



SST-1M report

SST-1M report

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The SST-1M imaging atmospheric Cherenkov telescope for gamma-ray astrophysics

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A&A, 699, A255 (2025)

Observation of the Crab Nebula with the Single-Mirror Small-Size Telescope stereoscopic system at low altitude

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Summary		
	den	hodin
Mira	31	209
Dušan	27	176
Patrik	33	242
Thomas	20	137
	111	764

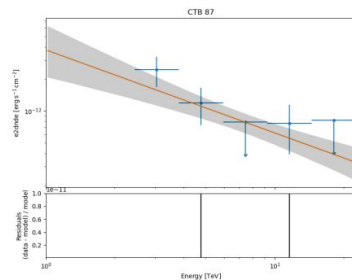
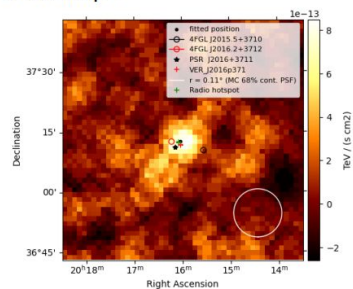
CygnusOB, CTA1, 1ES 1727+502,
Mrk421, Crab, 1ES 1950+650, M87
II, NuEm250409A

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SST-1M results

- In our data, the excess is compatible with a pointlike source

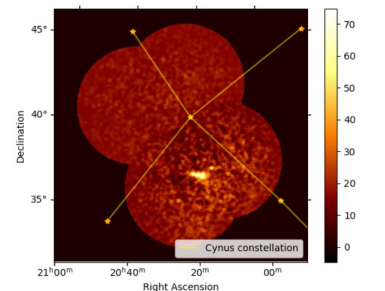
Flux map :



October 8, 2025 6 / 12

Combining OB2 & Dragonfly datasets

- 110.6 h hour in total
- Covering $\sim$ half of the Cygnus Constellation



Thomas Tavernier (tavernier@fzu.cz)

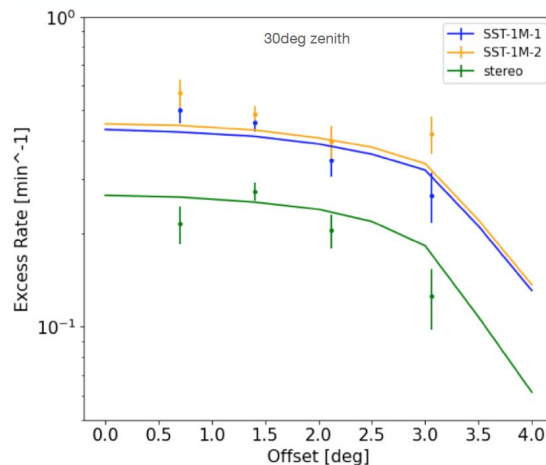
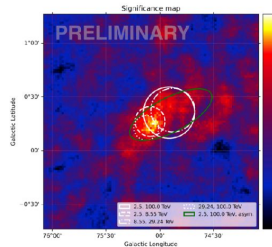
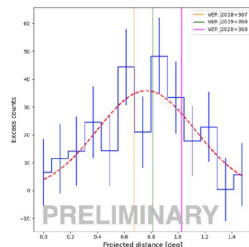
SST1M

September 10, 2025

11 / 12

Dragonfly analysis update - morphology

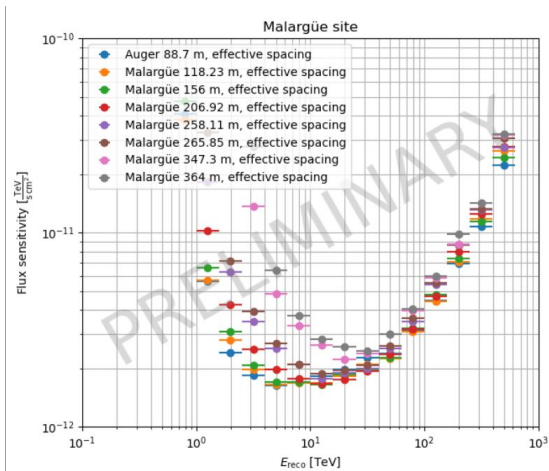
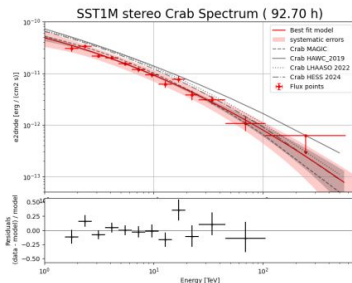
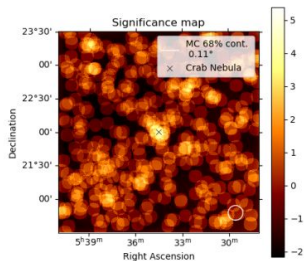
- Different spatial models assuming fixed PL with sp index -2
- A test of the energy dependent morphology
- Shape of the region derived, extension consistent with VERITAS**
- Longitudinal profile of the source - cannot confirm the two source morphology suggested by VERITAS (not significant in their



