Sunspot Observations at the Kanzelhöhe Observatory

W. Pötzi, KSO


Gerlitzen (1910m)
Observatory (1524m)
Kanzelhöhe
Tschlein
Treffen am Ossiacher See
Seespitz
Ossiacher See (500m)
Oswaldiberg
94
83
A10
A2
Villach
Bundesstr.
Triester Str.
Bachstr.
Seebacher Allee
Image © 2012 TerraMetrics
Image © 2012 GeoEye
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Bildaufnahmedatum: 10/10/2006
2006
46°37'58,49" N 13°51'09,46" O Höhe 570 m
Sichthöhe 3,73 km

The Observatory is part of the
Institute of Physics
University of Graz

200 km away from the University (2hours)
→ own infrastructure

- Library: room for small meetings (20 persons)
- IT-Center
- Workshops (optical, mechanical and electronic)
- Guesthouse (max 20 persons)

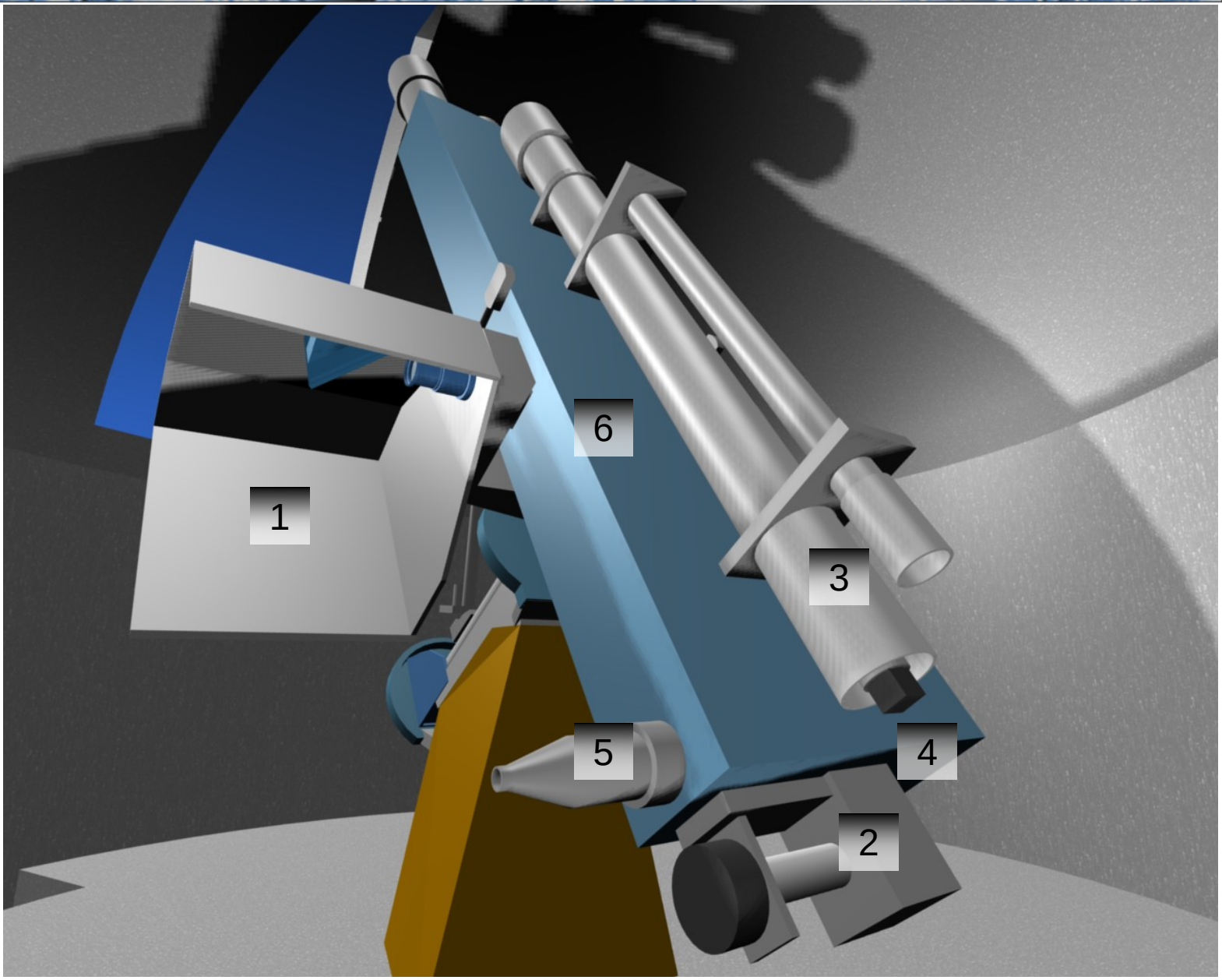
Core-Personel: employed at University

2 Scientists (both observers):
Poetzi (½ until July 2012, paternity leave) – Solar Physics
Baumgartner – Radiation Measurements
1 Technician: Freislich (observer)
1 Housekeeper

2 additional observers: Kienreich (½ position of Poetzi) and Hirtenfellner (external funding - SOTERIA)

The Patrol Instrument

1.Drawing
2.Hα Telescope
3.Whitelight Telescope
4.CaIIK Telescope
5.Hα Eyepiece
6.Guiding Telescope

