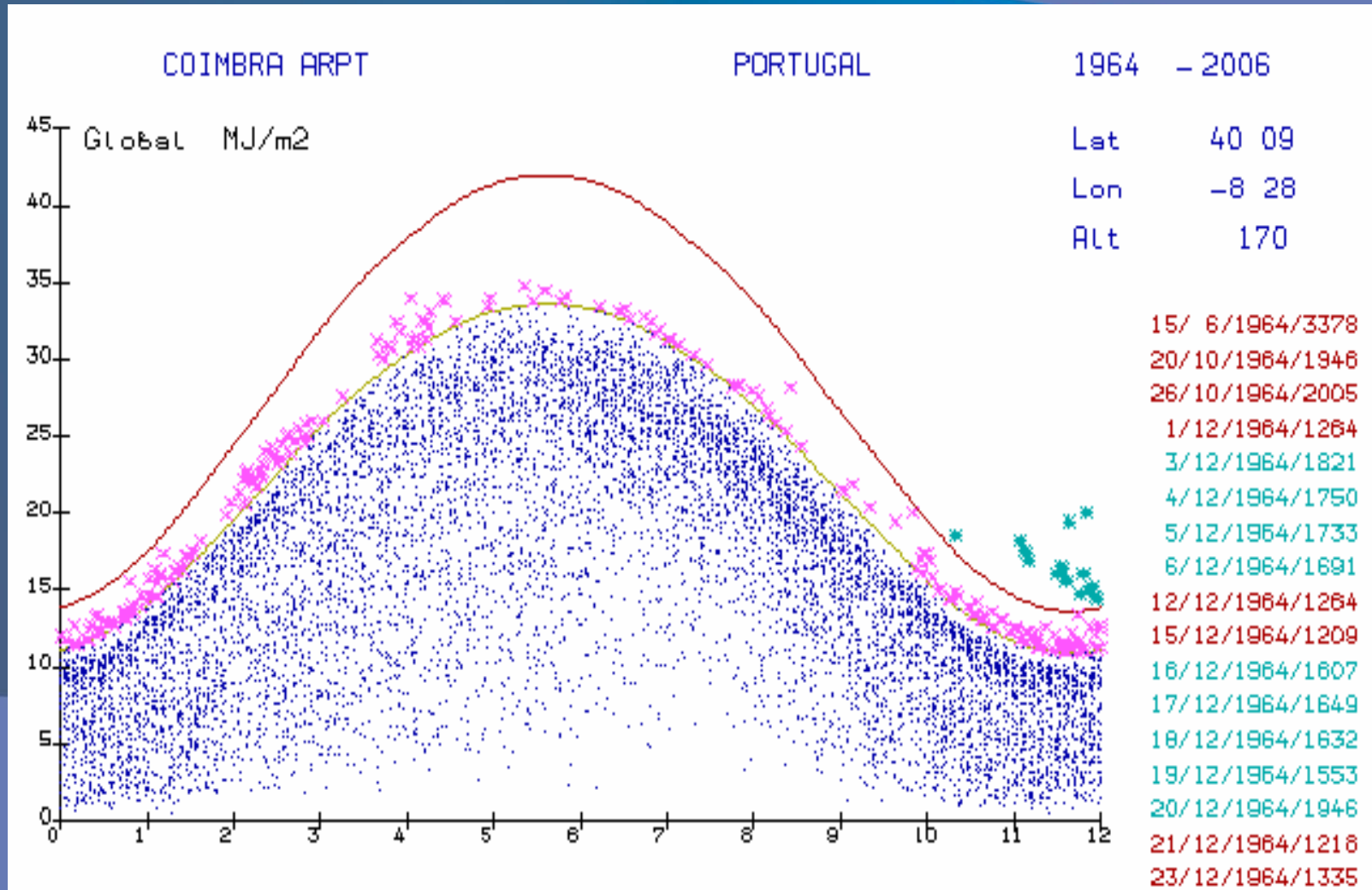


Daily totals of global radiation





Global radiation daily totals

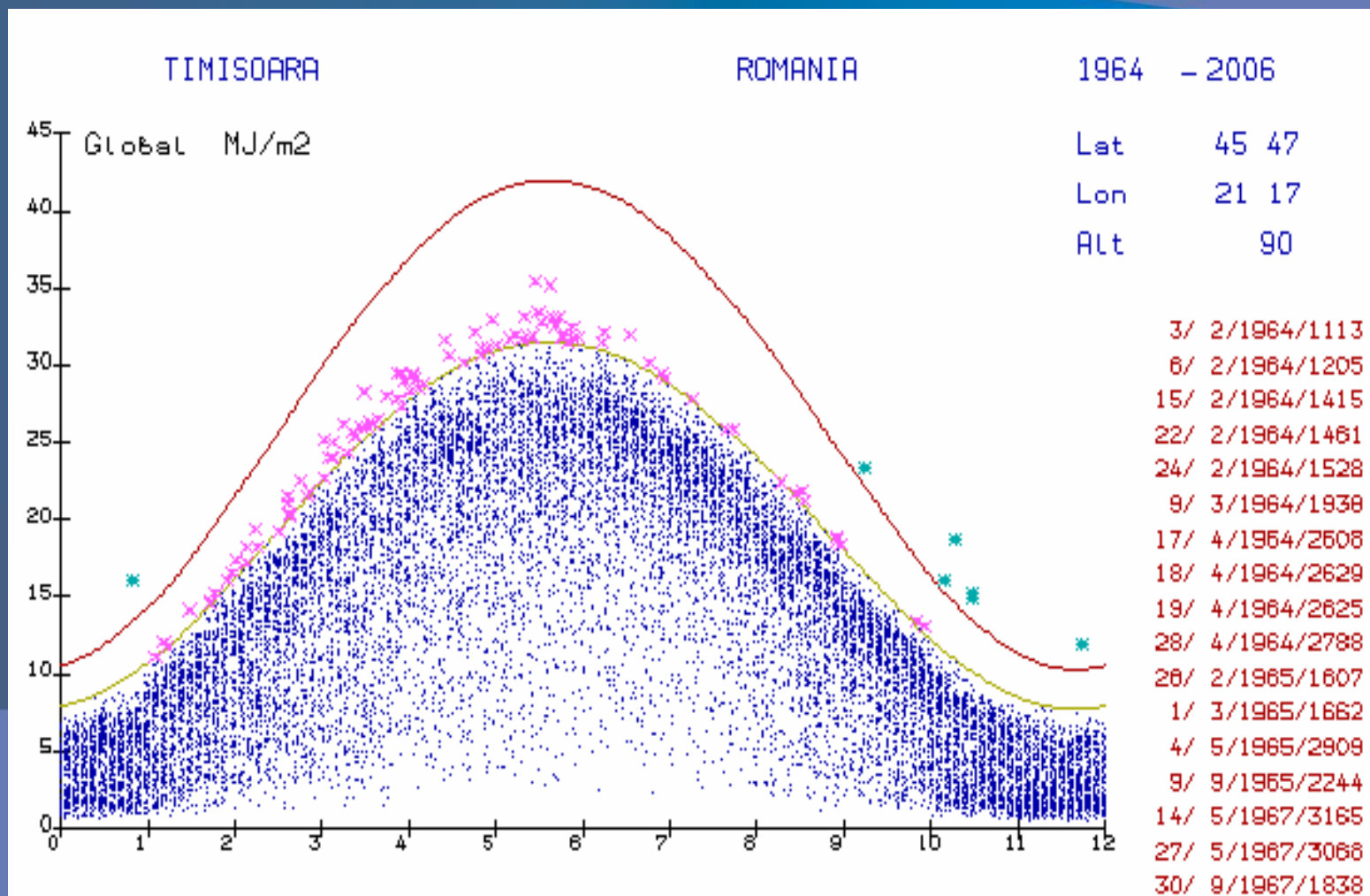


At TOA

95 % Probability Level



Global radiation daily totals

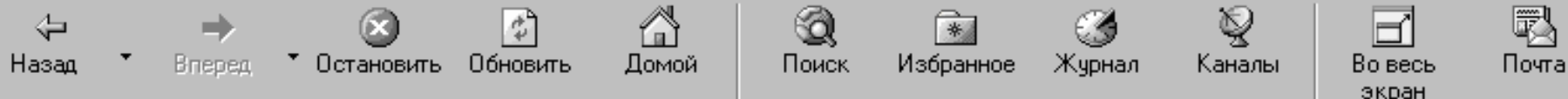




Access to the WRDC data

Options Available:

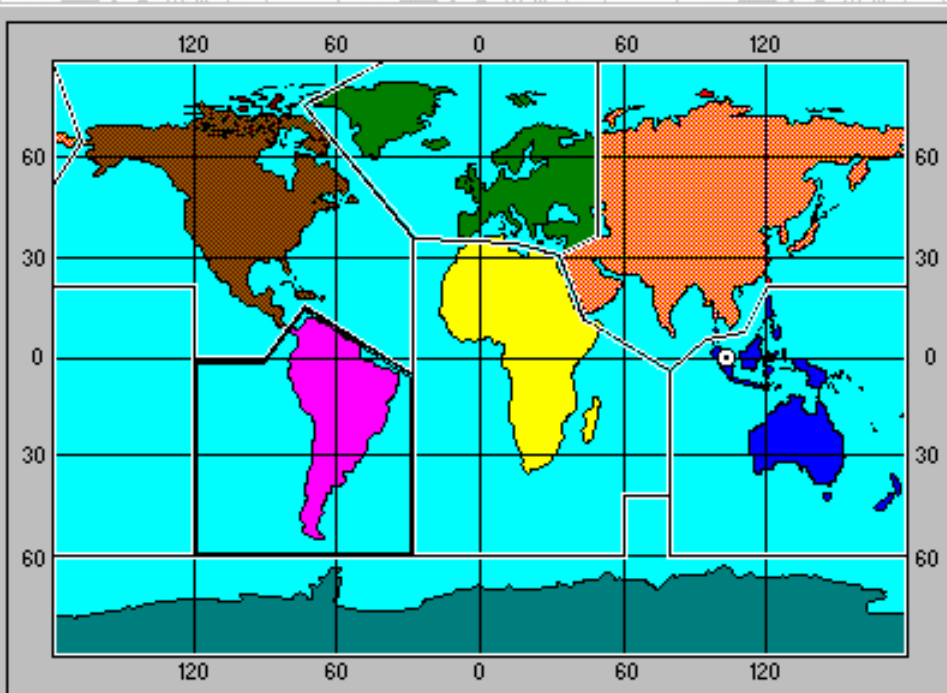
- Graphs of the requested time series for selected station and parameter.
- Tables of raw data and statistics.



Адрес <http://wrdc.mgo.rssi.ru/wrdccgi/protect.exe?wrdc/wrdc.htm>

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Welcome to WRDC database!



Station	SINGAPORE / CHANGI ARPT		
WMO	48698	Elevation	5 m
Longitude	103 59 'E	Latitude	1 22 'N

- S-W PACIFIC**
SINGAPORE
SINGAPORE / CH
- Year 1994**
 - Year 1995
 - Year 1996
 - Year 1997
 - Year 1998
 - Year 1999
 - Year 2000
 - Year 2001
 - Year 2002

