Východoslovenský Vesmírny Klaster

Šimon Mackovjak

SARIO
SLOVENSKÁ AGENTÚRA PRE ROZVOJ INVESTÍCIÍ A OBCHODU

SLOVENSKÁ VESMÍRNA KANCELÁRIA

DEUTSCHE TELEKOM IT SOLUTIONS

innovlab
startup centre of

TECHNICAL UNIVERSITY OF KOŠICE

SPACE::LAB

Perspective for young talents

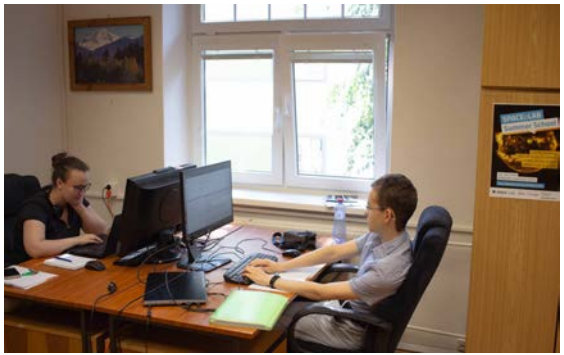
Background

SPACE::LAB

Main objectives

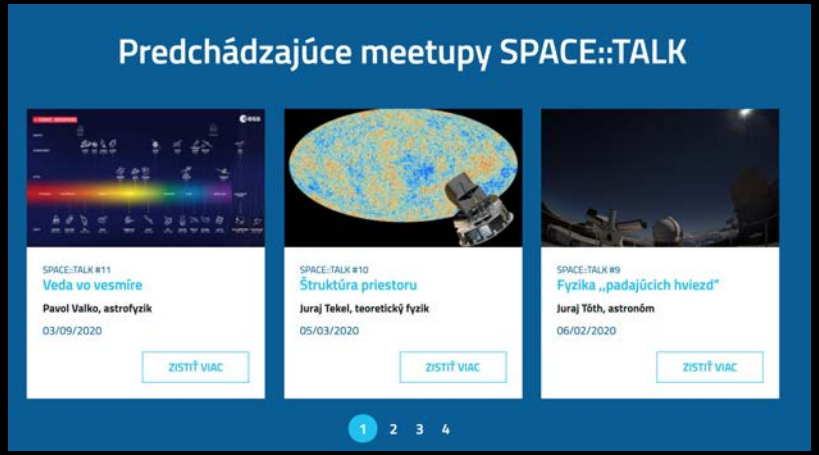
European Space Agency
Agence spatiale européenne

- **ATTRACT** young generation with passion for SPACE
- **EDUCATE** the attracted community directly in our lab
- **INVOLVE** the best students to our actual space science & engineering projects



SPACE::TALK

- regular meetup of space enthusiasts in Košice
- 23 meetups since April 2019
- various topics
- **5 Oct (Thursday) - SPACE::TALK #24**

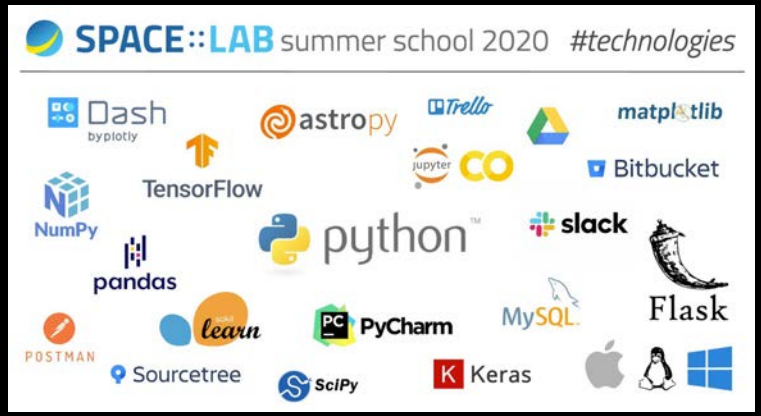


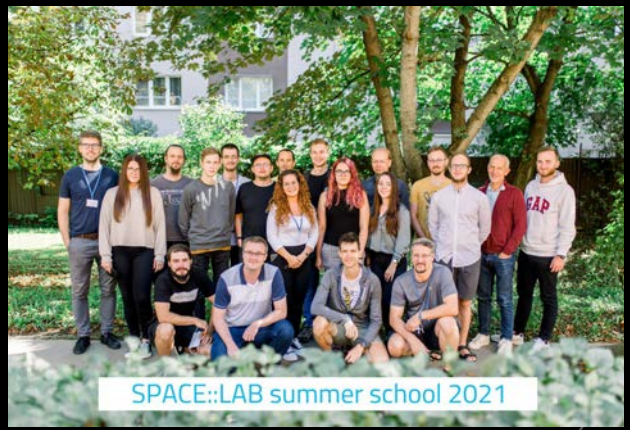
space-lab.sk/space-talk

SPACE::LAB summer school

Interconnection of Space and IT community

- 2019: Machine learning and Space data
- 2020: Develop your own virtual observatory
- 2021: Space, Cloud & Deep learning
- 2022: Merging Space & IT
- 2023: Exploring Space science with GPT