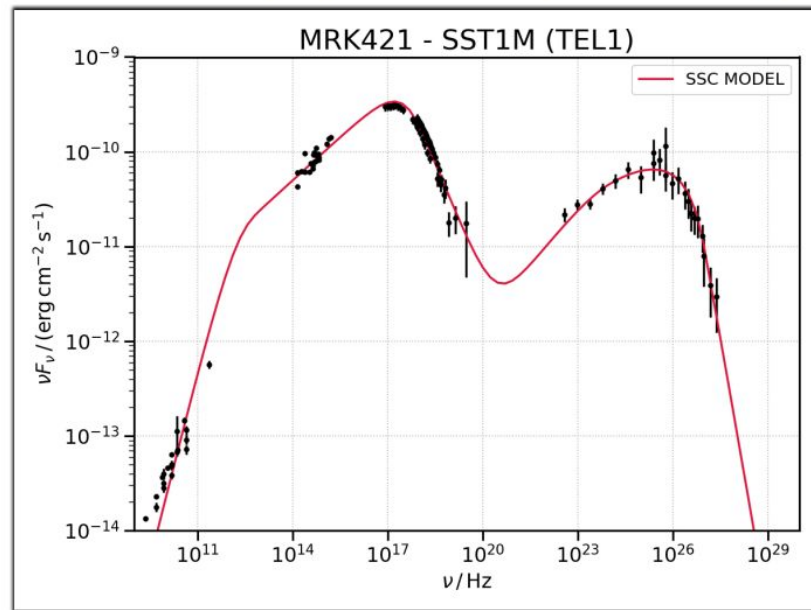
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Crab spectrum

- Which spectrum to show ?
- Significance > 100 TeV : 2σ
- Significance > 50 TeV : 5σ



DATA : SST-1M (TeV) + Abdo et al. (Radio to GeV)



SED of Mrk 421 with best fit SSC model using agnpy

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Letošní údržba

trip no.	location	date	cost CZK				note
			transport cos	no. Days	accomm.	salary	
1	Česká republika - Ondřejov	02.12.2025	5336,00	1	0	8000	Camera intervention
2	Česká republika - Ondřejov	27.11.2025	5318,00	1	0	8000	
3	Česká republika - Ondřejov	13.11.2025	5089,00	1	0	8000	
4	Česká republika - Ondřejov	30.10.2025	5161,00	2	2000	16000	
5	Česká republika - Ondřejov	16.09.2025	5722,00	2	2000	16000	
6	Česká republika - Ondřejov	17.07.2025	5157,00	1	0	8000	
7	Česká republika - Ondřejov	10.07.2025	5342,00	1	0	8000	
8	Česká republika - Ondřejov	02.07.2025	4730,00	1	0	8000	LID
9	Česká republika - Ondřejov	23.06.2025	5297,00	2	2000	16000	
10	Česká republika - Ondřejov	29.04.2025	4817,00	2	2000	16000	summer coolant + PLC
11	Česká republika - Ondřejov	09.04.2025	4313,00	2	2000	16000	PLC intervention
12	Česká republika - Ondřejov	14.01.2025	5555,00	2	2000	16000	DISK array
	Sum		61837		12000	144000	
	Total sum CZK		217837				
	Total sum €		8679				

Costs without material - power sources, gass, covers ... (1400 €)
 new disks - 7000 €

BACK-coated mirrors

[illegible]

T1 info	D80 2F	nir70 2F	L112	D80 min	D80 5690	RQC	year2020_6min30x30_60x60	year2020_5min30x30_45x45	location	measured at
S5T1M0BC	7.26	8.64	3.88	4.32	11159.59	87.40	75.97	87.43	75.97	Ondrejov
S5T1M0ZBC	7.14	7.18	3.57	3.59	11010.75	86.99	75.27	86.97	75.27	Ondrejov
S5T1M0BRC	7.48	10.86	3.74	5.43	11127.57	86.89	74.72	86.87	74.72	Ondrejov
S5T1M0BSC	6.86	9.78	3.48	4.98	11179.39	87.13	72.46	87.16	72.46	Ondrejov
S5T1M0SBC	5.88	5.96	2.94	2.98	11187.73	86.98	73.69	86.98	73.69	Ondrejov
S5T1M06BC	8.00	11.38	4.00	5.69	11143.43	87.30	79.32	87.34	79.32	Ondrejov
S5T1M07BC	9.09	12.60	4.54	6.30	11118.68	87.29	78.71	87.36	78.71	Ondrejov
S5T1M08BC	7.38	8.62	3.69	4.31	11145.48	87.56	76.87	87.63	76.87	Ondrejov
S5T1M09BC	7.58	12.21	3.78	4.11	11103.05	87.23	79.14	87.66	79.14	Ondrejov
S5T1M10BC	8.70	10.54	4.35	5.27	11147.88	87.14	78.74	87.19	78.74	Ondrejov
S5T1M0XBC										
S5T1M0YBC										
S5T1M0XBC										
S5T1M0XBC										
S5T1M0XBC										
S5T1M0XBC										
S5T1M0XBC										
S5T1M0XBC										
S5T1M0XBC										
MEAN	7.58	9.38	3.79	5.69	11154.50	87.23	77.17	87.25	77.17	