◀ ▶

Show non-active

http://wrdc.mgo.rssi.ru/graphic_eng.htm - Microsoft Internet Explorer

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Назад Поиск Избранное

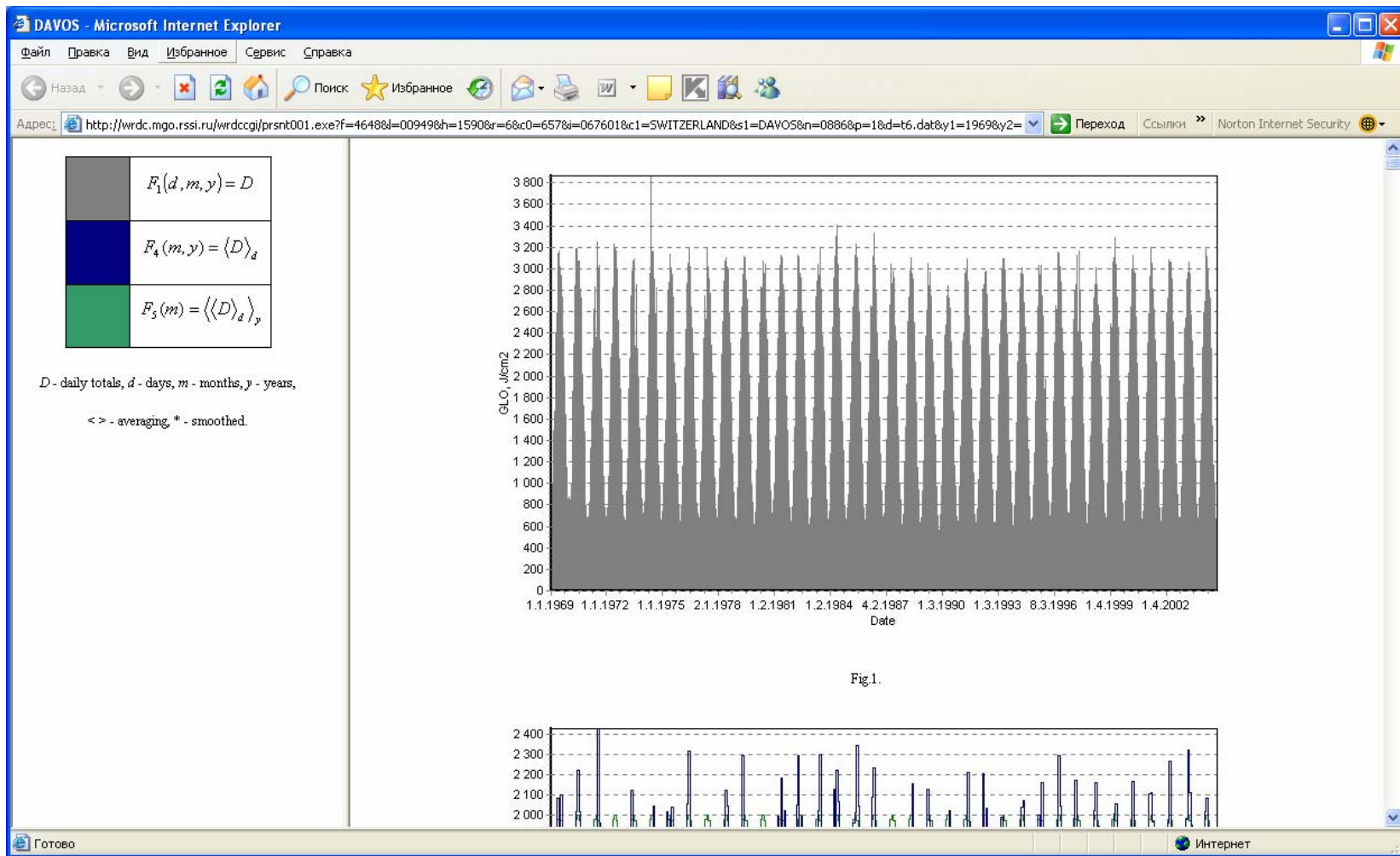
Адрес: http://wrdc.mgo.rssi.ru/graphic_eng.htm

Переход Ссылки Norton Internet Security

WRDC

Global Radiation (Africa)	066801 SWITZERLAND	BASEL	TT/MG/	SS/H/	1981	2005	Plot
	066700 SWITZERLAND	ZUERICH / KLOTEN	TT/MG/	SS/H/	1981	2005	Plot
	066800 SWITZERLAND	SAENTIS	TT/MG/	SS/H/	1981	2005	Plot
	066100 SWITZERLAND	PAYERNE	TT/MG/	SS/H/	1981	2005	Plot
Global Radiation (Asia)	067601 SWITZERLAND	DAVOS	TT/MG/	SS/H/	1969	2005	Plot
	067300 SWITZERLAND	JUNGFRAUJOCH	TT/MG/	SS/H/	1981	2005	Plot
	067020 SWITZERLAND	LA DOLE	TT/MG/	SS/H/	1981	2005	Plot
Global Radiation (S. America)	067910 SWITZERLAND	CORVATSCH	TT/MG/	SS/H/	1981	2005	Plot
	067000 SWITZERLAND	GENEVE	TT/MG/	SS/H/	1981	2005	Plot
	067600 SWITZERLAND	LOCARNO - MONTI	TT/MG/	SS/H/	1964	2005	Plot
Global Radiation (N. America)	400391 SYRIA	ALEPPO / MESSELMYEH	TT/E/	+	1971	1979	Plot
	400390 SYRIA	RAQQA	TT/E/	+	1972	1977	Plot
	400392 SYRIA	DOUMA	TT/MG/	+	1964	1967	Plot
	400393 SYRIA	DAMASCUS / KHARABO	TT/E/	+	1971	1974	Plot
Global Radiation (Australia & Oceania)	170622 TURKEY	SAMSUN	TT/MG/	SS/C/	1983	1984	Plot
	170621 TURKEY	ISTANBUL / GEBZE	TT/MG/	SS/C/	1983	1985	Plot
	171300 TURKEY	ANKARA	TT/MG/	SS/C/	1983	1984	Plot
	172200 TURKEY	IZMIR	TT/MG/	SS/C/	1983	1983	Plot
	172800 TURKEY	DIYARBAKIR	TT/MG/	SS/C/	1983	1983	Plot

Интернет



DAVOS - Microsoft Internet Explorer

Файл Правка Вид Избранное Сервис Справка

Назад Поиск Избранное

Адрес: <http://wrdc.mgo.rssi.ru/wrdccgi/prsnt001.exe?f=4648&l=00949&h=1590&r=6&c0=657&i=067601&c1=SWITZERLAND&s1=DAVO5&n=0886&p=1&d=t6.dat&y1=1969&y2=> Переход Ссылки Norton Internet Security

	$F_1(d, m, y) = D$
	$F_4(m, y) = \langle D \rangle_d$
	$F_5(m) = \langle \langle D \rangle_d \rangle_y$

D - daily totals, d - days, m - months, y - years,
 $\langle \rangle$ - averaging, * - smoothed.

Fig.2.
 DAVOS (SWITZERLAND), 1969 - 2005
 Global radiation

Fig.1. $F_1(d,m,y)$. Fig.2. All curves except $F_1(d,m,y)$.