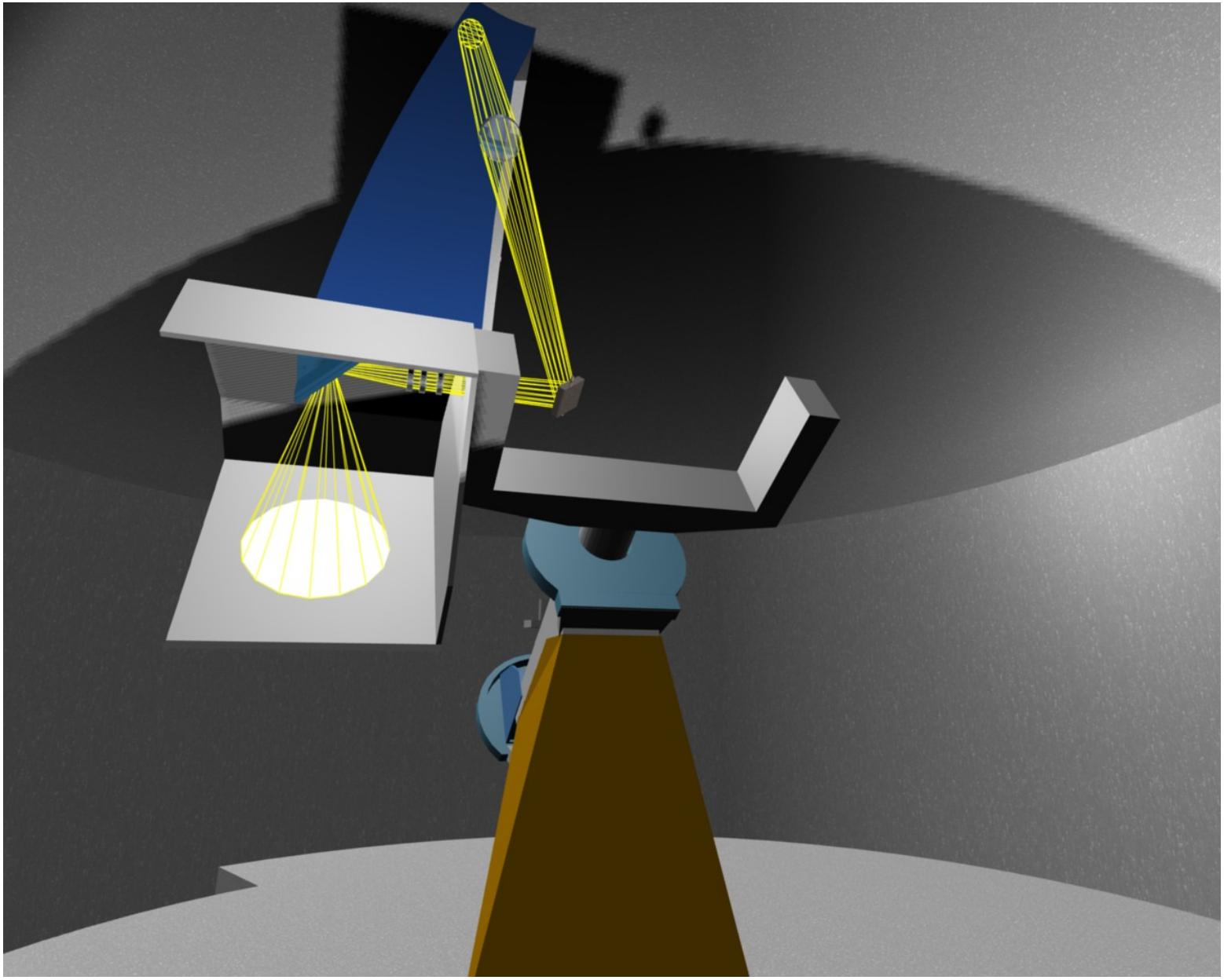


Drawing Device

Focal length: 1650mm
Diameter: 110 mm

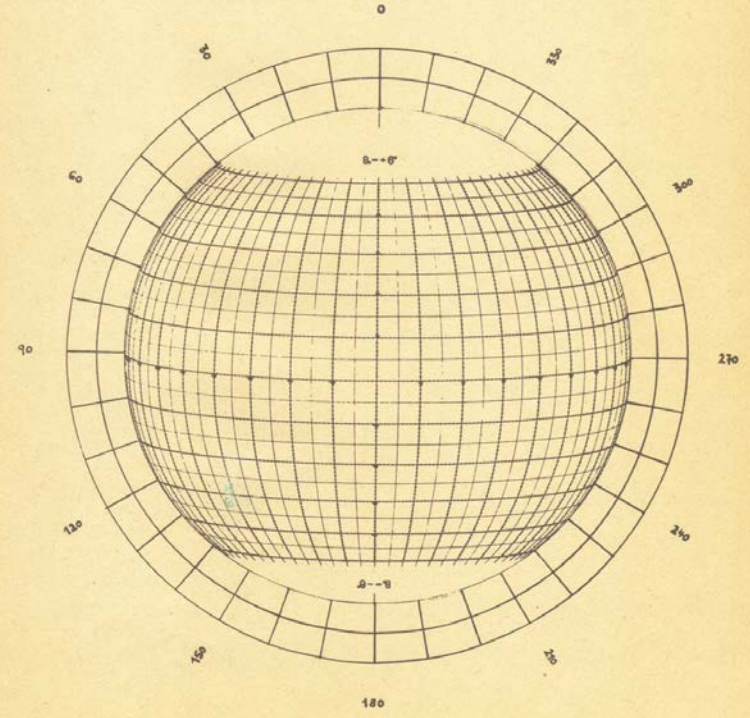
Size of Solar Disc: 250 mm

Due to mirrors the image is side reversed (W is left!)