Rozložení na teleskopu ->
SIMULACE teleskopu ->
instalace a měření PSF atd
01/2026

SST-1M report

budoucnost SST-1M : 2 místa Indie - Hanle, Argentina - Auger = preferovaná

SST-1M telescopes relocation risk assessment

Scope of the document

The document describes the basic risk assessment and the definition of the risks related to the relocation of two SST-1M telescopes from Ondřejov to a final site based on the decision of the Steering Committee. The document describes the main risk and defines the mitigation of the risk and its impact on the relocation process.

Risk assessment definition

Risks are a natural part of the project. It is necessary to recognise and reduce the possible or acceptable level, and the remaining risk needs to be managed (see the measures below). Risk assessment [1] is the process of identifying, analysing, and evaluating risks to determine their impact on a project. The purpose of risk identification is to find, recognise, and describe risks that might help or prevent them from achieving their objectives. Relevant, appropriate, and up-to-date information is important in identifying risks. Risk evaluation involves comparing the results of the risk analysis with the established risk criteria to determine where additional action is required. This can lead to a decision to:

- do nothing further;
- consider risk treatment options;
- undertake further analysis to better understand the risk;
- maintain existing controls;
- reconsider objectives

Risk analysis involves a detailed consideration of uncertainties, risk sources, consequences, likelihood, events, scenarios, controls, and their effectiveness. The risks need to be identified and clear scales for the probability (likelihood) and severity of individual risks need to be defined. The score of the item can be calculated by multiplying these two measures. The result can identify critical risks that should be deeply investigated. Risks are evaluated in terms of probability of occurrence and impact on the project by the scales set out in Tables 1, 2 (a) - likelihood (probability) and (b) - severity (impact on the project below).

likelihood (a)	
scale	description
1	MIN (not likely to occur during the project lifetime)
2	LOW (occur rarely during the project lifetime)
3	MED (occur sometimes)
4	HIGH (occur frequently)
5	MAX (Certain to occur)

Tab. 1: Likelihood of the risk describes the probability of occurrence of the risk (0 - 100 %)

severity (b)		
scale	impact	description
1	No impact	Almost no impact on the project, no extra mitigation needed
2	Small	Low impact on the project, the risk should be monitored
3	Moderate	Potential threats to terms, cost, respectively resources of any partial activities - will require intervention, measure, adjustments, and re-evaluation of the project plan.
4	Significant	Threats to terms, cost, respectively resources of any partial activities - will require special intervention, significant adjustments, and re-evaluation of the project plan.
5	Fundamental	Serious threat to the objective of the project the final date of the project or the possibility of exceeding the total project budget - requires extraordinary interventions in the project plan.

Tab. 2: Definition of the severity of the risk assessment.

National/regional level risks

The list describes the project risks connected with the national or regional consequences affecting the process of telescope relocation. The risks are general groups of potential risks on the governmental and regional level connected with the implementation of the future SST-1M observatory to the host country, the scientific, and public community. The table includes the description, severity, and mitigation of the risks.

Local level risks

The local level risks are connected with the local conditions at the given site and can differ within a country depending on the location of the site.

Conclusion

The main risks at the national/regional and local levels were defined and described. The calculation of the risk assessment of the proposed sites applies the methodology to the location and condition of the sites. The result of the analysis is a 5x5 risk matrix with the

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hodnocení rizik

risk reg	National/ Regional level risk	likelihood	severity	risk level (like x sever)
N/R 1	Cultural/environmental impact	MIN	FUNDAMENTAL	5
N/R 2	Political/economical condition	LOW	FUNDAMENTAL	10
N/R 3	Host country support	LOW	SIGNIFICANT	8
N/R 4	Natural hazards risk	HIGH	SIGNIFICANT	16
N/R 5	Security risks	HIGH	SIGNIFICANT	16
N/R 6	Operational risk	MED	SIGNIFICANT	12
Local level risk				
LOC 1	environmental condition	HIGH	SIGNIFICANT	16
LOC 2	construction	MED	SIGNIFICANT	12
LOC 3	operation	MED	SIGNIFICANT	12
LOC 4	decomisioning risks	MIN	SIGNIFICANT	4
LOC 5	Skill resource risk	LOW	MODERATE	6
LOC 6	future developments	LOW	SIGNIFICANT	8
LOC 7	resources availability	MED	SMALL	6
LOC 8	funds	HIGH	FUNDAMENTAL	20
				Score
				146