1969, January

Day	Value	Quality
1	514	0
2	322	0
3	389	0
4	640	0
5	628	0
6	623	0
7	640	0
8	460	0
9	519	1
10	682	0
11	372	0
12	527	0
13	581	0
14	372	0

Готово Интернет

DAVOS - Microsoft Internet Explorer

Файл Правка Вид Избранное Сервис Справка

Назад Поиск Избранное

Адрес: <http://wrdc.mgo.rssi.ru/wrdccgi/prsnt001.exe?f=4648&l=00949&h=1590&r=6&c0=657&l=067601&c1=SWITZERLAND&s1=DAVOS&n=0886&p=1&d=t6.dat&y1=1969&y2=> [Переход](#) Ссылки Norton Internet Security

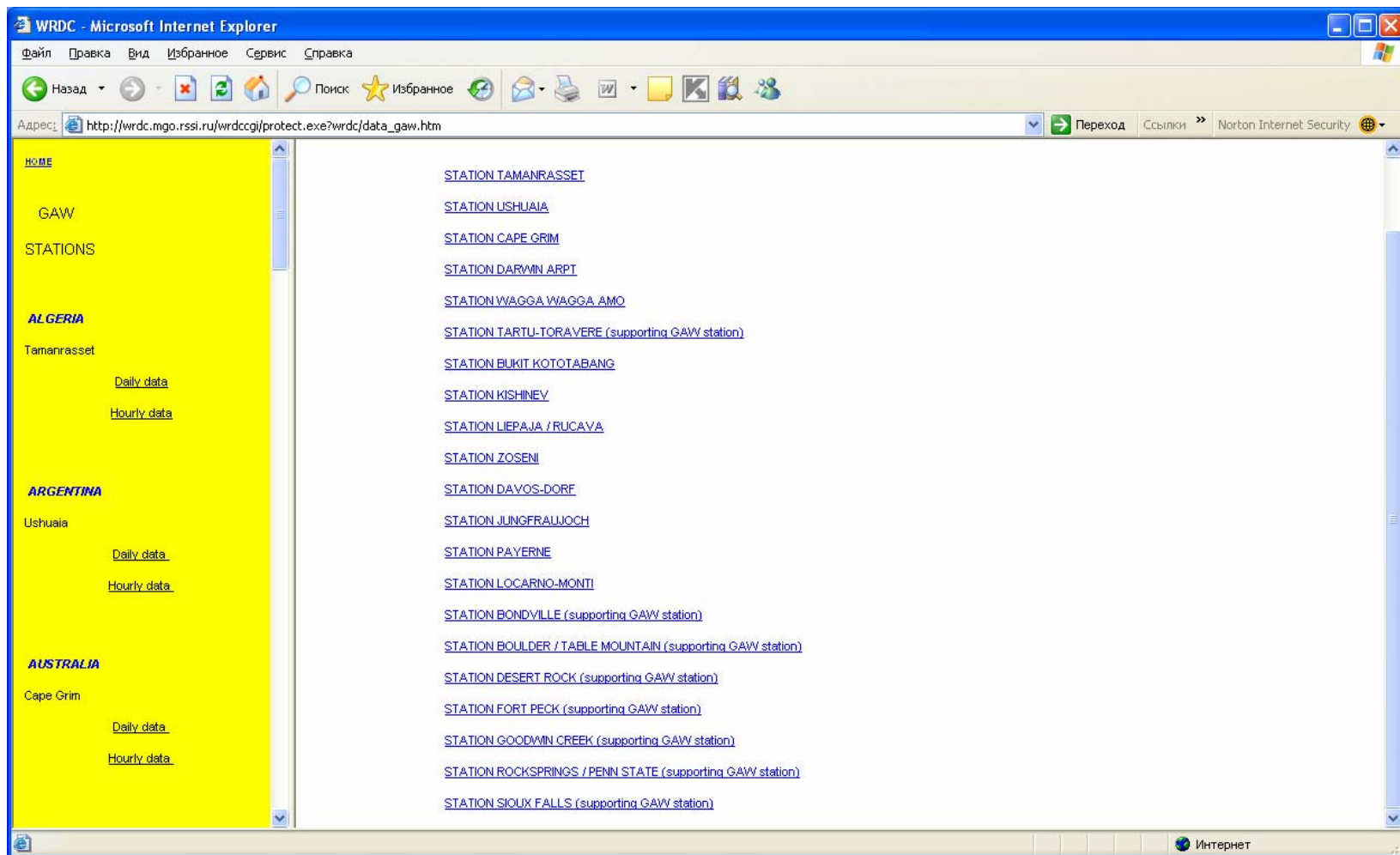
	$F_1(d, m, y) = D$
	$F_4(m, y) = \langle D \rangle_d$
	$F_5(m) = \langle \langle D \rangle_d \rangle_y$

D - daily totals, *d* - days, *m* - months, *y* - years,
<> - averaging, * - smoothed.

2004, December

Day	Value	Quality
1	553	0
2	288	0
3	658	0
4	621	0
5	524	0
6	664	0
7	622	0
8	563	0
9	600	0
10	614	0
11	627	0
12	625	0
13	623	0
14	623	0
15	511	0
16	492	0
17	347	0
18	206	0
19	323	0
20	715	0
21	669	0
22	640	0
23	439	0
24	694	0
25	495	0

Готово Интернет



WRDC - Microsoft Internet Explorer

Файл Правка Вид Избранное Сервис Справка

Назад Поиск Избранное

Адрес: http://wrdc.mgo.rssi.ru/wrdccgi/protect.exe?wrdc/data_gaw.htm Переход Ссылки Norton Internet Security

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[STATION DESERT ROCK \(supporting GAW station\)](#)

[STATION FORT PECK \(supporting GAW station\)](#)

[STATION GOODWIN CREEK \(supporting GAW station\)](#)

