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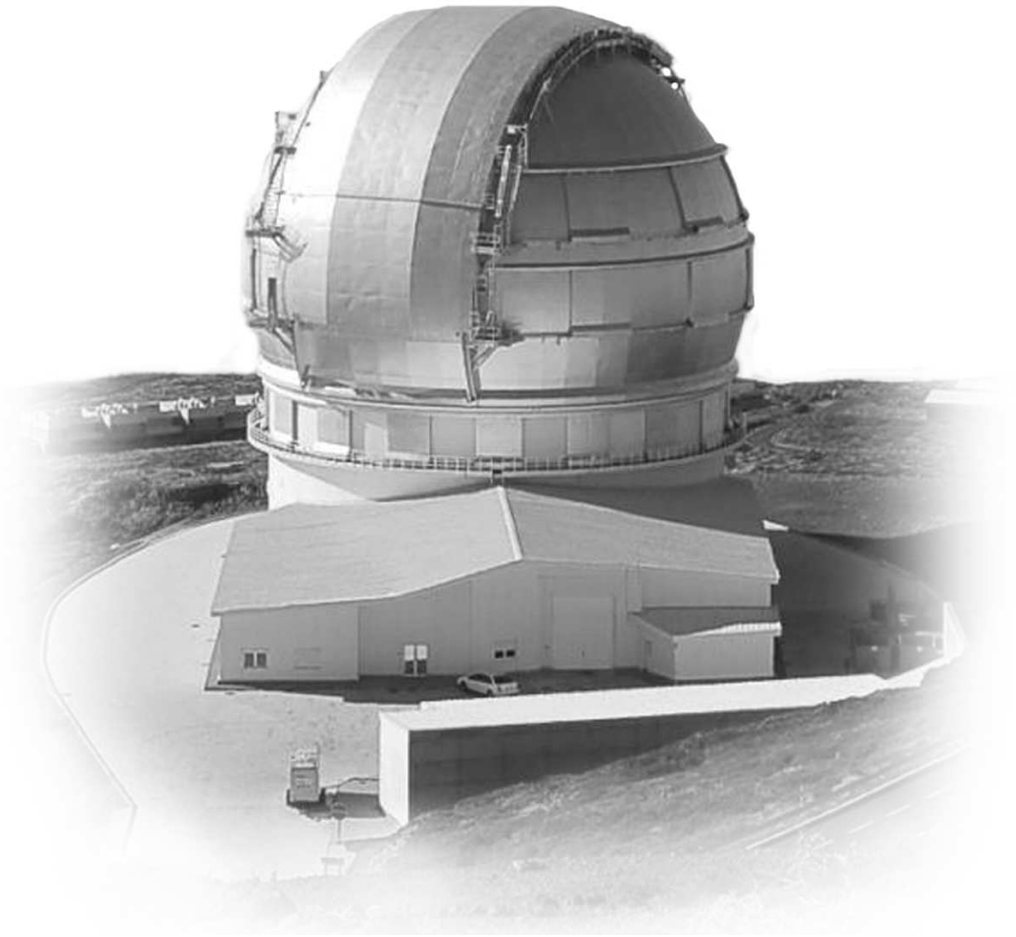

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Construction and installation of an all-sky meteor camera at the Slovak Central Observatory in Hurbanovo

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This contribution describes new observational equipment installed at the Slovak Central Observatory (SCO) in Hurbanovo, Slovakia ($\varphi = 47°53^m32^s$ N, $\lambda = 18°11^m36^s$ E). It also briefly outlines the history of meteor observations in Hurbanovo.

1 Historical background

Meteor observations in Hurbanovo (formerly Ó-Gyalla, Stará Ďala) have already a 141-year long history.

In 1871, Dr. Nicholas Konkoly-Thege (Figure 1) and his colleagues introduced meteor observations. Observational results were published in the annals of the observatory (Figure 2), which were published annually until the First World War.

We can safely say that these observations constituted a pioneer effort, also in a global sense. For example, these observers could distinguish between sporadic meteors and shower meteors, they developed an improved method to determine meteor shower radiants, and they managed to observe meteor spectra visually. Among other findings, they discovered in this way that there is ionized sodium in the upper layer of the Earth's atmosphere. Dr. Konkoly was also the organizer of the first network of meteor observers in Hungary. One result of this network was the determination of the height of meteor trails.

Unfortunately, this promising development was interrupted by the First and Second World War. It was possible to restart meteor observations in Hurbanovo only in 1964, by the establishment of a network of all-sky cameras in the former Czechoslovakia (Figure 3). From this historical point of view, the new equipment we will describe fits well with the historical tradition of meteor observations in Hurbanovo.