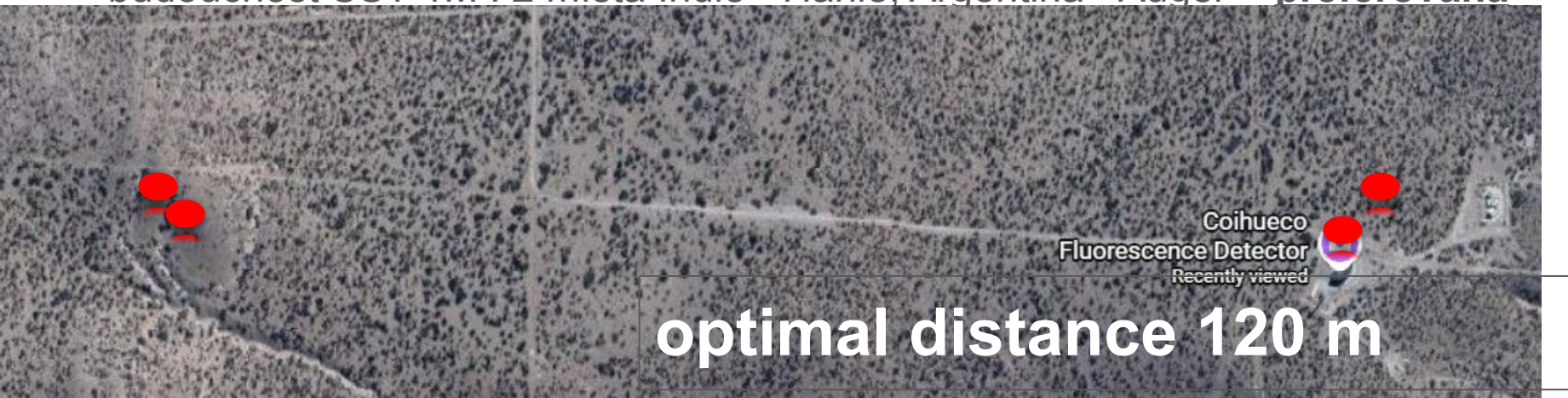
Discussion of the risks

risk ID	Hanle	Auger
N/R 1	Currently running a project, we do not expect any issues	Currently running a project, we do not expect any issues
N/R 2	No political economic issues so far	complicated political and economic situation. Pierre Auger Observatory has been operating for 25 years without any issues. The fees are slightly decreasing. The staff of the PAO project are highly experienced in handling the potential instabilities.
N/R 3	Strong interest from the Indian site.	PAO offers the infrastructure for hosting experiments,
N/R 4	Seismic zone 4, high tourist area, potential light pollution	Seismic zone 2, relaxed weather conditions
N/R 5	Close to the China border military area. A recent conflict between Pakistan and India has occurred. Special permit needed.	No accident at the site since 25 years of operation of PAO
N/R 6	not clear importation condition, no document signed	remote operation of PAO, local crews, Customs will be handled by the PAO with all exceptions.
LOC 1	low temperatures, low air pressure - cooling issues,	all env. parameters within SST-1M design requirements
LOC 2	Transport issues limited to a certain season, including installation, the 40ft container can not reach the site, high altitude sickness, and long acclimatisation. Infrastructure limited to summer time, limited availability of construction tools (crane, forklift ...)	no risk, low altitude, direct transport of the telescope from Buenos Aires harbour to the site within the container during the whole year. Containers could be used for storage. Construction the whole year expect July/Sep (winter)

risk reg	National/ Regional level risk	likelihood	severity	risk level (like x sever)
N/R 1	Cultural/environmental impact	MIN	FUNDAMENTAL	5
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Local level risk				
LOC 1	environmental condition	LOW	SIGNIFICANT	8
LOC 2	construction	LOW	SIGNIFICANT	8
LOC 3	operation	LOW	SIGNIFICANT	8
LOC 4	decomisioning risks	MIN	SIGNIFICANT	4
LOC 5	Skill resource risk	LOW	MODERATE	6
LOC 6	future developments	LOW	SIGNIFICANT	8
LOC 7	resources availability	LOW	SMALL	4
LOC 8	funds	LOW	FUNDAMENTAL	10
				Score
				98