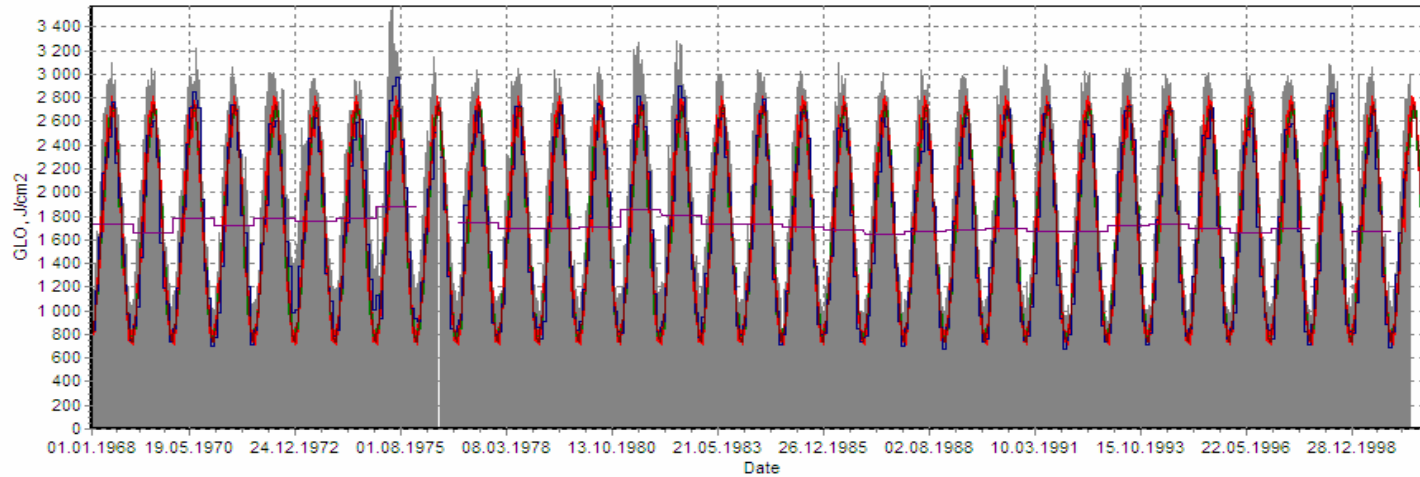
[STATION ROCKSPRINGS / PENN STATE \(supporting GAW station\)](#)

[STATION SIOUX FALLS \(supporting GAW station\)](#)

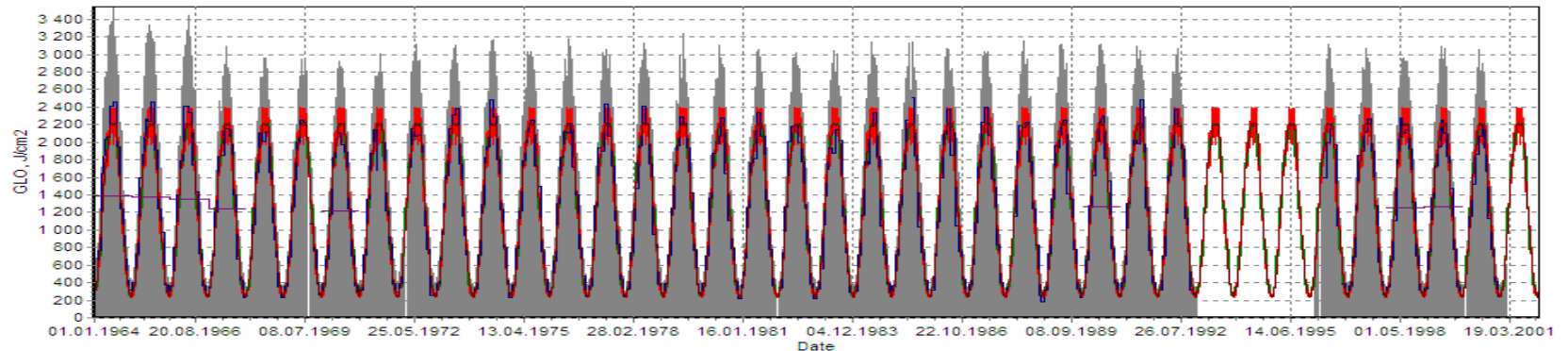
Интернет

Some daily values of global radiation (grey colour), annual means (violet colour) seasonal variation (red colour).

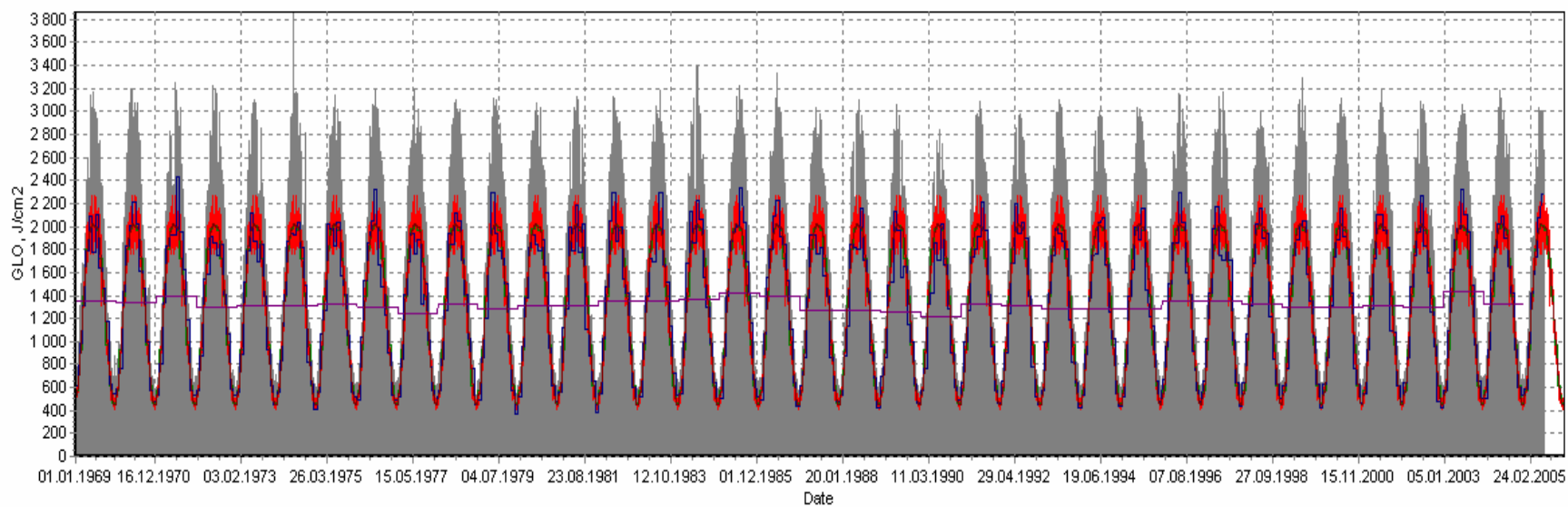
SIDI BOU SAID (TUNISIA), 1968 - 2000
Global Radiation