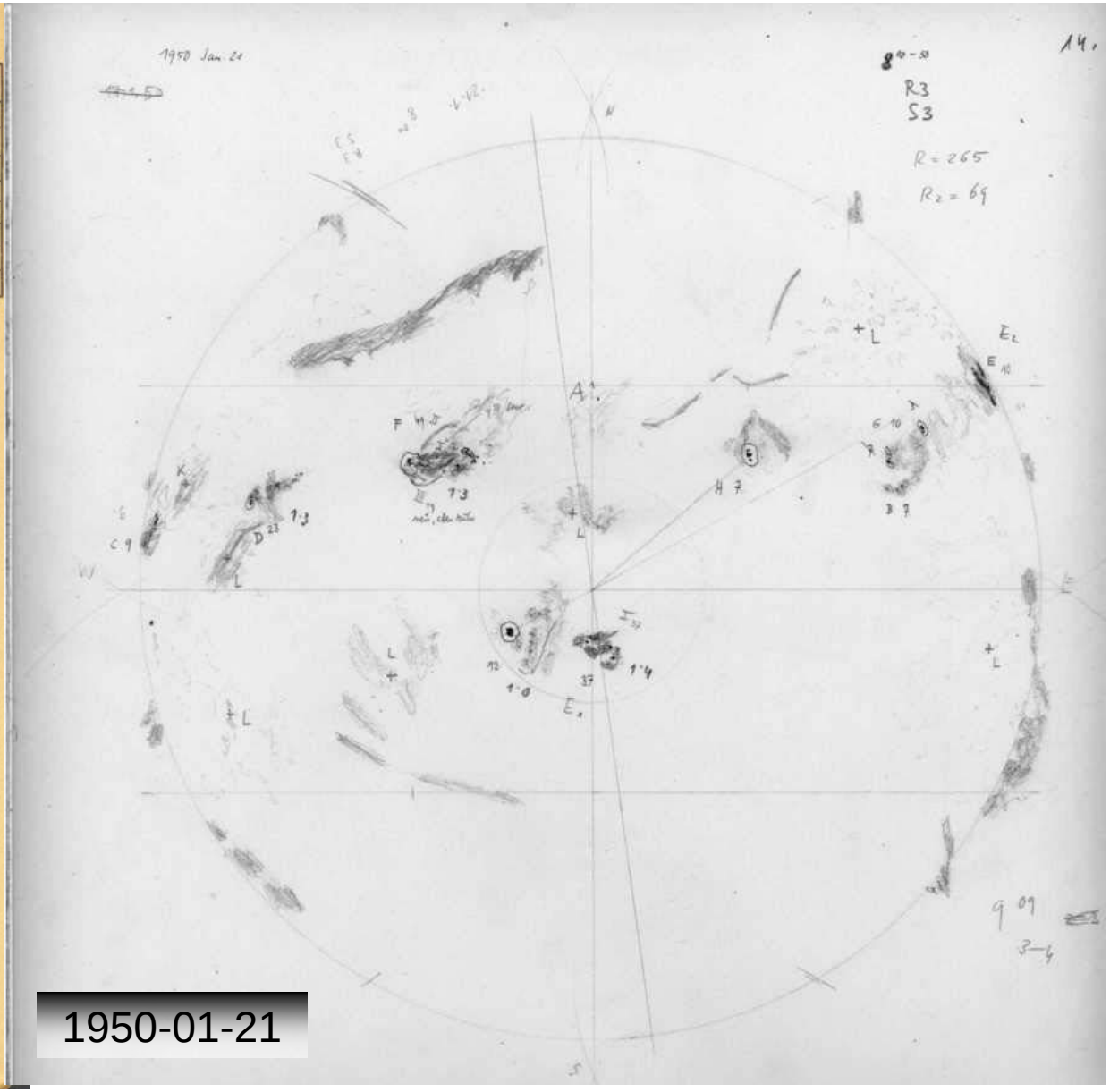


Station: Kanzelhöhe Rot.Nr. 1525 Datum: 14.10.44

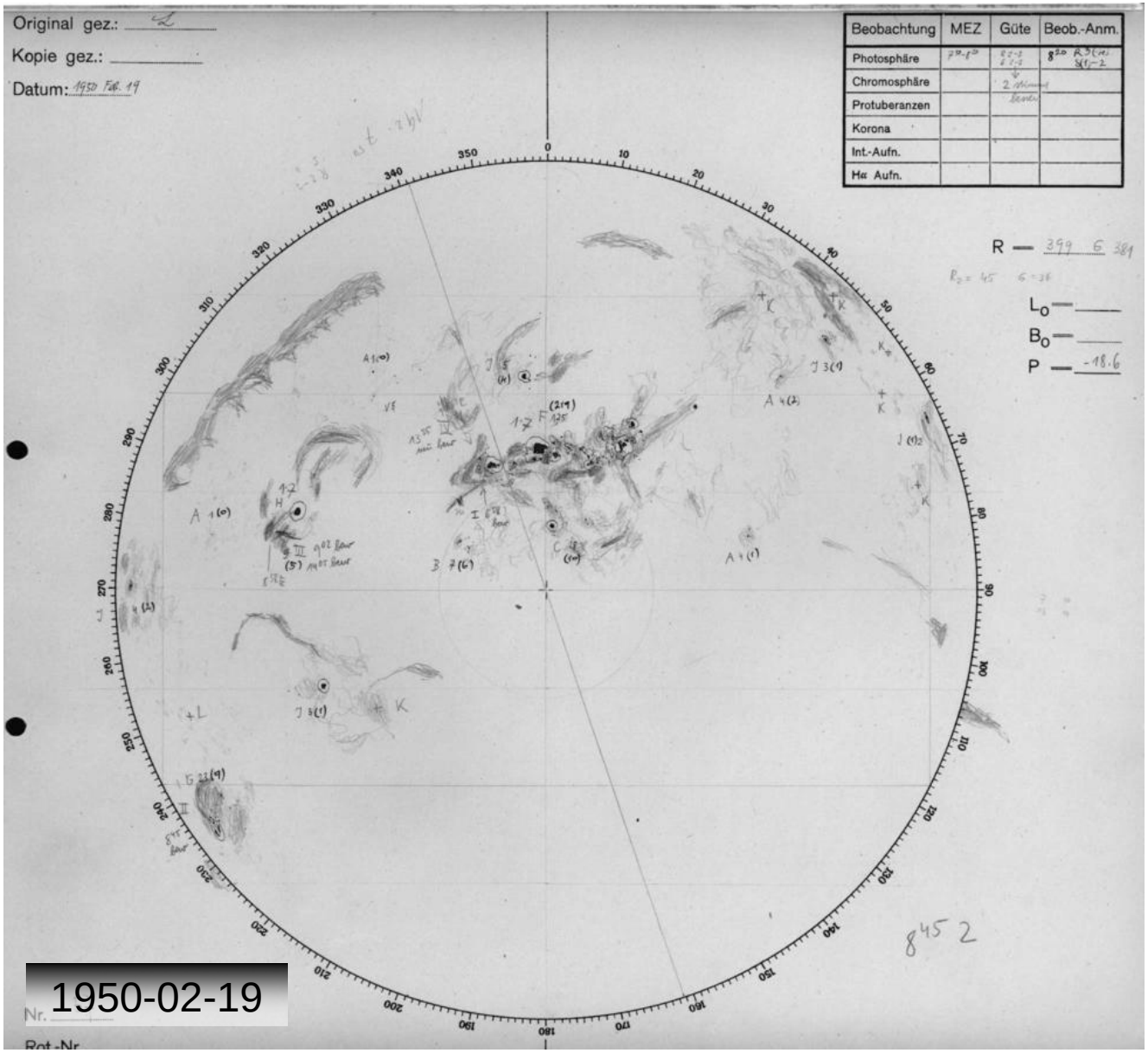
Beobachtungen	Zeit	Güte	Beobachter, Bemerk.	Sonnenmeldung
Photosphäre	$8^{58} - 9^{20}$	3/4	Lauritsch	S1410 0944X
Chromosphäre	$9^{58} - 10^{00}$	4	"	00000 NK10X
Integral-Aufnahme				23442
H_α- Aufnahme				
K - Aufnahme				1530
Protuberanzen H_α				
Korona λ 5303				
Korona λ 6374				



1944-10-14



1950-01-21



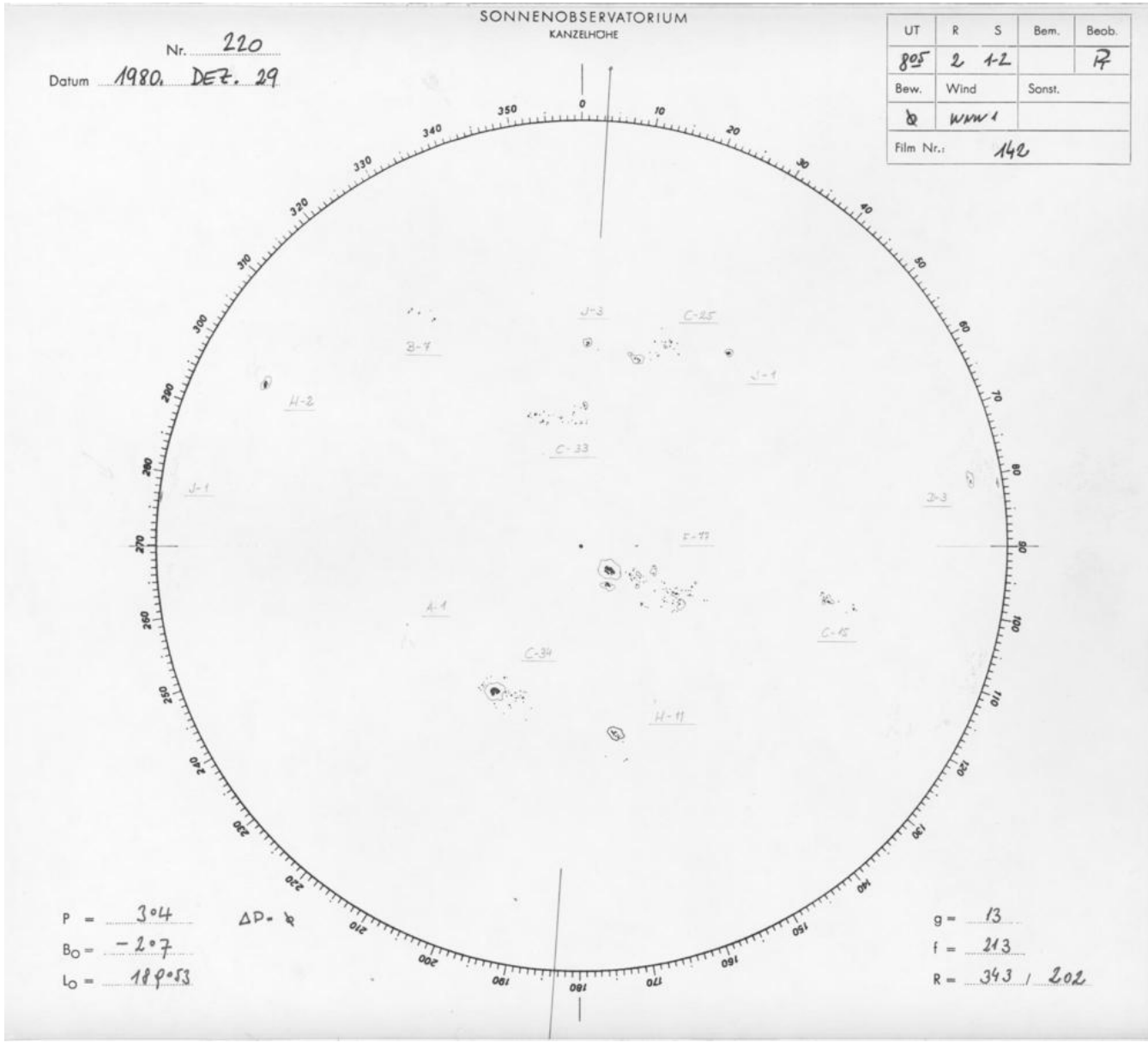
In the beginning photospheric and chromospheric features were drawn: filaments, plages, spots.