SST-1M report

budoucnost SST-1M : 2 místa Indie - Hanle, Argentina - Auger = **preferovaná**



Land owner contacted by Ingo - no objections so far

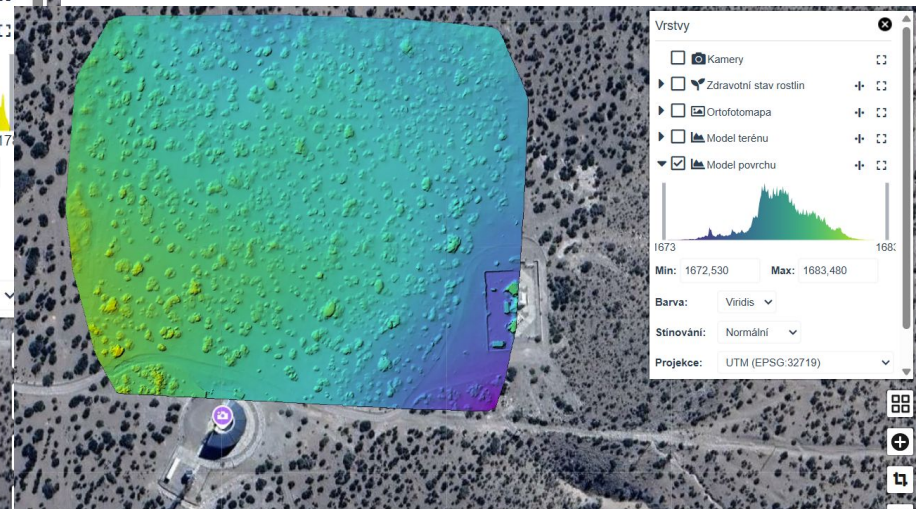
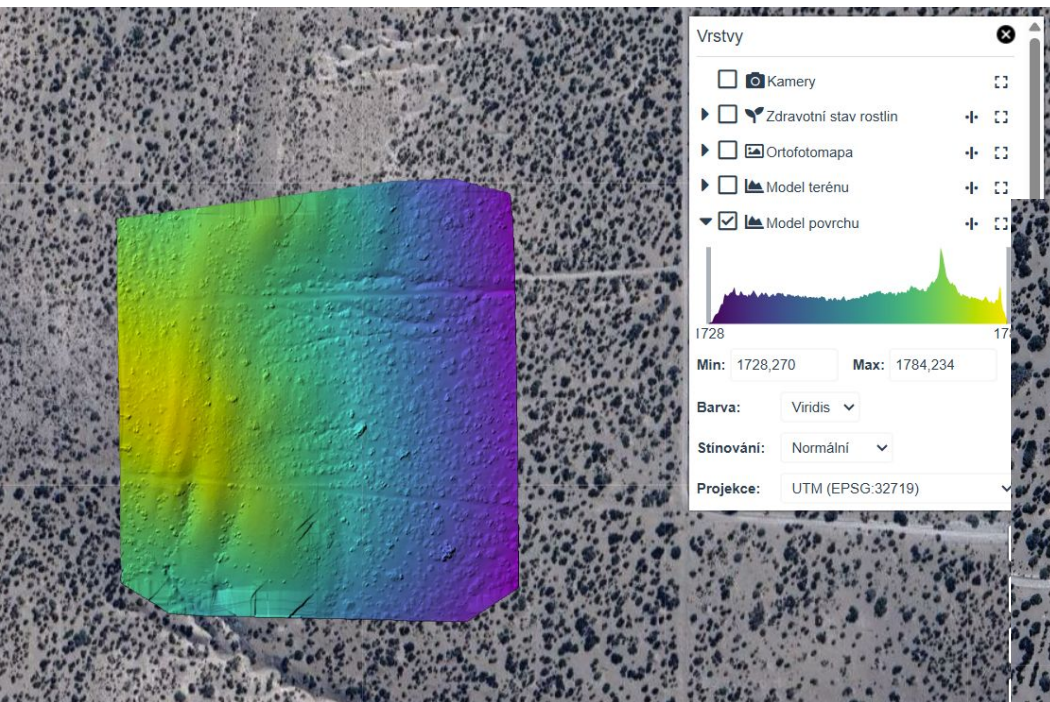
Site on top of the hill near Coihueco

- + full visibility of Andes (10-15 km)
- + neutrino search program to complement gamma ray physics
- + synergy with ANT
- need to build expensive infrastructure (road, electrical and internet connection >1km)