EDMONTON / STONY PLAIN (CANADA), 1964 - 2001
Global Radiation



DAVOS (SWITZERLAND), 1969 - 2005 Global Radiation

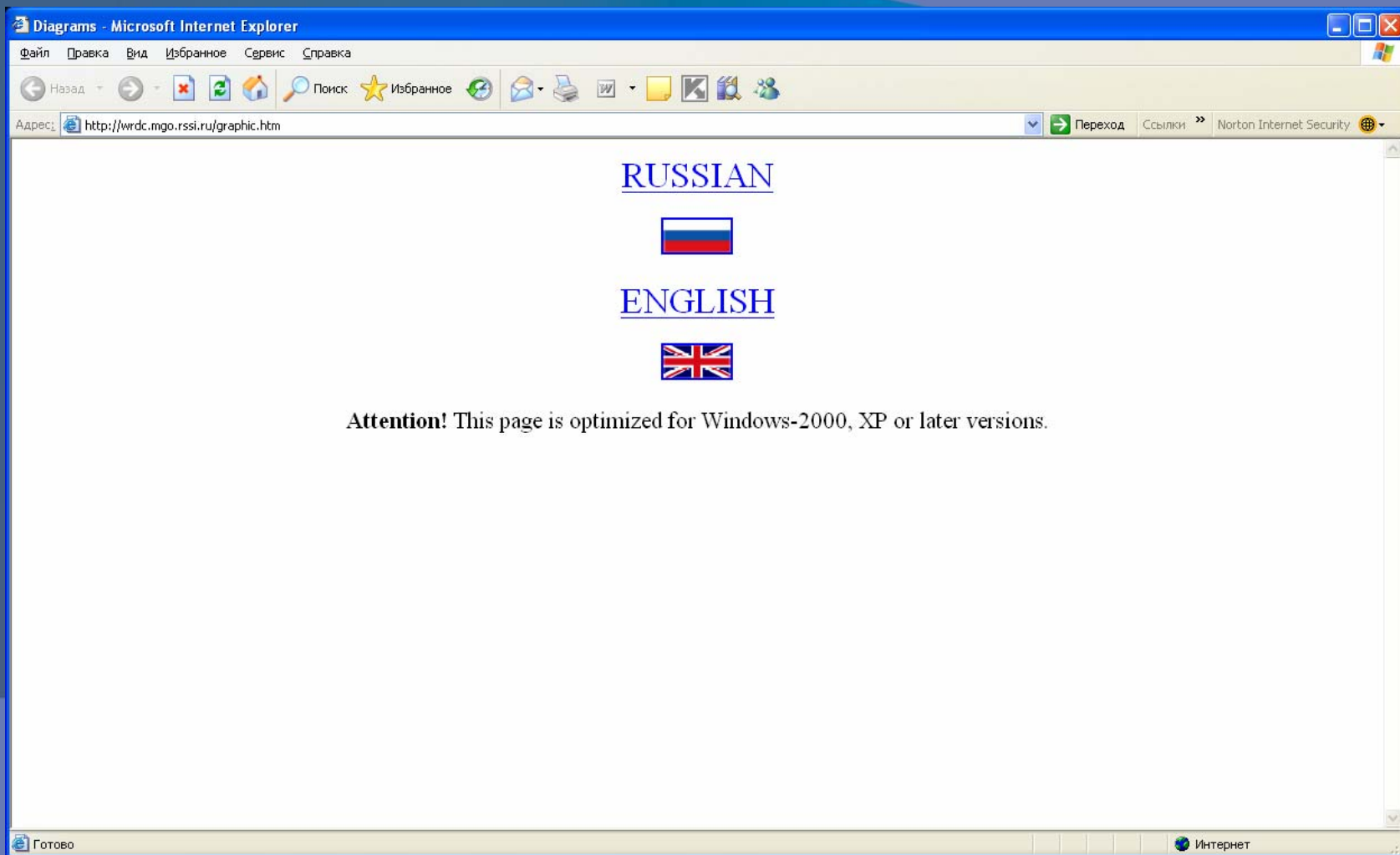


Временной ход суточных сумм

File Curve Plot Table Options Description About

Fig. 1 Table 1 Fig. 2 Table 2 Fig. 3 Table 3 Fig. 4 Table 4 Fig. 5 Table 5

Date	D	<D>y	<D>d	<<D>d>y	<D>d,m	<D>*y
01.01.1969	514	480	571	616	1347	528,79
02.01.1969	322	448	571	616	1347	528,91
03.01.1969	389	502	571	616	1347	529,26
04.01.1969	640	476	571	616	1347	529,86
05.01.1969	628	515	571	616	1347	530,71
06.01.1969	623	470	571	616	1347	531,82
07.01.1969	640	507	571	616	1347	533,20
08.01.1969	460	541	571	616	1347	534,86
09.01.1969	519	528	571	616	1347	536,83
10.01.1969	682	529	571	616	1347	539,12
11.01.1969	372	524	571	616	1347	541,74
12.01.1969	527	536	571	616	1347	544,73
13.01.1969	581	514	571	616	1347	548,11
14.01.1969	372	604	571	616	1347	551,89
15.01.1969	380	561	571	616	1347	556,10
16.01.1969	510	555	571	616	1347	560,76
17.01.1969	778	582	571	616	1347	565,89
18.01.1969	623	601	571	616	1347	571,52
19.01.1969	477	583	571	616	1347	577,66
20.01.1969	837	555	571	616	1347	584,33
21.01.1969	644	615	571	616	1347	591,55
22.01.1969	682	634	571	616	1347	599,33
23.01.1969	473	596	571	616	1347	607,67
24.01.1969	1004	596	571	616	1347	616,59
25.01.1969	498	623	571	616	1347	626,10
26.01.1969	1000	648	571	616	1347	636,19
27.01.1969	875	616	571	616	1347	646,86
28.01.1969	736	638	571	616	1347	658,11
29.01.1969	854	699	571	616	1347	669,92
30.01.1969	531	679	571	616	1347	682,29
31.01.1969	929	737	571	616	1347	695,20
01.02.1969	954	800	926	984	1347	708,63
02.02.1969	699	719	926	984	1347	722,56
03.02.1969	908	781	926	984	1347	736,97
04.02.1969	736	789	926	984	1347	751,82
05.02.1969	741	778	926	984	1347	767,08
06.02.1969	1109	746	926	984	1347	782,73
07.02.1969	1235	800	926	984	1347	798,73
08.02.1969	761	752	926	984	1347	815,04





http://wrdc.mgo.rssi.ru/graphic_eng.htm - Microsoft Internet Explorer

Файл Правка Вид Избранное Сервис Справка

Назад Поиск Избранное

Адрес: http://wrdc.mgo.rssi.ru/graphic_eng.htm

Переход Ссылки Norton Internet Security

WRDC

- [Global Radiation \(Africa\)](#)
- [Global Radiation \(Asia\)](#)
- [Global Radiation \(S. America\)](#)
- [Global Radiation \(N. America\)](#)
- [Global Radiation \(Australia & Oceania\)](#)
- [Global Radiation \(Europe\)](#)
- [Global Radiation \(Antarctica\)](#)
- [Diffuse Radiation \(all continents\)](#)