Bachelor / Diploma Thesis

- **Matej Varga**, theses in machine learning and space weather: Bachelor thesis (SK), Diploma thesis (SK)

- **Martin Harman**, thesis in deep learning and solar corona segmentation: Diploma thesis (SK)
- **Adrián Kundrát**, theses in deep learning for detection and prediction tasks: Bachelor thesis (SK), Diploma thesis (SK)
- **Samuel Jaščur**, thesis in unsupervised learning and atmospherics detection: Diploma thesis (SK)
- **Petra Kamenská**, thesis in deep learning and TLEs detection: Bachelor thesis (SK)
- **Kamila Jenčíková**, thesis in deep learning and meteors detection: Bachelor thesis (SK)
- **Michal Bencúr**, thesis in deep learning and airglow science: Bachelor thesis (SK)
- **Veronika Motúzová**, thesis in Dst prediction by LSTM: Diploma thesis (SK)
- **Lívia Potočňáková**, thesis in segmentation of flare ribbons by SCSS-Net: Diploma thesis (SK)
- **Erik Kandalík**, thesis in AMON-ES data engineering: Diploma thesis (SK)
- **Lívia Muranková**, thesis in deep learning and TLEs detection: Bachelor thesis (SK)
- **Adam Majirský**, thesis in SCSS-Net application to SOHO data: Bachelor thesis (SK)

https://space-lab-sk.github.io

Scientific Papers

AGU ADVANCING EARTH AND SPACE SCIENCE

JGR Space Physics

TECHNICAL REPORTS: METHODS

10.1029/2020JA028991

Data-Driven Modeling of Atomic Oxygen Airglow over a Period of Three Solar Cycles

Š. Mackovjak[1,3], M. Varga[2], S. Hrivňak[3], O. Palkoci[3], and G. G. Didebulidze[4]

[1]Department of Space Physics, Institute of Experimental Physics, Slovak Academy of Sciences, Košice, Slovakia,

Key Points:

- A data-driven model is able to represent c phenomena
- Advanced ma techniques ar development model
- Developed da visualizes alt over a 30-yea (41.75 N, 42.8

Correspondenc Š. Mackovjak, mackovjak@sasi

Citation: Mackovjak, Š., V Palkoci, O., & Di Data-driven mo airglow over a p cycles. *Journal o Space Physics*, 12 https://doi.org/1

Received 4 DEC Accepted 22 FE

Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY

MNRAS **508,** 3111–3124 (2021) https://doi.org/10.1093/mnras/stab2536

SCSS-Net: solar corona structures segmentation by deep learning

Šimon Mackovjak,[1]★ Martin Harman,[2] Viera Maslej-Krešňáková[2] and Peter Butka[2]

[1]*Department of Space Physics, Institute of Experimental Physics, Slovak Academy of Sciences, 040 01 Košice, Slovakia*

[2]*Department of Cybernetics and Artificial Intelligence, Faculty of Electrical Engineering and Informatics, Technical University of Košice, 042 00 Košice, Slovakia*

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Key

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AGU ADVANCING EARTH AND SPACE SCIENCE

Earth and Space Science

TECHNICAL REPORTS: METHODS

10.1029/2021EA002007

Automatic Detection of Atmospherics and Tweek Atmospherics in Radio Spectrograms Based on a Deep Learning Approach

Viera Maslej-Krešňáková[1], Adrián Kundrát[1], Šimon Mackovjak[2], Peter Butka[1], Samuel Jaščur[1], Ivana Kolmašová[3,4], and Ondřej Santolík[3,4]

[1]Department of Cybernetics and Artificial Intelligence, Faculty of Electrical Engineering and Informatics, Technical University of Košice, Košice, Slovakia, [2]Department of Space Physics, Institute of Experimental Physics, Slovak

Key Points:

- Atmospherics can be effectively detected on frequency-time spectrograms by a deep learning approach
- Our method provides automatic and reliable extractio atmospherics' details further statistical ana
- The developed metho applicable as a metho similar applications i