The observations have been made on top of the Gerlitzen (1910 m) with a coronagraph (plus additionally mounted teleskopes) and in the observatory with a spectrohelioscope.

The observers lived at the observatory or in the surroundings.

In the beginning of the 60s all observations were transferred to the observatory, the top was to complicated to reach and the observing conditions were not better.

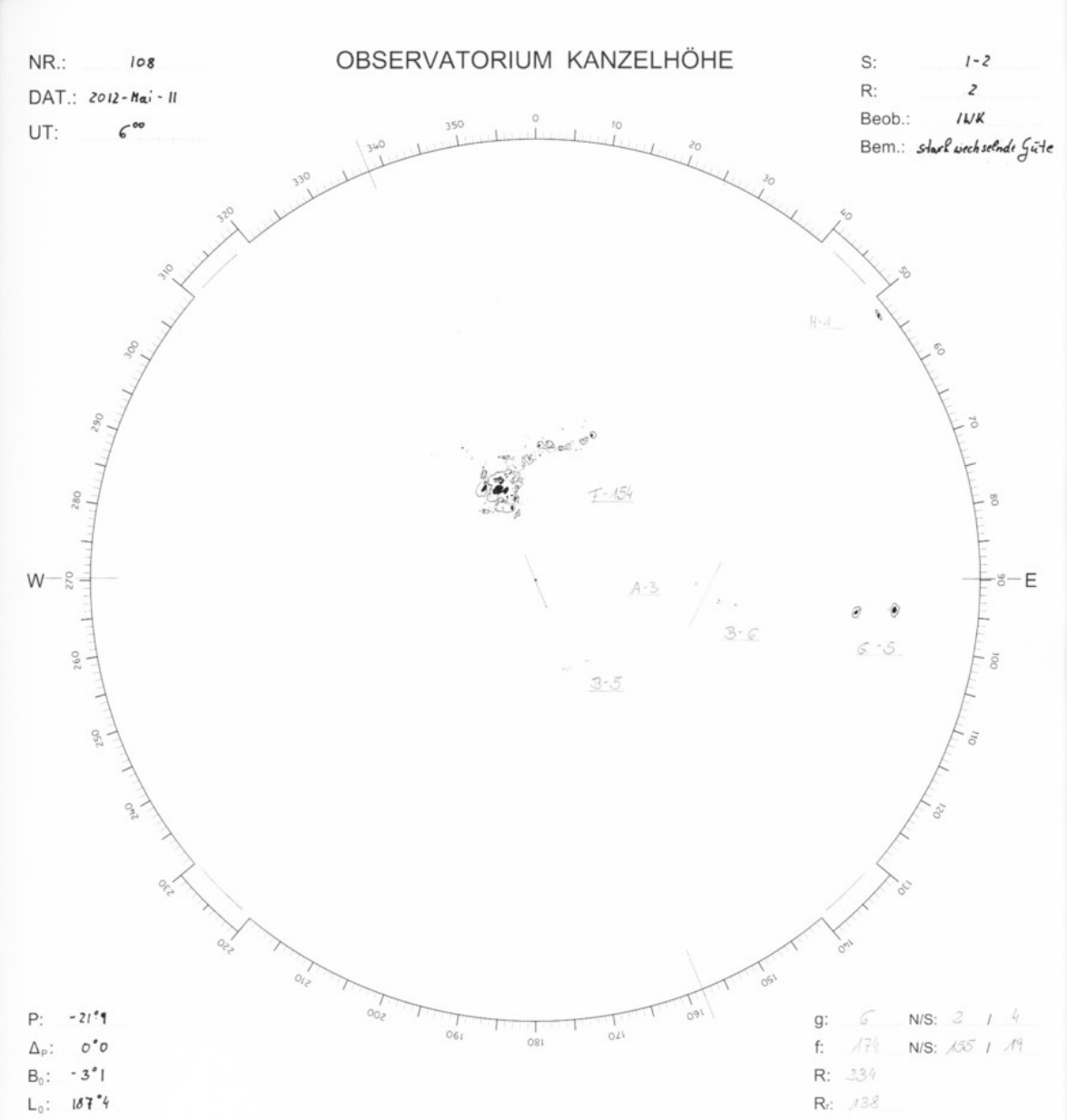
From 1973 on also weather conditions like clouds and wind were published on the drawings.