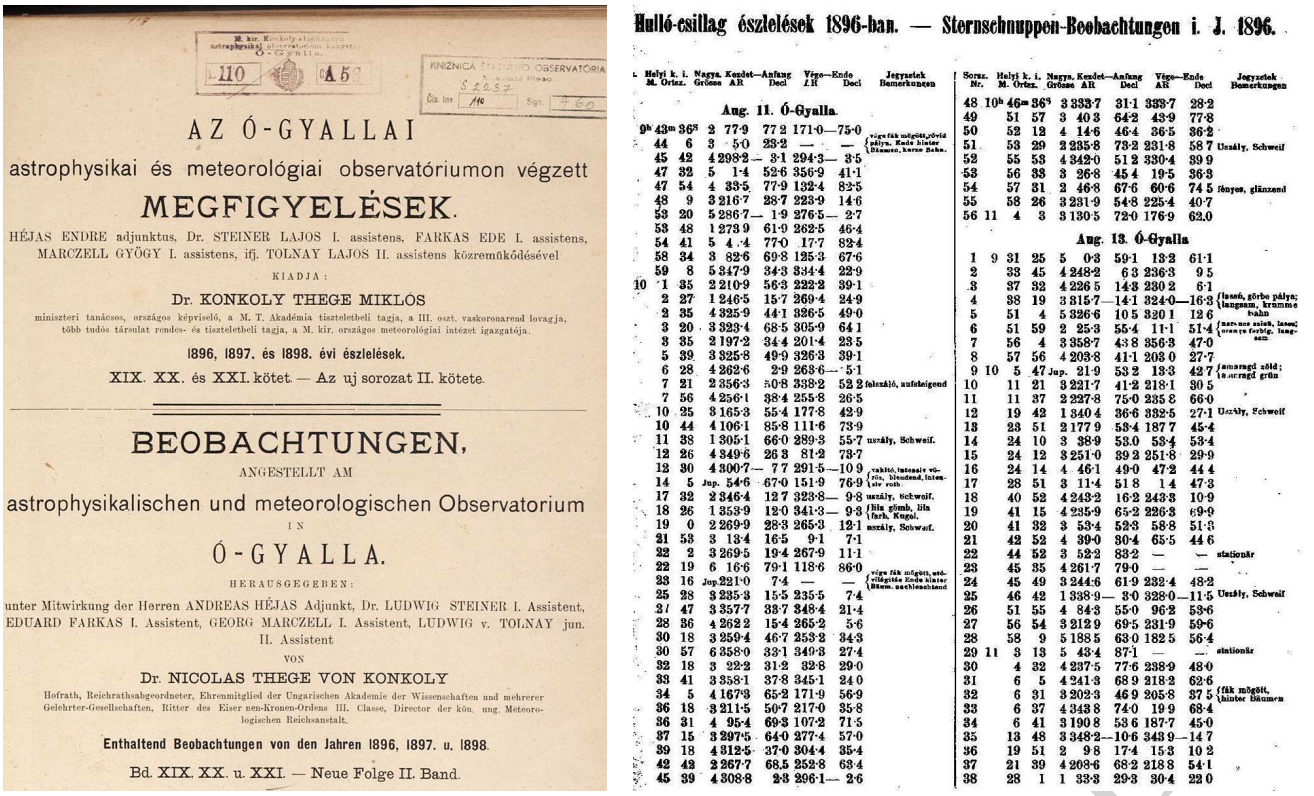
2 All-Sky Camera Hurbanovo (ASKH-1)

The main optical part of the all-sky camera is a fish-eye type camera lens Canon 04/02/15 mm. The image is enhanced at the output by using an image brightness amplifier with a diameter of 50 mm, for which the output scintillating shading is scanned by using a secondary lens, a Meopta 09/01/16 mm. A CCD sensor of the analog TV camera Watec 902H2 has been placed in its focus. The system is powered by a voltage of 24 V. The core of the control system is a single-chip processor ATMega 16.

The analog video signal from the camera is digitized by a Pinnacle card. The UFOCapture software analyzes in real-time mode the digitized image, and evaluates whether or not there was a meteor or another moving object in the field of view. In case a meteor was detected, the video sequence recording starts from memory. Then, each meteor is recorded into an uncompressed `.avi` file. A corresponding map of the field of view with stars is saved in .bmp format as well as a preview file in `.jpg` format. Information on recorded object, location and time of observation necessary for further analysis are stored in a file with `.xml` format.

More details are given by, e.g., Tóth et al. (2008).

Figure 1 – Dr. Nicholas Konkoly-Thege.



AZ Ó-GYALLAI

astrophysikai és meteorológiai observatóriumon végzett

MEGFIGYELÉSEK.