Site by Coihueco

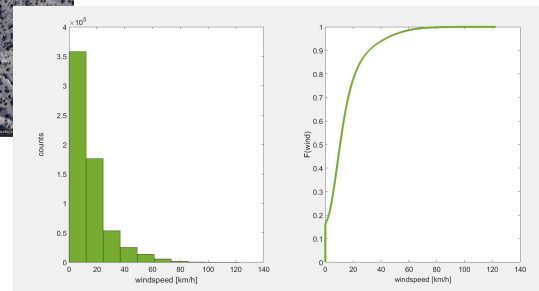
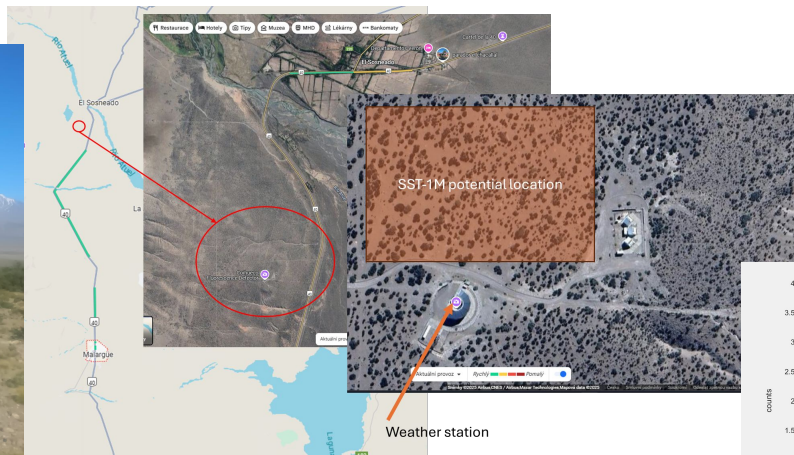
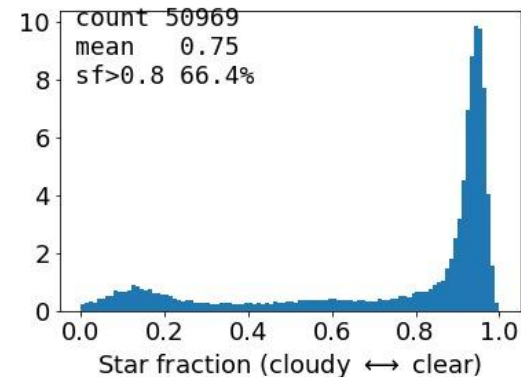
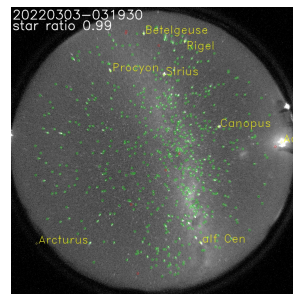
- obscuration of Andes
- no neutrino program
- + no need to build expensive infrastructure

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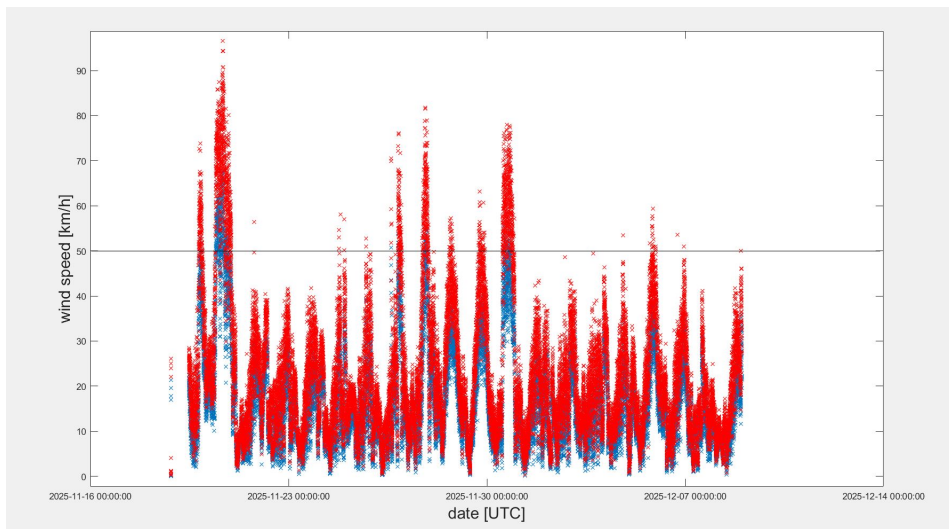


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Site for potential neutrino detection far from CO, we installed anemometer - thanks to AUGER staff