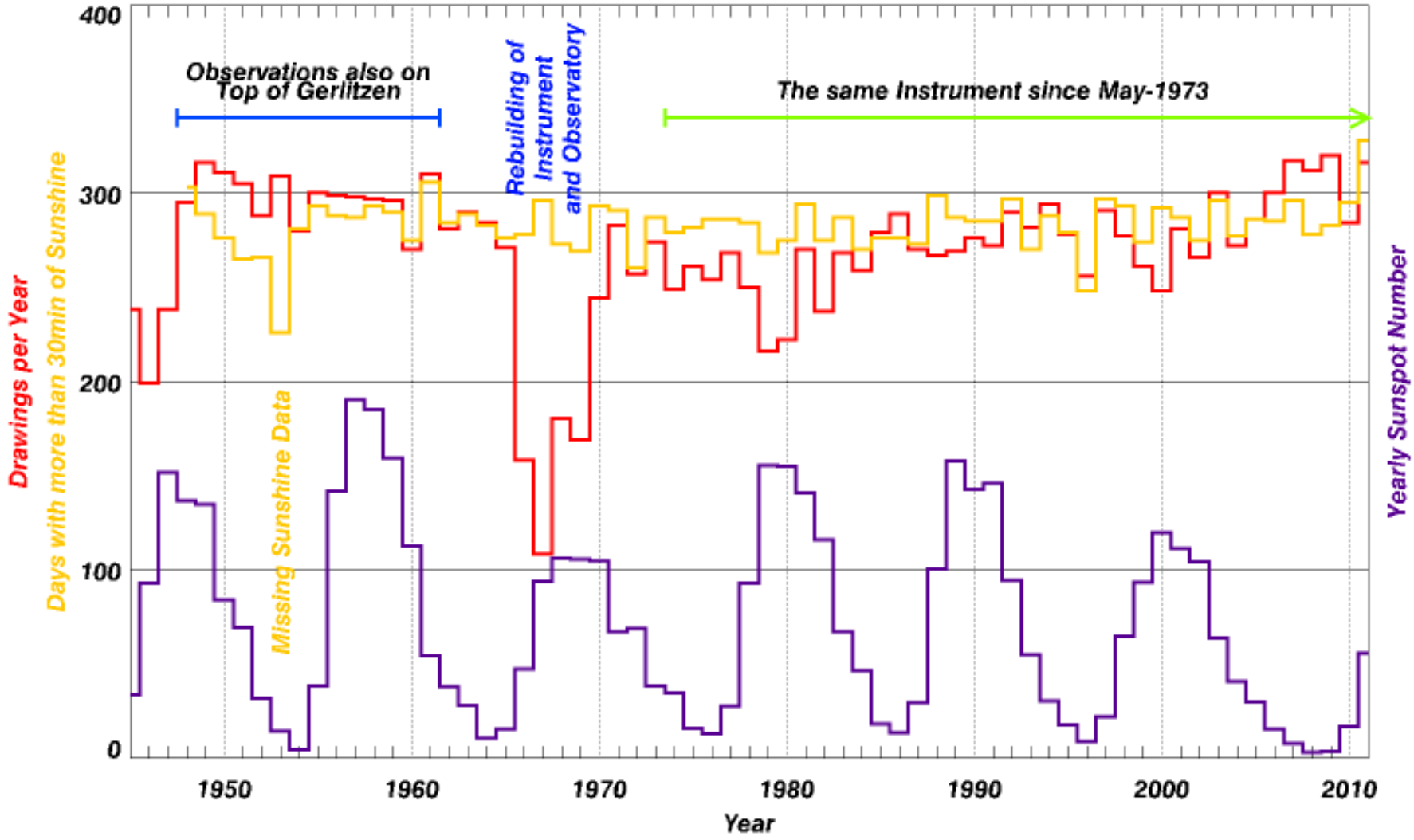
1980-12-29

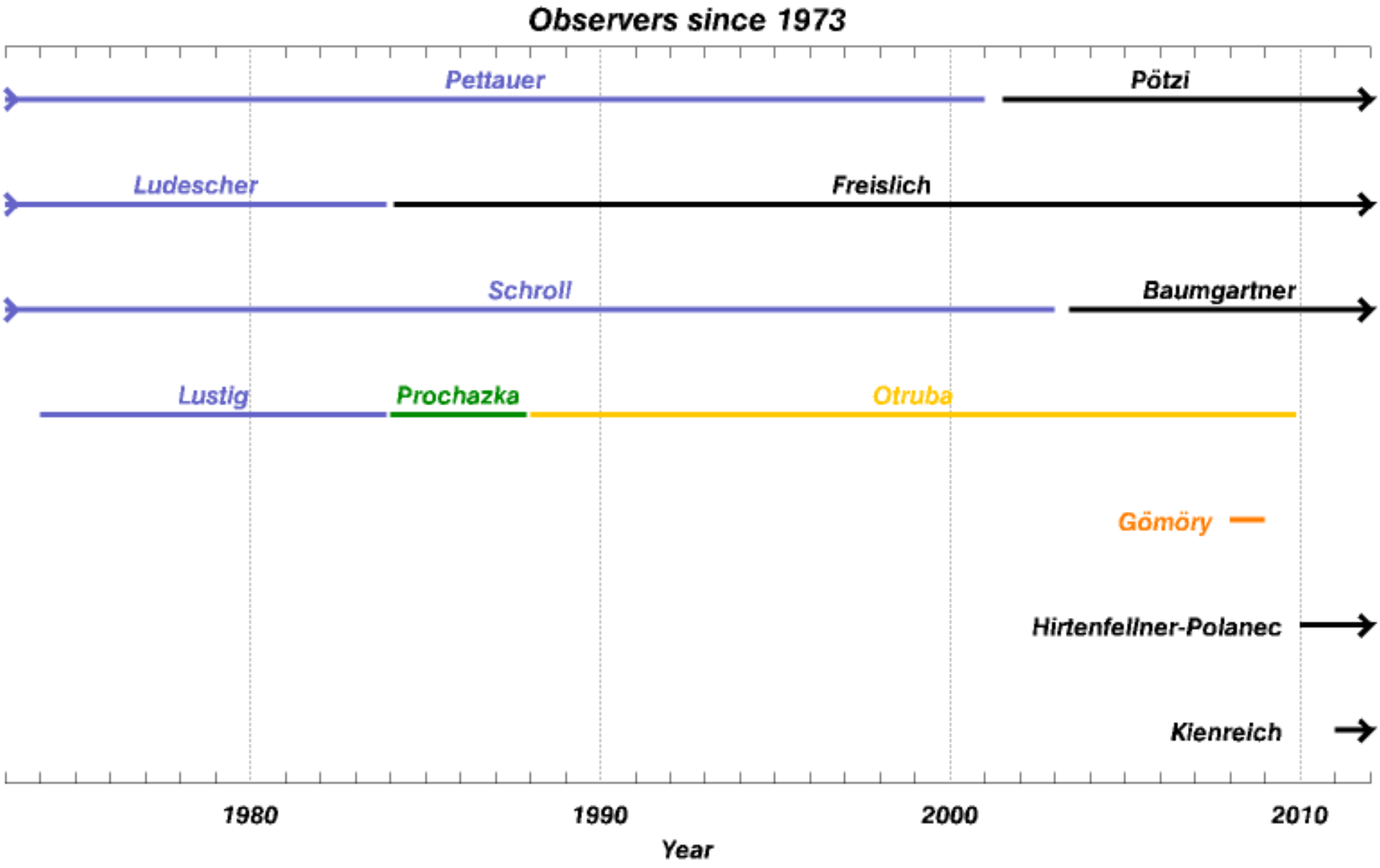
From 2011 on the north and south spots were denoted separately on the drawings (new templates were necessary).
The weather conditions are not written onto the drawing anymore, we have 2 numbers for the quality:
Sharpness: 1 (good) – 5
Quietness: 1 (quiet) - 5

But a separate counting of north and south spots exists since 2003-12-01.