HÉJAS ENDRE adjunktus, Dr. STEINER LAJOS I. assistens, FARKAS EDE I. assistens, MARCZELL GYÖGY I. assistens, ifj. TOLNAY LAJOS II. assistens közreműködésével

KIADJA:

Dr. KONKOLY THEGE MIKLÓS

miniszteri tanácsos, országos képviselő, a M. T. Akadémia tiszteletbeli tagja, a III. oszt. vaskoronarend lovagja, több tudós társulat rendes- és tiszteletbeli tagja, a M. kir. országos meteorológiai intézet igazgatója.

1896, 1897. és 1898. évi észlelések.

XIX. XX. és XXI. kötet. — Az uj sorozat II. kötete.

BEOBACHTUNGEN,

ANGESTELLT AM

astrophysikalischen und meteorologischen Observatorium

IN

Ó-GYALLA.

HERAUSGEGEBEN:

unter Mitwirkung der Herren ANDREAS HÉJAS Adjunkt, Dr. LUDWIG STEINER I. Assistent, EDUARD FARKAS I. Assistent, GEORG MARCZELL I. Assistent, LUDWIG v. TOLNAY jun. II. Assistent

VON

Dr. NICOLAS THEGE VON KONKOLY

Hofrath, Reichsrathsabgeordneter, Ehrenmitglied der Ungarischen Akademie der Wissenschaften und mehrerer Gelehrter-Gesellschaften, Ritter des Eiser nen-Kronen-Ordens III. Classe, Director der kön. ung. Meteorologischen Reichsanstalt.

Enthaltend Beobachtungen von den Jahren 1896, 1897. u. 1898.

Bd. XIX. XX. u. XXI. — Neue Folge II. Band.

Hulló-csillag észlelések 1896-ban. — Sternschnuppen-Beobachtungen i. J. 1896.

Aug. 11. Ó-Gyalla.

Helyi k. i. M. Órisz.	Nagys. Grösse	Kezdet—Anfang AR	Kezdet—Anfang Decl	Vége—Ende AR	Vége—Ende Decl	Jegyzetek Bemerkungen
9h 43m 36s	2	77·9	77 2	171·0	—75·0	vége fák mögött, rövid pálya. Ende hinter Bäumen, kurze Bahn.
44 6	3	5·0	23·2	—	—	
45 42	4	298·2	— 3·1	294·3	— 3·5	
47 32	5	1·4	52·6	356·9	41·1	
47 54	4	33·5	77·9	132·4	82·5	
48 9	3	216·7	28·7	223·9	14·6	
53 20	5	286·7	— 1·9	276·5	— 2·7	
53 48	1	273·9	61·9	262·5	46·4	
54 41	5	4·4	77·0	17·7	82·4	
58 34	3	82·6	69·8	125·3	67·6	
59 8	5	347·9	34·3	334·4	22·9	
10 1 35	2	210·9	56·3	222·2	39·1	
2 27	1	246·5	15·7	269·4	24·9	
2 35	4	325·9	44·1	326·5	49·0	
3 20	3	323·4	68·5	305·9	64·1	
3 35	2	197·2	34·4	201·4	23·5	
5 39	3	325·8	49·9	326·3	39·1	
6 28	4	262·6	2·9	263·6	— 5·1	
7 21	2	356·3	50·8	338·2	52·2	felszálló, aufsteigend
7 56	4	256·1	38·4	255·8	26·5	
10 25	3	165·3	55·4	177·8	42·9	
10 44	4	106·1	85·8	111·6	73·9	
11 38	1	305·1	66·0	289·3	55·7	uszály, Schweif.
12 26	4	349·6	26·3	81·2	73·7	
12 30	4	300·7	— 7·7	291·5	—10·9	vakító, tetemes világítás, blendend, intensiv roth.
14 5	Jup.	54·6	67·0	151·9	76·9	
17 32	2	346·4	12·7	323·8	— 9·8	uszály, Schweif.
18 26	1	353·9	12·0	341·3	— 9·3	fényes gömb, lila farb. Kugel.
19 0	2	269·9	28·3	265·3	12·1	uszály, Schweif.
21 53	3	13·4	16·5	9·1	7·1	
22 2	3	269·5	19·4	267·9	11·1	
22 19	6	16·6	79·1	118·6	86·0	
23 16	Jup.	221·0	7·4	—	—	vége fák mögött, sárgás világítás Ende hinter Bäumen, nachleuchtend
25 28	3	235·3	15·5	235·5	7·4	
27 47	3	357·7	33·7	348·4	21·4	
28 36	4	262·2	15·4	265·2	5·6	
30 18	3	259·4	46·7	253·2	34·3	
30 57	6	358·0	33·1	349·3	27·4	
32 18	3	22·2	31·2	32·8	29·0	
33 41	3	358·1	37·8	345·1	24·0	
34 5	4	167·3	65·2	171·9	56·9	
36 18	3	211·5	50·7	217·0	35·8	
36 31	4	95·4	69·3	107·2	71·5	
37 15	3	297·5	64·0	277·4	57·0	
39 18	4	312·5	37·0	304·4	35·4	
42 42	2	267·7	68·5	252·8	68·4	
45 39	4	308·8	2·8	296·1	— 2·6	

