Construction and Installation of a Meteoric All-Sky Camera at the Slovak Central Observatory in Hurbanovo

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This contribution describes a new observational equipment installed in the Slovak Central Observatory (SCO) in Hurbanovo, Slovakia (φ = 47° 53′ 32″ N, λ = 18° 11′ 36″ E). It also briefly describes the history of meteor observations in Hurbanovo.

1. Historical Background

The observing of meteors in Hurbanovo (formerly *Ó-Gyalla, Stará Ďala*) has already a 141-year long history. In 1871 Dr. Nicholas Konkoly-Thege and his colleagues introduced meteor observations. Observational results were published in the annals of the observatory, which were published yearly until the First World War. We can say that these observations were pioneer ones also in the global meaning. They could distinguish from the observations whether it was a sporadic meteor or a shower meteor . They developed an improved method to determine the meteor shower radiant and they managed to visually observe the meteor spectrum. During these observations they discovered among other findings that there is radiating natrium in the upper layer of the Earth's atmosphere, Dr. Konkoly was also the organizer of of the first network of meteor observers in Hungary. One result of this network was the detection of the height of meteor trails.


AZ Ó-GYALLAI

astrophysikai és meteorológiai observatóriumon végzett

MEGFIGYELÉSEK.

KIADJA

Dr. KONKOLY THEGE MIKLOS

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.

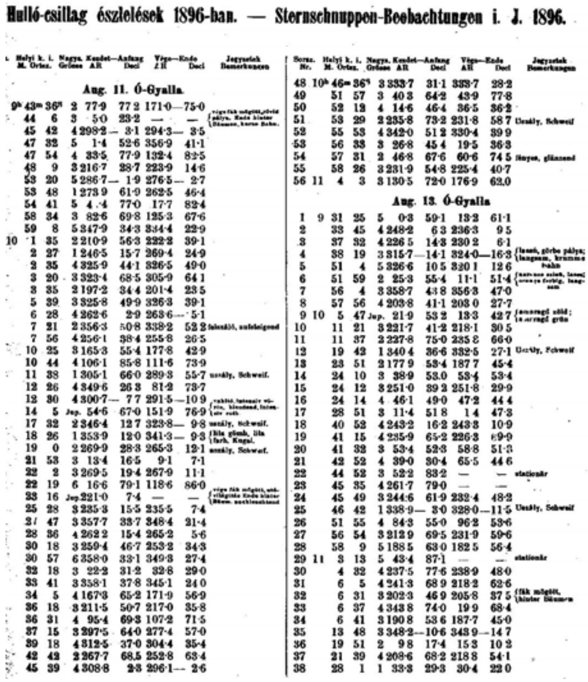
VON

Dr. NICOLAS THEGE VON KONKOLY

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

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

Figure 1 - Dr. Nicholas Konkoly-Thege.


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

Aug. 11. Ó-Gyalla.

Helyi k. i. M. Ortsz.			Nagys. Grösse	Kezdet—Anfang AR	Decl	Vége—Ende AR	Decl	Jegyzetek Bemerkungen
9h	43m	36s	2	77·9	77·2	171·0	−75·0	
	44	6	3	5·0	23·2	—	—	[illegible]
	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	[illegible]
	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	[illegible], Schweif.
	12	26	4	349·6	26·3	81·2	73·7	
	12	30	4	300·7	−7·7	291·5	−10·9	[illegible]
	14	5	Jup.	54·6	67·0	151·9	76·9	[illegible]
	17	32	2	346·4	12·7	323·8	−9·8	[illegible], Schweif.
	18	26	1	353·9	12·0	341·3	−9·3	[illegible]
	19	0	2	269·9	28·3	265·3	12·1	[illegible], 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	—	—	[illegible]
	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	63·4	
	45	39	4	308·8	2·3	296·1	−2·6	

Sorsz. Nr.	Helyi k. i. M. Ortsz.			Nagys. Grösse	Kezdet—Anfang AR	Decl	Vége—Ende AR	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	[illegible], 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	[illegible], 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	[illegible]
5		51	4	5	326·6	10·5	320·1	12·6	
6		51	59	2	25·3	55·4	11·1	51·4	[illegible]
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	[illegible]
10		11	21	3	221·7	41·2	218·1	30·5	
11		11	37	2	237·8	75·0	235·8	66·0	
12		19	42	1	340·4	36·6	332·5	27·1	[illegible], Schweif
13		23	51	2	177·9	53·4	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	69·9	
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	[illegible], 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	46·9	205·8	37·5	[illegible]
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	208·6	68·2	218·8	54·1	
38		28	1	1	33·3	29·3	30·4	22·0	

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

Unfortunately, this promising development was interrupted by the First World War events and the Second World War, respectively. 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. From this historic point of view the new equipment follows the historical tradition of meteor observations in Hurbanovo.

