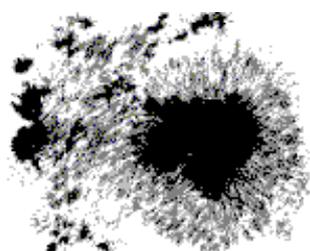
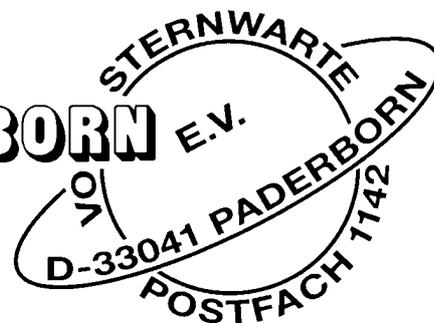


# VOLKSSTERNWARTE PADERBORN

Astronomische Arbeitsgemeinschaft



## THE INTER-SOL PROGRAMME (ISP)

*International Sun Observation Programme  
for Amateurs und Professionals*

E-Mail: [Mail@Inter-Sol.org](mailto:Mail@Inter-Sol.org)

 <http://www.Inter-Sol.org> 

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Volkssternwarte Paderborn e.V. • Postfach 1142 • D-33041 Paderborn • Germany  
 +49 (0)5254-932042 • Fax: +49 (0)5254-932043 • E-Mail: [Mail@AstroObsPb.de](mailto:Mail@AstroObsPb.de)

# The Inter-Sol Programme

The INTER-SOL PROGRAMME (ISP) was established by Mr Reinhard Wiechoczek – also founder of the Paderborn Public Observatory, Germany – in 1977 after several preparatory tests during 1976.

- Surveying the different sunspot phenomena, *IS* (INTER-SOL Index) should give more detailed information about the solar activity than the common international SIDC (Brussels) which is deriving just one concluding sunspot number “R”.
- *IS* should be comparable to terrestrial statistics of any kind for possible research of solar-terrestrial phenomena. The task of ISP is to draw up a document of the solar activity. Since most of the terrestrial statistics dealing with all aspects of life are based on monthly or yearly terms, the *IS* data are smoothed to means out of three terrestrial months.
- *IS* is also a fascinating project of close collaboration between amateurs and professionals around the globe. The intention is to extend a network of active solar observers in all continents.
- Facing all the giant scientific investigations – earth-bound as well as operating in space – we have to be aware of the fact that ISP does not have a professional but a serious amateur character.
- All experienced solar observers are welcome to join the growing international *IS*-Team.

## Methods of Sunspot Registration and Evaluation

1. The INTER-SOL Index is defined as:

$$IS = gr + grfp + grf + efp + ef$$

2. ***IS*** – INTER-SOL Index  
***gr*** – number of spot groups (consisting of two or more spots)  
***grfp*** – number of penumbral spots belonging to a group  
***grf*** – number of spots without penumbra belonging to a group  
***efp*** – number of single penumbral spots not belonging to any group  
***ef*** – number of single spots without penumbra not belonging to any group

Check-formula:  $(grfp + grf) : gr \geq 2$

3. Contrary to the sunspot number “R” (SIDC, Brussels) single spots (***efp*** and ***ef***) are not (!) classified as groups (***gr***).
4. Each umbra within one penumbra is to be counted as ***grfp***.
5. To classify the different phenomena please use Waldmeier’s schedule shown on our website.
6. Pores are not registered as spots.
7. If the telescope is smaller than  $\varnothing$  100 mm (4") we advise the direct view through filter glasses, as the method of projecting the Sun’s picture onto a screen sometimes weakens the contrast.
8. Several observations on the same day or with different telescopes must be registered on separate protocol sheets.
9. Time of observation is **UTC** (Greenwich Time).

10. Observing conditions (“*Cond.*”) are defined as follows:

- 1 – very good, picture very contrasty and clear, granulation visible.
- 2 – good, Sun limb or spots in slight motion, granulation only visible from time to time.
- 3 – satisfactory, Sun limb or spots in moderate motion, granulation invisible.
- 4 – weak, Sun limb fluttering, close spots hardly to be resolved.
- 5 – poor, Sun limb in strong ebullition, detailed observations almost impossible.

11. In order to evaluate the data as soon as possible, monthly protocols have to arrive at the Paderborn observatory within three weeks after the end of a month. We accept data sent by postal mail, facsimile or by e-mail in a special format.

**Volkssternwarte Paderborn e.V., Postfach 1142, D-33041 Paderborn, Germany**  
**Fax: (+49) (0)5254-932043 / E-Mail: [Data@Inter-Sol.org](mailto:Data@Inter-Sol.org) .**

For observers sending in their monthly reports by e-mail, a special e-mail protocol including detailed instructions may be downloaded from the service section of our web site at:  
<http://www.Inter-Sol.org> .