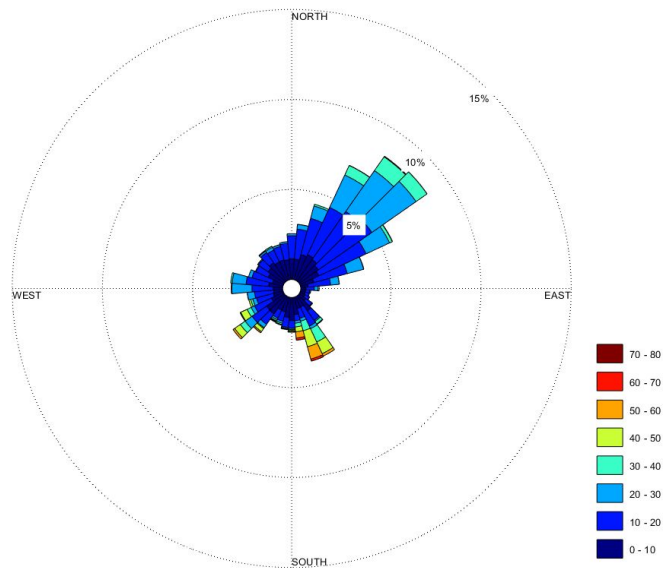


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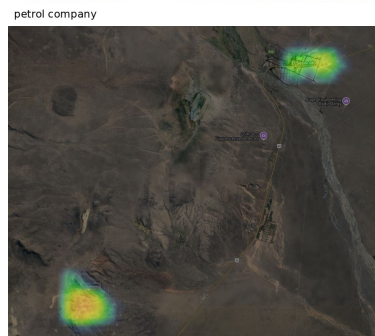
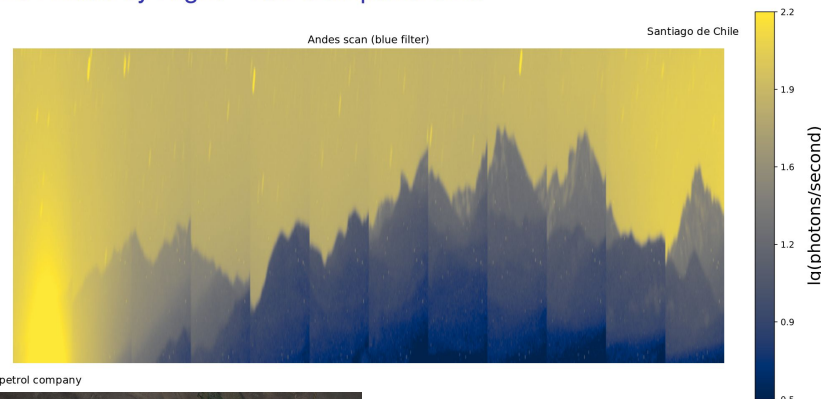
vítr ANT site

momentálně krátká statistika
čekám na další data



NSB for ANT location

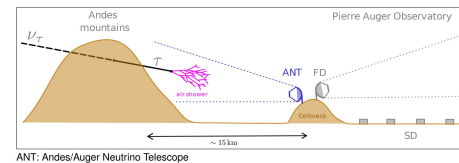
The Andes by Night – raw blue panorama



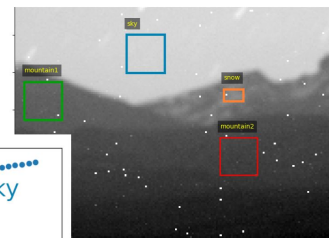
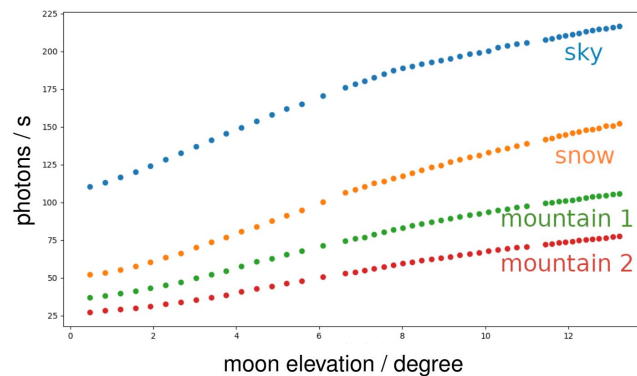
Ropáci

The Andes by Night: Optical Background for ANT

H. Beltz, K. Daumiller, U. Giaccari, B. Keilhauer, R. Mussa,
L. Perrone, J.R. Rodriguez, F. Salamida, M. Unger

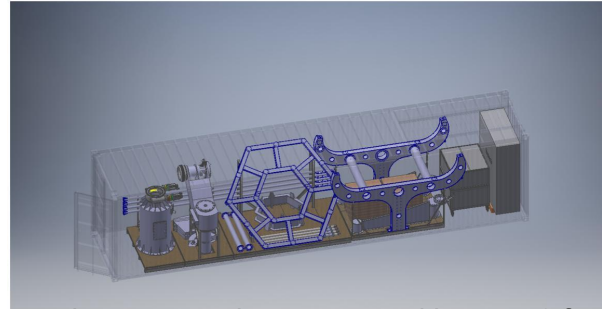


Andes and Sky Background (preliminary)