2012-05-11


Observations also on Top of Gerlitzen
Rebuilding of Instrument and Observatory
The same Instrument since May-1973
Drawings per Year
Days with more than 30min of Sunshine
Missing Sunshine Data
Yearly Sunspot Number
400
300
200
100
0
1950
1960
1970
1980
1990
2000
2010
Year


Observers since 1973
Pettauer
Pötzi
Ludescher
Freislich
Schroll
Baumgartner
Lustig
Prochazka
Otruba
Gömöry
Hirtenfellner-Polanec
Kienreich
1980
1990
2000
2010
Year

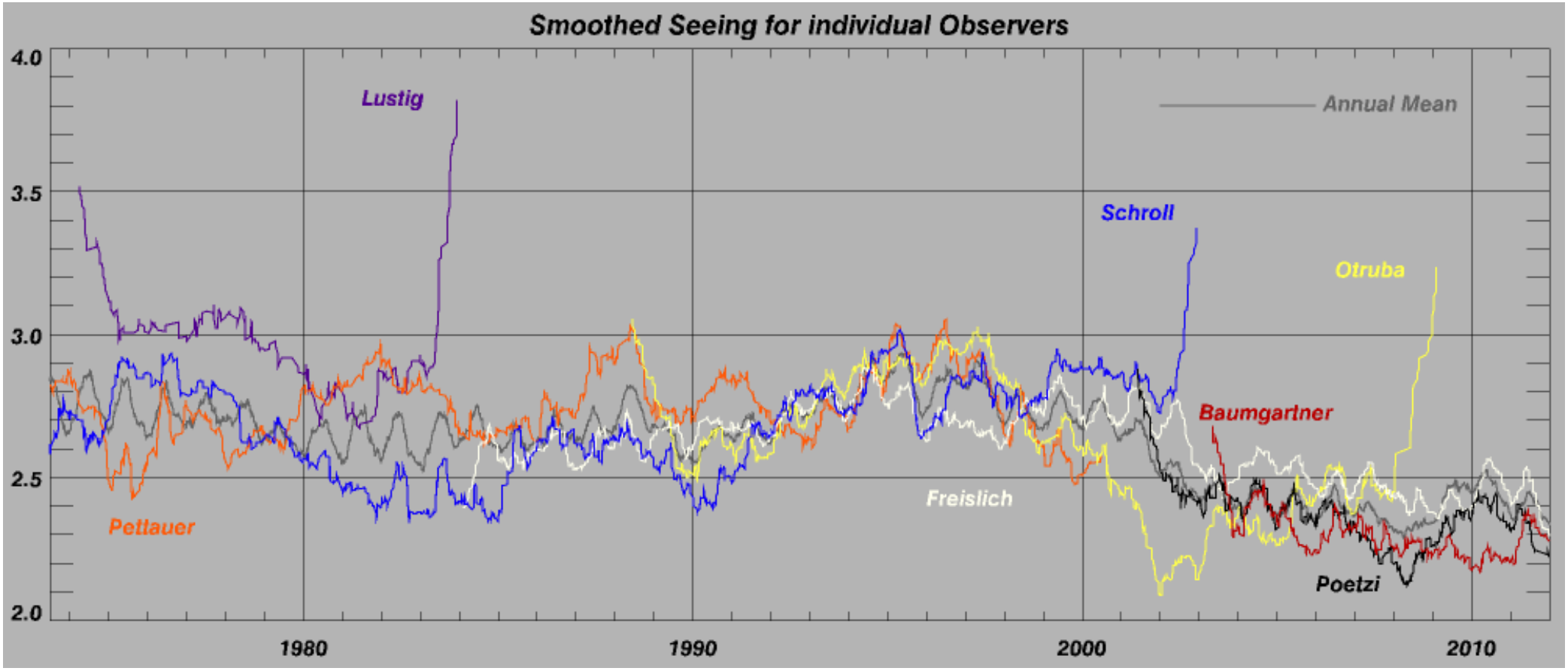
Determination of the Image-Quality:
s („Schärfe“ = image sharpness, seeing) and r („Ruhe“ = image quiescense)
Modified Kiepenheuer System

The value of **r** is determined by the motion of spots and the solar limb:
r=1 if there is no motion
r=2 almost no motion in spots but limb is shaking
r=3 limb is shaking about 3 arcsec (½ mm)

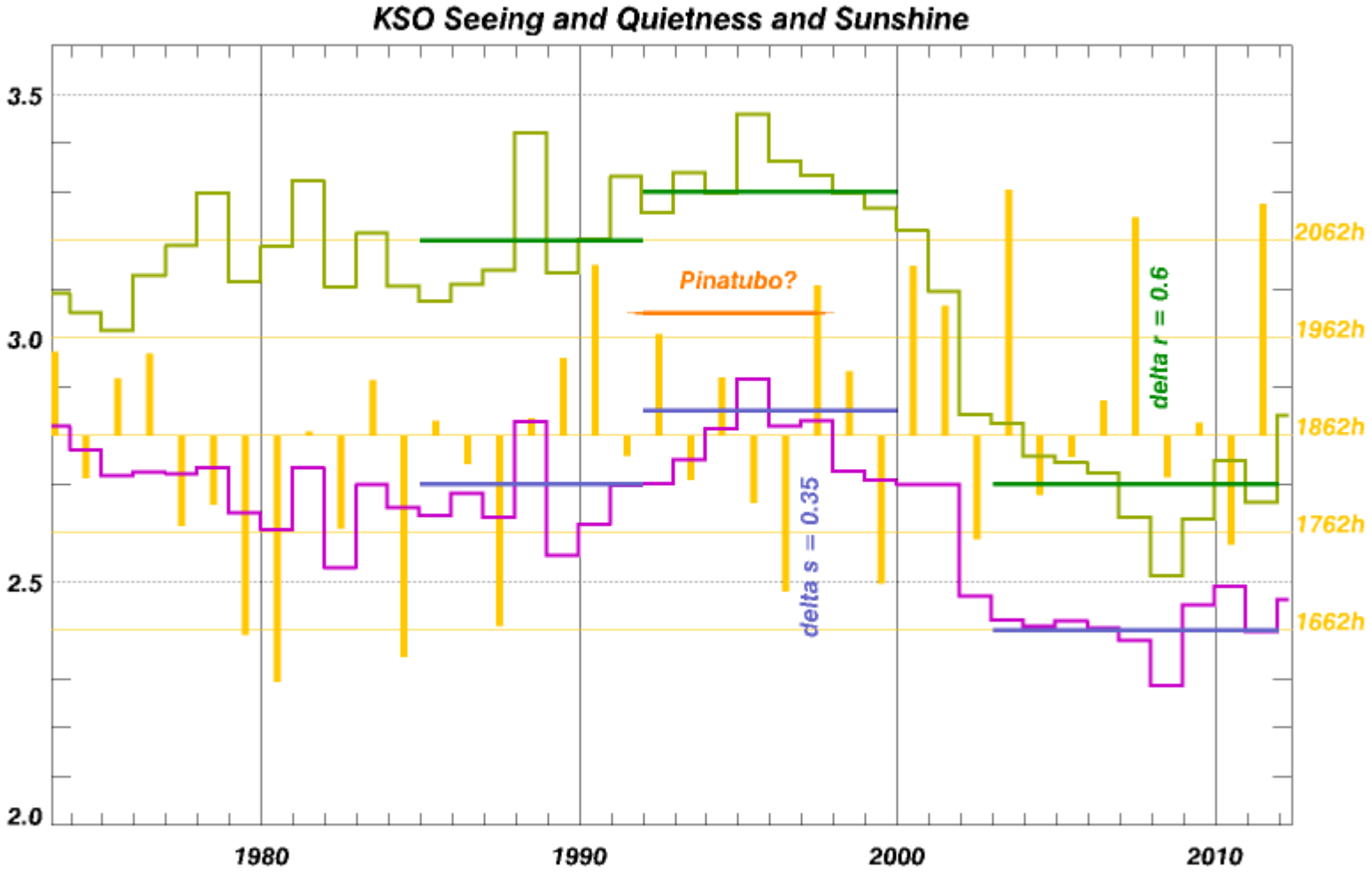
The value of **s** is defined by details, that can be seen in spots:
s < 2 structures in penumbra can be seen and granulation is clearly visible
s > 3 no granulation, the separation between umbra and penumbra becomes worse