12. All incoming protocols are evaluated at the Paderborn Observatory, computing daily and monthly means.

13. Various telescope sizes are valued by  $f_i$  (factor of instrument):

$$f_i = \frac{\text{aperture (mm)}}{60 \text{ mm (amateur standard refractor)}}$$

14. Observing conditions are considered by  $f_c$  (factor of conditions):

Conditions	1	2	3	4	5
$f_c$	2	1.5	1	0.5	0.1

15.  $n$  is the sum of all evaluated observations.

$$n' = \sum_{j=1}^n (f_{ij} \cdot f_{cj})$$

16. The differences of the monthly means are smoothed by terms of three months:

$$\overline{IS}_M = (IS_{M-1} + IS_M + IS_{M+1}) : 3$$

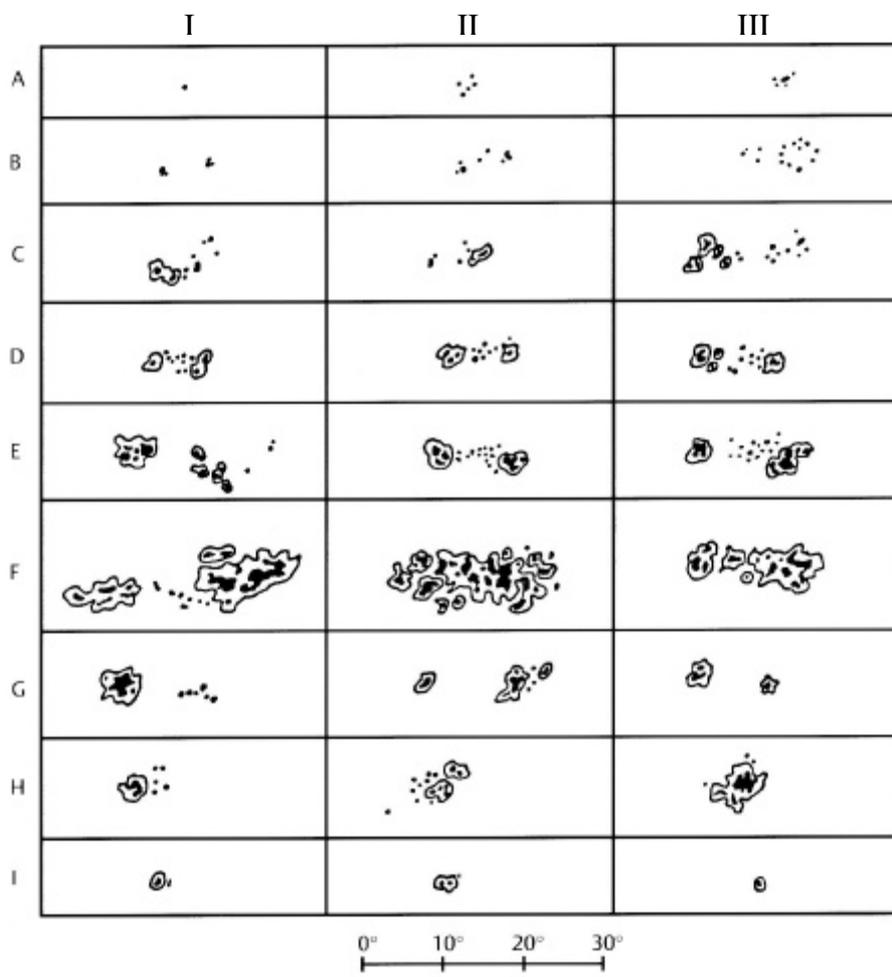
Example:     January :  $IS = 80$                      Smoothed number of February:  
                   February :  $IS = 75$                       $\Rightarrow$                       $\overline{IS} = (80+75+40) : 3 = 65$   
                   March :  $IS = 40$

So the final INTER-SOL Index is:

$$\overline{IS} = \overline{gr} + \overline{grfp} + \overline{grf} + \overline{efp} + \overline{ef}$$

17. The monthly IS-Report is published on the internet at <http://data.Inter-Sol.org> .  
 Additionally, an annual printed summary of the data is send to all observers.

**Please note:** Observers have to take care of paragraphes 1. - 11. only.



Examples of INTER-SOL sunspot registration by means of the Waldmeier schedule

		gr	grfp	grf	efp	ef
A	I	0	0	0	0	1
	II	1	0	5	0	0
	III	1	0	5	0	0
B	I	1	0	2	0	0
	II	1	0	7	0	0
	III	1	0	15	0	0
C	I	1	2	7	0	0
	II	1	2	5	0	0
	III	1	5	11	0	0
D	I	1	3	9	0	0
	II	1	4	8	0	0
	III	1	4	9	0	0
E	I	1	10	3	0	0
	II	1	5	14	0	0
	III	1	5	14	0	0
F	I	1	11	7	0	0
	II	1	21	3	0	0
	III	1	12	0	0	0
G	I	1	3	6	0	0
	II	1	5	3	0	0
	III	1	3	0	0	0
H	I	1	1	5	0	0
	II	1	5	9	0	0
	III	1	3	3	0	0
J	I	1	1	1	0	0
	II	1	2	1	0	0
	III	0	0	0	1	0