

SONNEBERG OBSERVATORY: SKY PATROL, FIELD PATROL, THE WORLD'S LARGEST LIVING WFFA

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1. Introduction

The Sonneberg Sky and Field Patrols have been the suppliers of the Sonneberg plate collection for 6 decades. They have led to the detection of more than 10,000 variable stars and the discovery of spectacular objects.

Sky Patrol:	monitoring the whole visible sky 7 Zeiss Tessars 71/250 mm 26° x 26° 13,5 ^m (pg) 7 Zeiss Tessars 55/250 mm 26° x 26° 14,5 ^m (pv)
Field Patrol:	monitoring 81 fields near the Milky Way Astrograph 400/2000 mm 8° x 8° 17,5 ^m (pg) Astrograph 400/1600 mm 10° x 10° 17,5 ^m (pg)
Sonneberg WFFA:	250,000 plates, covering the past 7 decades.

The Sonneberg WFFA still holds a wealth of unexploited optical information on the past history of astronomical sources.

However, over present plans and innovations — introduction of modern observational and photometric techniques, systematic search for new, unforeseen events and study of evolutionary effects — hangs the threat of closure like the sword of Damocles.

2. History of the Sky Patrol

- 1926 Idea of PAUL GUTHNICK's (Universitätssternwarte Berlin-Babelsberg);
aim: a continuous record of the whole northern sky to be run at Babelsberg, Bamberg and Sonneberg.
- 1928 Realizing the advantage of the geographical position of the Sonneberg Observatory, Guthnick left the southernmost zone ($\delta = -17.5^\circ$) to CUNO HOFFMEISTER (Sonneberg).
- 1933 The Babelsberg instrument was transferred to Sonneberg.
- 1941 The Bamberg instrument was transferred to Sonneberg.
- 1958 Sky Patrol modernized (see table in Introduction).

3. History of the Field Patrol

- 1923 Plan of Cuno Hoffmeister's, to collect data for statistical investigation of variable stars and galactic structure; run with Zeiss-Triplet 170/1200 mm, 41 fields monitored.
- 1935 Quadruplet lens astrograph 400/1600 mm put into service, with limiting magnitude of about 18^m.
- 1945 Loss of that astrograph as reparations after war.
- 1960 and 1961: Two new quadruplet lens astrographs (see table in Introduction) put into service; from then on 81 fields monitored.
- 1934 - 1938, 1952/53, 1959: Sky patrol and field patrol photographs of the southern sky from expeditions to South and Southwest Africa.

4. Typical Results

- 1) Discovery and investigation of more than 10,000 variable stars, among them such interesting cases as:
 BL Lac (prototype of one of the most interesting extragalactic objects)
 FG Sge (the hitherto only observation of the rare event of a Helium flash)
 HZ Her (one of the strongest and best-investigated X-ray binaries).
- 2) Statistical investigations based on the Field Patrol, for example (Papers published in Veröff. Sternw. Sonneberg):
 W. Wenzel 1961. 'Some properties of irregular variable stars of faint luminosity'.
 W. Götz 1965. 'Some interrelations between RW Aurigae stars and the interstellar medium'.
 G.A. Richter 1966. 'Investigation of the structure of the Galaxy by means of statistics of the variable stars of the Sonneberg Field Patrol'.
- 3) Eruptive binaries: There are two ways of searching for rare outbursts of eruptive stars: either by checking back on old plates or by watching out for new events. Studied in Sonneberg:

PQ And	VY Aqr	UZ Boo	WX Cet	HT Cas	AL Com
V 404 Cyg	HR Del	DO Dra	V 592 Her	V 616 Mon	UW Per
AS Psc	WZ Sge	SW UMa	BZ UMa		and others

5. Present State of the Archive

Number of plates about 250,000. Time covered > 65 years uninterrupted (even during World War II and post-war time). — Work in the plate vault is greatly facilitated by clear layout and machine-readability of the catalogues (see contribution 'The Sonneberg WFPA Database' by H.-J. Bräuer & B. Fuhrmann, these proceedings). — Plate photometry is now being computerized (see contribution 'Scanning the Sonneberg Plate Archive with DIA' by P. Kroll & P. Neugebauer, these proceedings).

6. Present and Future Projects

Observations made from satellites in non-conventional spectral regions have opened new horizons for the plate archive. Use now concentrates on:

- 1) search for and investigation of optical counterparts of X-ray sources and Gamma-ray bursts measured by ROSAT and GRO.

Future activity will, in addition, have to focus on:

- 2) stellar evolution; systematic study of secular changes of the parameters of variability, e.g. period changes, or even cessation of pulsation (as in RU Cam, which was monitored in great detail on Sonneberg plates);
- 3) rare eruptive phenomena: optical bursts, flares and flashes; eruptions of novae and long-cyclic dwarf novae; secular changes of the pattern of eruptions;
- 4) systematic watch for new, unforeseen events.

(See also contribution 'First steps toward a CCD-based Sky Patrol' by P. Kroll & T. Lehmann, these proceedings).