Готово Интернет



http://wrdc.mgo.rssi.ru/graphic_eng.htm - Microsoft Internet Explorer

Файл Правка Вид Избранное Сервис Справка

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[Global Radiation \(Africa\)](#)

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[Global Radiation \(Australia & Oceania\)](#)

[Global Radiation \(Europe\)](#)

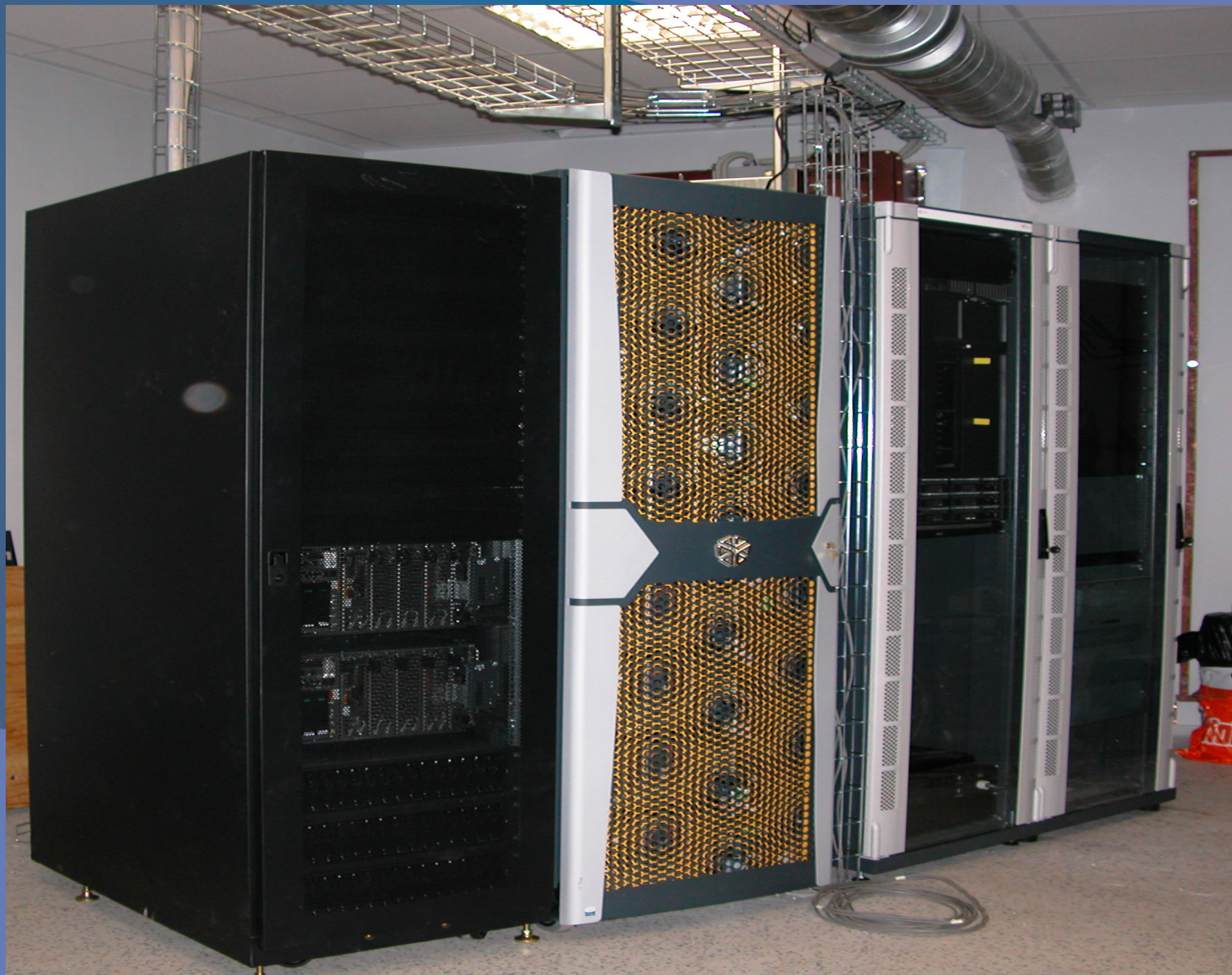
[Global Radiation \(Antarctica\)](#)

[Diffuse Radiation \(all continents\)](#)

Global radiation. Daily totals, monthly means and totals (Europe).