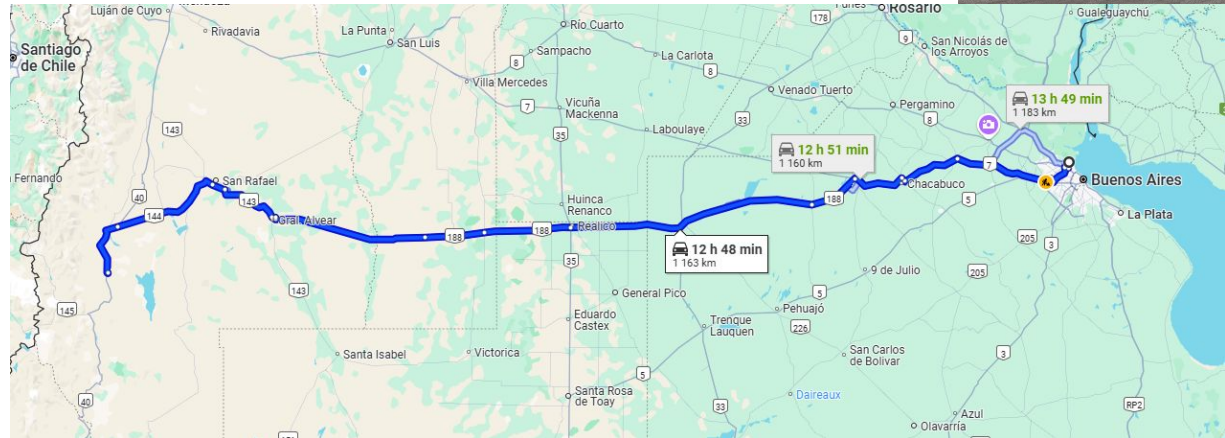
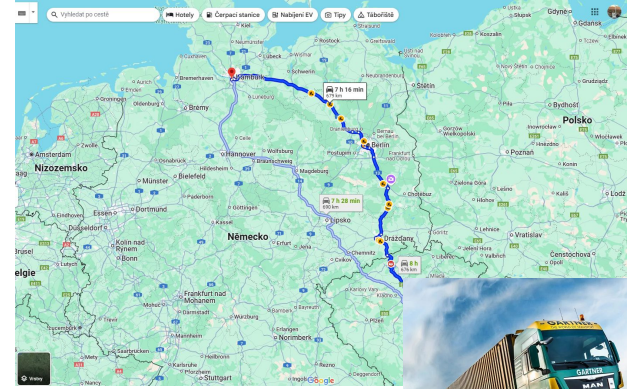


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- Transport + customs



One telescope can be transported in one 40 ft container. The servers and auxiliary equipment for two telescopes fit in one 20 ft container. In total three containers are needed to be shipped two 40 ft containers and one 20 ft.



SST-1M report

[illegible]

SST-1M report

1 month/telescope



SST-1M report

PROJECT TITLE		SST-1M decommissioning			
PROJECT MANAGER		Dusan, Mira, Petr			
WBS NUMBER	TASK TITLE	description	estimate cost	indirect cost	comment
				FTE (salary), accommodation, etc	
1	Telescope Structure				
1,1	dismounting telescope parts	crane , forklift	150000		4 days/telescope;2200/hour
1,2	Preparation of the the un-assembly cabinet	PL	0		
1,3	moving the containers to the location	crane, track	30000		5 hours, crane + track
1,4	removing the pallets from containers, fix	forklift	10000		
1,6	moving pallets back to containers	forklift	10000		20 hours;2000CZK/hour
1,7	transport full containers to a location for further transport	crane and track			
1,8	UN -assembling of the docking station	remove/pack	1000		packing material
2	Cables				
2,1	new electrical cabinet	for installation to PAO	30000		we will need the cabinets for power and network distribution
2,2					
3	Mirrors and tests				
3,1	Mirrors uninstillation	scaffolding	0		
3,2	Packing mirrors	boxes	10000		
3,3	packing actuators	boxes	10000		
3,4					
4	Camera				
4,1	unloading the cameras	lorry with crane	6500		
4,2	storage in the garage	storage	0		
4,3	shipment	transport	0		Swiss money
4,4					
4,5					
4,6					
4,7					
5	indirect				
5,1	accommodation			54000	64 paxnights
5,2	salaries*			243000	486 hours
containers					
CSC revision			15000		https://www.cslloyd.cz/kontakty/
total sum (CZK)			262500	297000	
total sum (€)			10714	12122	
new containers*			180000		
total sum* (CZK)			407500		in case of new containers
total sum* (€)			16633		

Plány 2026 :

- Obnovit pozorování ve stereo
- pozorovat do min. Q3/2026
- kamera tel1 v létě na zásadní upgrade do UNIGE
- kamera tel2 po létě na základní upgrade do UNIGE
- příprava infrastruktury AUGER Q2, Q3, Q4
- rozložení teleskopů a příprava na transport Q4/2026, Q1/2027
- transport Q2/2027
- instalace Q3-4/2027

Zásadní bude výsledek jednání STEERING COMMITTEE 16.12.2025 v Ondřejově