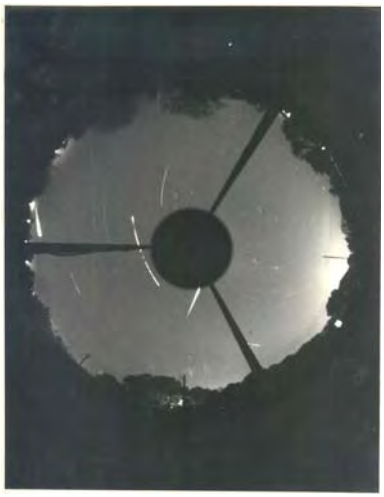


Figure 3 - All-sky camera at the tower of the Slovak Hydrometeorological Institute, Hurbanovo (*top and middle panels*) and Image recorded by the photographical all-sky camera from the archive of the SCO ({*bottom panel*).

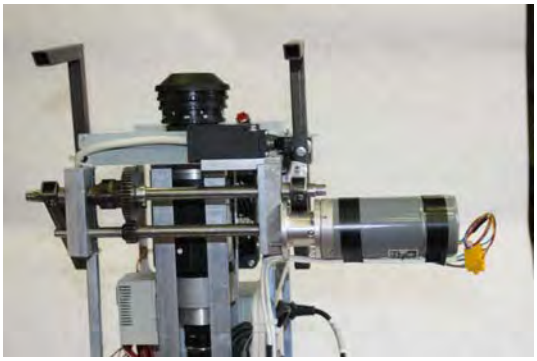
Figure 4 - Perseid meteor captured on 12 August 2012 at 20:32 UT by a Canon EOS 350D (photo: M. Lorenc).

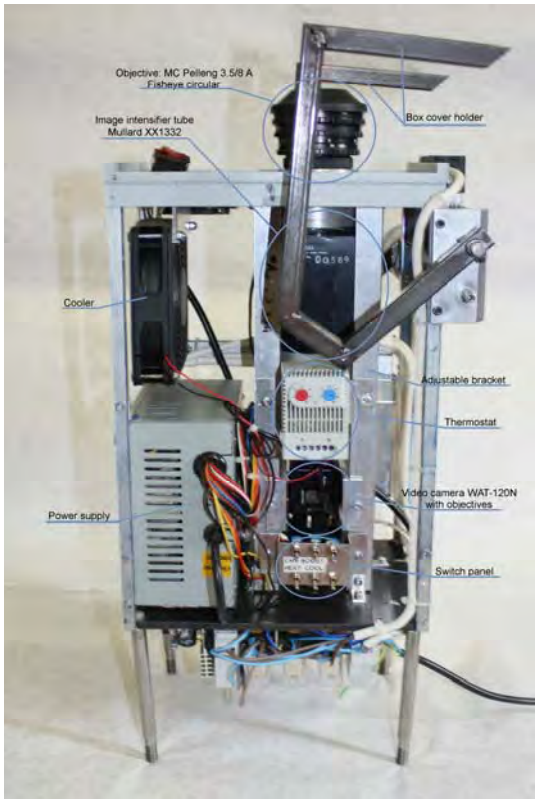
2. All-Sky Camera Hurbanovo (ASKH-1)

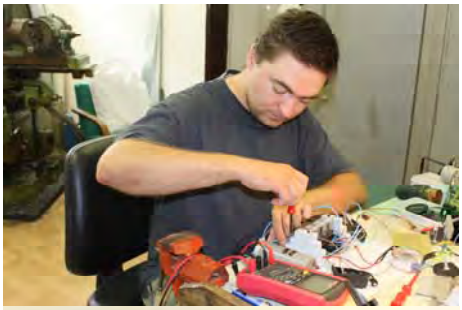
The main optical part of the all-sky camera is a fish-eye type camera lens CANON 04/02/15 mm. The image is enhanced at the output by using an image brightness amplifier with a diameter of 50 mm, for which the output scintillating shading is scanned by using the secondary lens, a Meopta 09/01/16 mm. A CCD sensor of the analog TV camera Watec 902H2 has been placed in its focus. The system is powered by a 24V voltage. 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 there was a meteor or another moving object in the field of view or not. In case there is a meteor, 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 can be found *e.g.* in Tóth et al. (2008).

3. Construction and Installation of the ASKH-1

This section presents a photogallery of the construction and installation of the All-Sky Camera Hurbanovo (ASKH-1).







Acknowledgements

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References

Tóth, J., Kornoš, L., Gajdoš, Š., Kalmančok, D., Zigo, P., Világi, J., Hajduková, M.: 2008, TV Meteor Observations from Modra, *Earth, Moon, and Planets*, 102, 257-261.