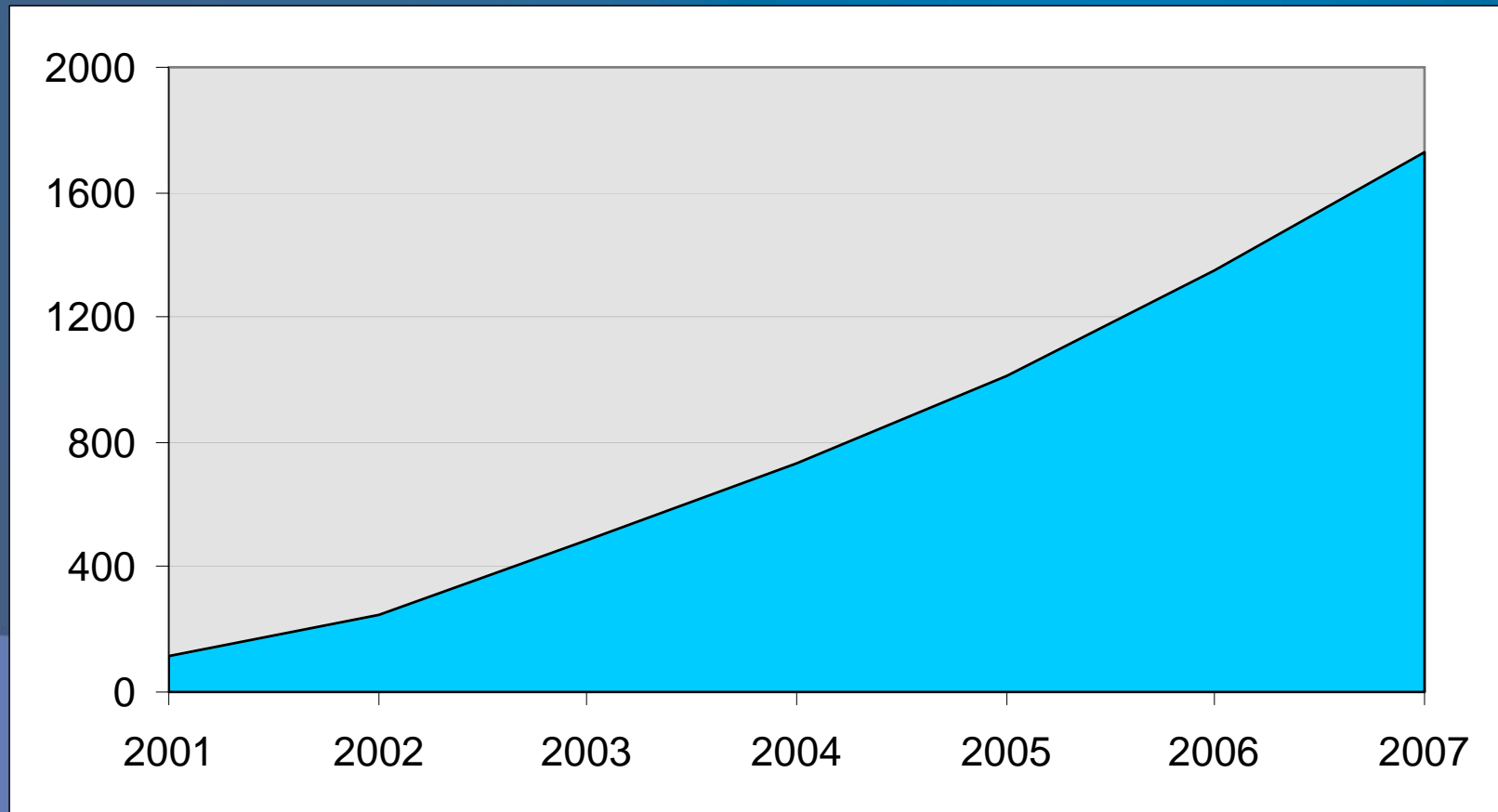
110351 AUSTRIA	OBERSIEBENBRUNN
110350 AUSTRIA	WIEN / HOHE WARTE
110370 AUSTRIA	GROSSENZERSDORF
110352 AUSTRIA	STEUR
110353 AUSTRIA	LUNZ AM SEE
111550 AUSTRIA	FEUERKOGEL
113500 AUSTRIA	SALZBURG/FREISAAL
111501 AUSTRIA	KRIPPENSTEIN
111850 AUSTRIA	MOENICHKIRCHEN
111010 AUSTRIA	BREGENZ
111503 AUSTRIA	FUSSACH
111050 AUSTRIA	FELDKIRCH
111200 AUSTRIA	INNSBRUCK ARPT
112900 AUSTRIA	GRAZ UNIV.
113430 AUSTRIA	SONNBLICK
112310 AUSTRIA	KLAGENFURT

Готово Интернет





Number of Remote Users of WRDC Server



All registered between Sept. 2001 г. up to Dec. 2007 - **1729**

**Operations related to
GAW/BSRN**



by QA/SAC Switzerland

GAWSYS

STATION INFORMATION SYSTEM

- Find Information
- Edit/Add Information
- Provide Feed-back



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QuickFind

Stations by Country

Individual Station Report

Contact Information

GO!

Clear

GAW World Data Centres

[WDCGG \(Gases\)](#)

[WRDC \(Radiation\)](#)

[WOUDC \(Ozone/UV\)](#)

[WDCA \(Aerosols/AOD\)](#)

[WDCPC \(Precipitation\)](#)

GoogleEarth Port



Run [gaw.kml](#) for GoogleEarth access to GAWSYS!

What's New

2007-10-19 Under >Edit/Add Information<, GAWSYS users can chose **Bibliographic References** and provide a list of references to scientific ppapers, technical reports, etc.

2007-08-15 The WDCGG database has been re-organized. The links from GAWSYS to WDCGG still point to the old database, but will be updated ASAP. We are sorry for the

Select by Station type

- Global Regional Contributing

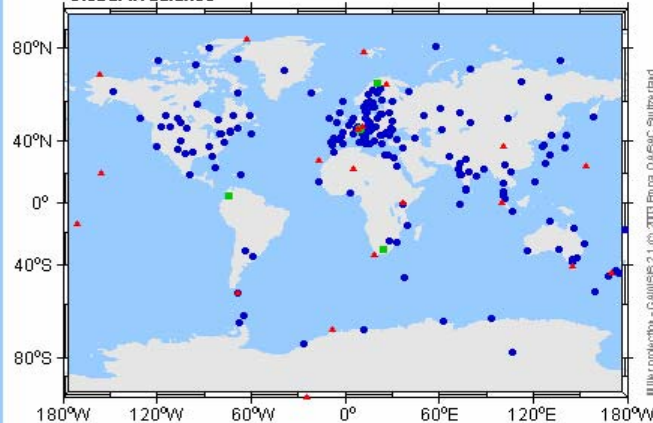
Select by Parameter

- +
Refresh
Reset



[Solar Radiation]
Global irradiance

18-Jan-2008



● GAW Regional Station ■ Contributing Station ▲ GAW Global Station



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Data Series Details

Last update: 2005-03-09/0

Station	Sodankylä
Parameter	Diffuse irradiance
Platform Height (m)	
Inlet	
Analytical Method	Pyranometer (global broadband)
Method Details	
Data Series Start	
Data Series End	
Data Type	
Time Resolution	
Data Submission Start	1991-01-01
Data Submission End	2002-12-01
Comments	

Measurement Leader

Instrument History not available

References

Sorry, there are currently no bibliographic references available.



QA/SAC Switzerland is hosted by the Swiss Federal Laboratories for Materials Testing and Research (EMPA), Dübendorf, Switzerland. Funding provided by MeteoSwiss is greatly acknowledged.





Literature

- Guidelines on the Quality Control of Data from the World Radiometric Network. Leningrad, 1987. WCDP-3, WMO/TD-No. 258.



**THE
END**