Sorsz. Nr.	Helyi k. i. M. Órisz.	Nagys. Grösse	Kezdet—Anfang AR	Kezdet—Anfang Decl	Vége—Ende AR	Vége—Ende Decl	Jegyzetek Bemerkungen
48	10h 46m 36s	3	333·7	31·1	333·7	28·2	
49	51	57	3 40·3	64·2	43·9	77·8	
50	52	12	4 14·6	46·4	36·5	36·2	
51	53	29	2 235·8	73·2	231·8	58·7	Uszály, Schweif
52	55	53	4 342·0	51·2	330·4	39·9	
53	56	33	3 26·8	45·4	19·5	36·3	
54	57	31	2 46·8	67·6	60·6	74·5	fényes, glänzend
55	58	26	3 231·9	54·8	225·4	40·7	
56	11 4	3	3 130·5	72·0	176·9	62·0	

Aug. 13. Ó-Gyalla

1	9	31	25	5	0·3	59·1	13·2	61·1	
2		33	45	4	248·2	6·3	236·3	9·5	
3		37	32	4	226·5	14·3	230·2	6·1	
4		38	19	3	315·7	—14·1	324·0	—16·3	lassú, görbe pálya; langsam, krumme bahn
5		51	4	5	326·6	10·5	320·1	12·6	
6		51	59	2	25·3	55·4	11·1	51·4	narancs színű, lassú; orange farbig, langsam
7		56	4	3	358·7	43·8	356·3	47·0	
8		57	56	4	203·8	41·1	203·0	27·7	
9	10	5	47	Jup.	21·9	53·2	13·3	42·7	smaragd zöld; smaragd grün
10		11	21	3	221·7	41·2	218·1	39·5	
11		11	37	2	227·8	75·0	235·8	66·0	
12		19	42	1	340·4	36·6	332·5	27·1	Uszály, Schweif
13		23	51	2	177·9	58·4	187·7	45·4	
14		24	10	3	38·9	53·0	53·4	53·4	
15		24	12	3	251·0	39·2	251·8	29·9	
16		24	14	4	46·1	49·0	47·2	44·4	
17		28	51	3	11·4	51·8	1·4	47·3	
18		40	52	4	243·2	16·2	243·3	10·9	
19		41	15	4	235·9	65·2	226·3	69·0	
20		41	32	3	53·4	52·3	58·8	51·3	
21		42	52	4	39·0	30·4	65·5	44·6	
22		44	52	3	52·2	83·2	—	—	stationär
23		45	35	4	261·7	79·0	—	—	
24		45	49	3	244·6	61·9	232·4	48·2	
25		46	42	1	338·9	— 3·0	328·0	—11·5	Uszály, Schweif
26		51	55	4	84·3	55·0	96·2	53·6	
27		56	54	3	212·9	69·5	231·9	59·6	
28		58	9	5	188·5	63·0	182·5	56·4	
29	11	3	13	5	43·4	87·1	—	—	stationär
30		4	32	4	237·5	77·6	238·9	48·0	
31		6	5	4	241·3	68·9	218·2	62·6	
32		6	31	3	202·3	46·2	205·8	37·5	fák mögött, hinter Bäumen
33		6	37	4	343·8	74·0	19·9	68·4	
34		6	41	3	190·8	53·6	187·7	45·0	
35		13	48	3	348·2	—10·6	343·9	—14·7	
36		19	51	2	9·8	17·4	15·3	10·2	
37		21	39	4	203·6	68·2	218·8	54·1	
38		23	1	1	33·3	29·3	30·4	22·0	

Figure 2 – Sample observations for the year 1896 from the annals of the observatory.

(a) (b) (c)

Figure 3 – All-sky camera at the tower of the Slovak Hydrometeorological Institute at Hurbanovo (a, b) and an image recorded by the photographical all-sky camera from the archive of the SCO (c).

3 Construction and installation of the ASKH-1

In Figure 4, we show a photo gallery of the construction and the installation of the All-Sky Camera Hurbanovo (ASKH-1).

Figure 5 shows an example meteor picture.

Acknowledgements

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Figure 4 – Photo gallery of the construction and installation of the All-Sky Camera Hurbanovo (ASKH-1).

Figure 5 – Perseid meteor captured on 12 August 2012 at $20^{h}32^{m}$ UT by a Canon EOS 350D (photo: M. Lorenc).