Correction factors for relative number								
s=1	1.5	2	2.5	3	3.5	4	4.5	5
0.55	0.59	0.63	0.68	0.73	0.79	0.85	0.92	0.99

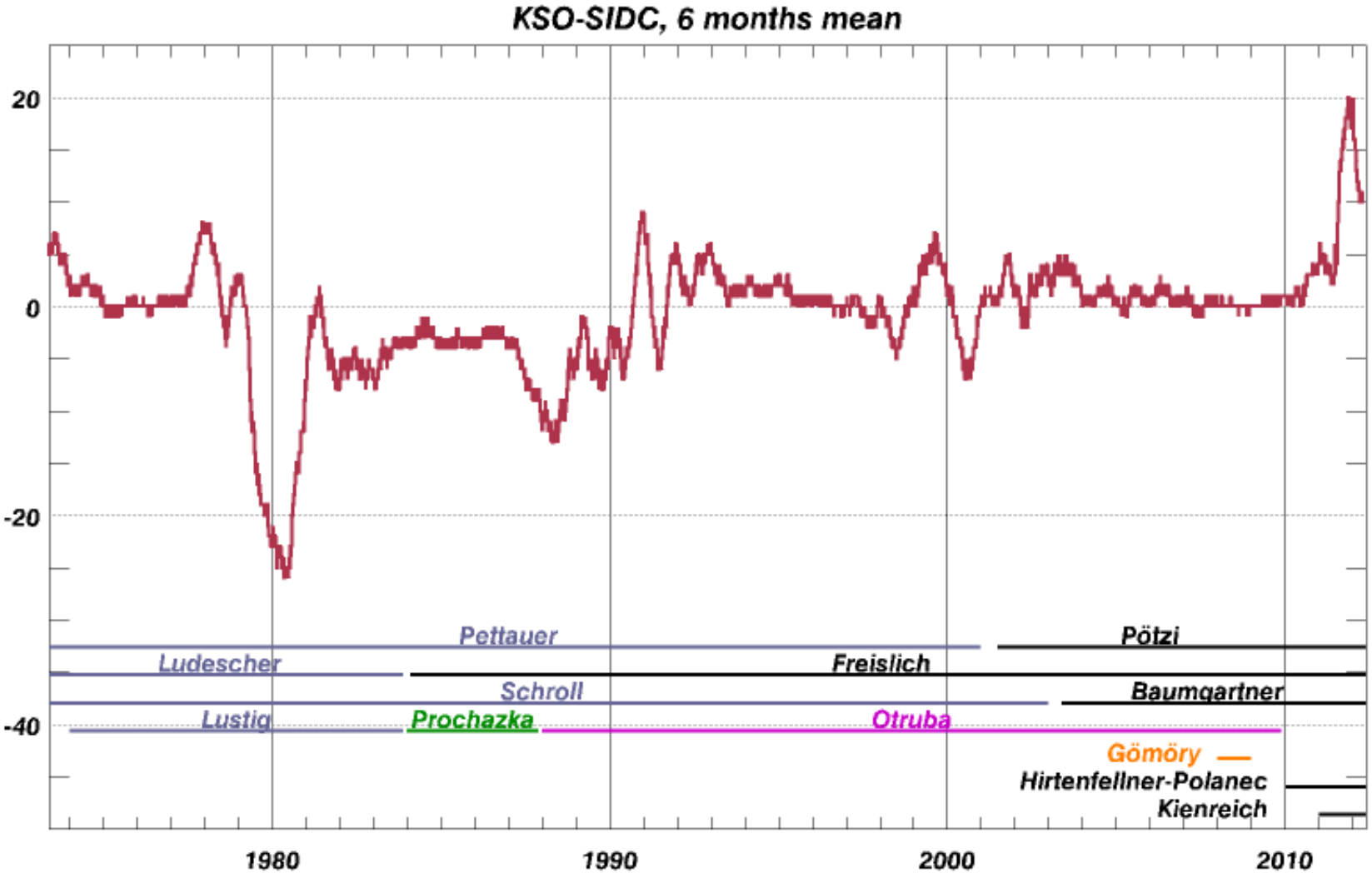
R = k(10g+f) no weighting of spots



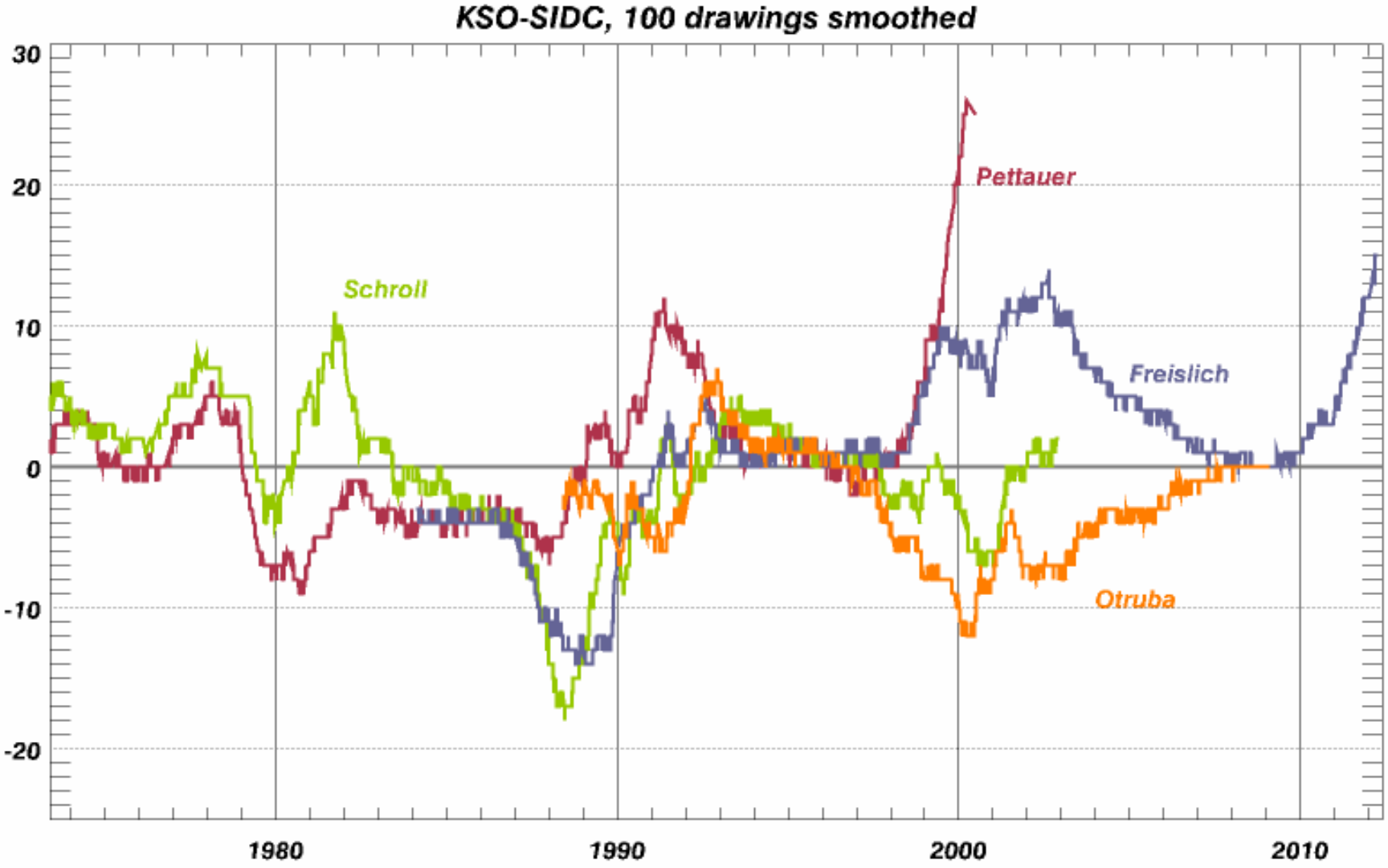
High values at the end of career?
Higher values for the first 2 months.
Did the seeing become better from 2000 on?


KSO Seeing and Quietness and Sunshine
3.5
3.0
2.5
2.0
1980
1990
2000
2010
2062h
1962h
1862h
1762h
1662h
Pinatubo?
delta r = 0.6
delta s = 0.35

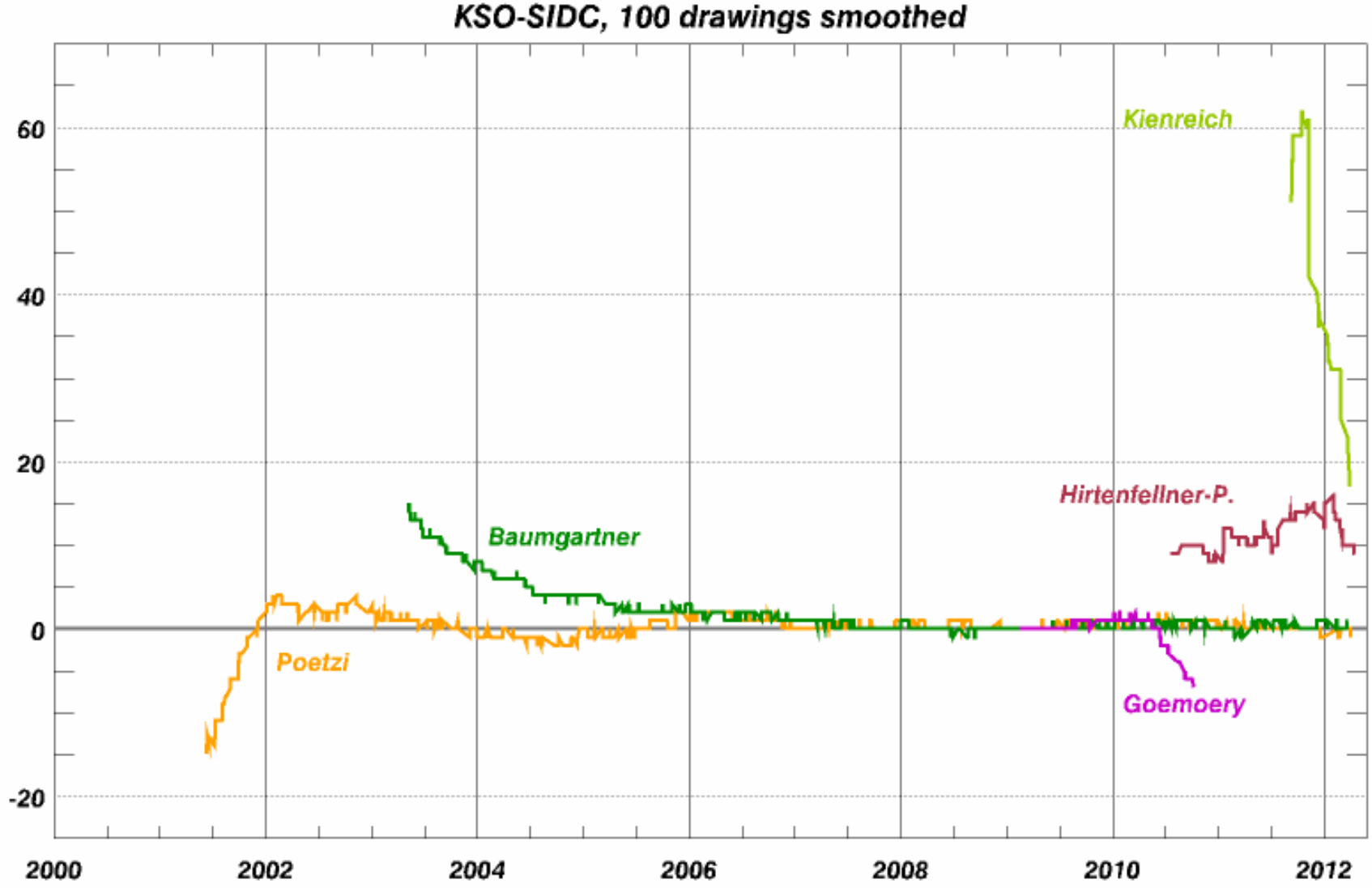
Differences in Sunspot Numbers: each Maximum is visible



Differences in Sunspot Numbers for „long-time“ Observers



Differences in Sunspot Numbers for new („short time“) Observers



Differences to earlier observations (before 2008)

- H-alpha image always visible for observer
- CaIIK image always visible
- SOHO/SDO: magnetic field visible
- Guiding system improved
- observers are younger
- main task is not the drawing → 1 drawing in the morning and only when the seeing improves a new drawing is made
- Only one „long time“ observer is left

Special Test after this meeting

Selec t a day with good and stable seeing conditions: wind and high air pressure

- At first: Every observer makes a drawing without using the monitors and calculates the Relative Number
- Later: Every observer does the same using the monitors.

What are the differences between the observers and between the first and the second drawing?

Are the seeing conditions r and s the same?