Correspondence to: Š. Mackovjak, mackovjak@saske.sk

Citation: Maslej-Krešňáková, V., K Mackovjak, Š., Butka, P., Kolmašová, I., & Santolí Automatic detection of a and tweek atmospherics spectrograms based on a approach. *Earth and Spa* 8, e2021EA002007. https org/10.1029/2021EA002

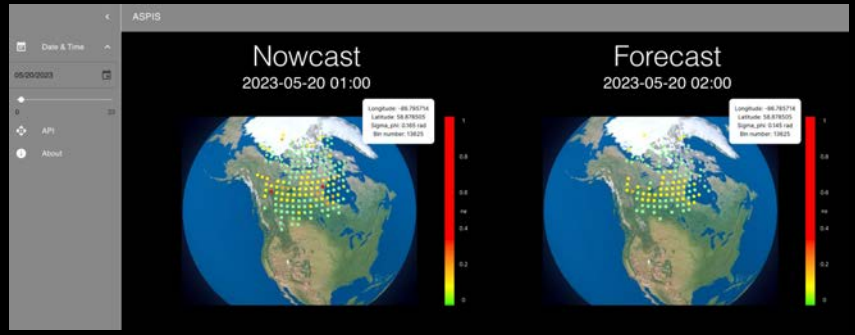
Design and construction of hardware and software for autonomous observations of Transient Luminous Events

S. Amrich,[a,b,*] Š. Mackovjak,[b] I. Strhárský,[b] J. Baláž[b] and M. Hančikovský[c]

[a]*Charles University, Faculty of Mathematics and Physics, Ke Karlovu 3, 121 16 Praha 2, Czech Republic*

[b]*Department of Space Physics, Institute of Experimental Physics, Slovak Academy of Sciences,*

ESA projects



ASPIS

How to use our REST API

GET	aspis.services/api/type/year/month/day/hour/file

{type}	nowcast I forecast
{year}/{month}/{day}{hour}	YYYY/MM/DD/HH
{file}	averaged.json I raw.json

Example:

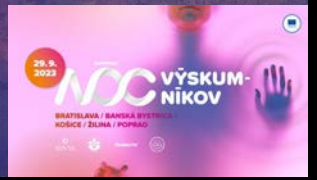
GET	aspis.services/api/nowcast/2023/07/02/11/averaged.json
Response status code: 200	{ "dataSource": "CHAIN", "timeUtc": "2023-07-02T11:00:00", "binValues": [{ "binId": 12984, "sigmaPhi": 0.039 }, { "binId": 12987, "sigmaPhi": 0.036 },

KOZMICKÝ STRÁŽCA

MONITOROVANIE KOZMICKÉHO ODPADU

PLANETÁRNA OBRANA

SPACE LAB innovlab startup centre of VÝSKUM-NÍKOV

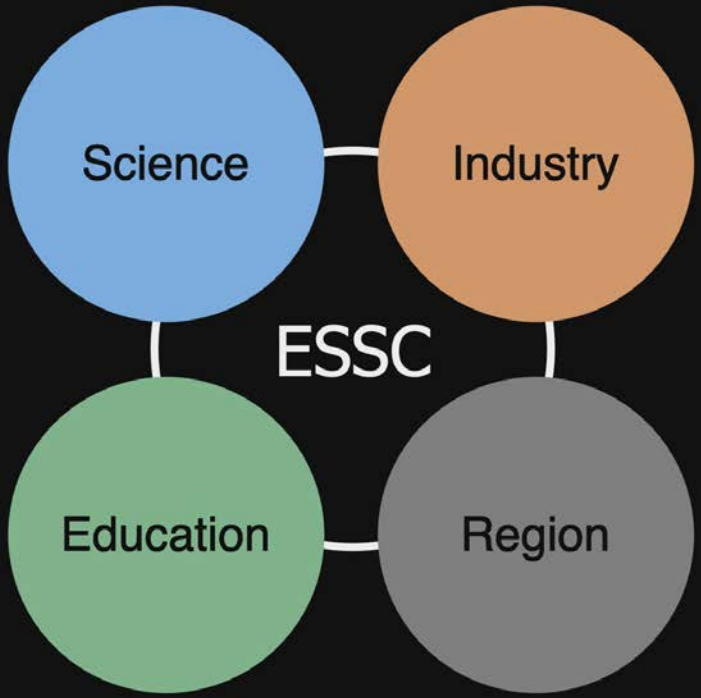


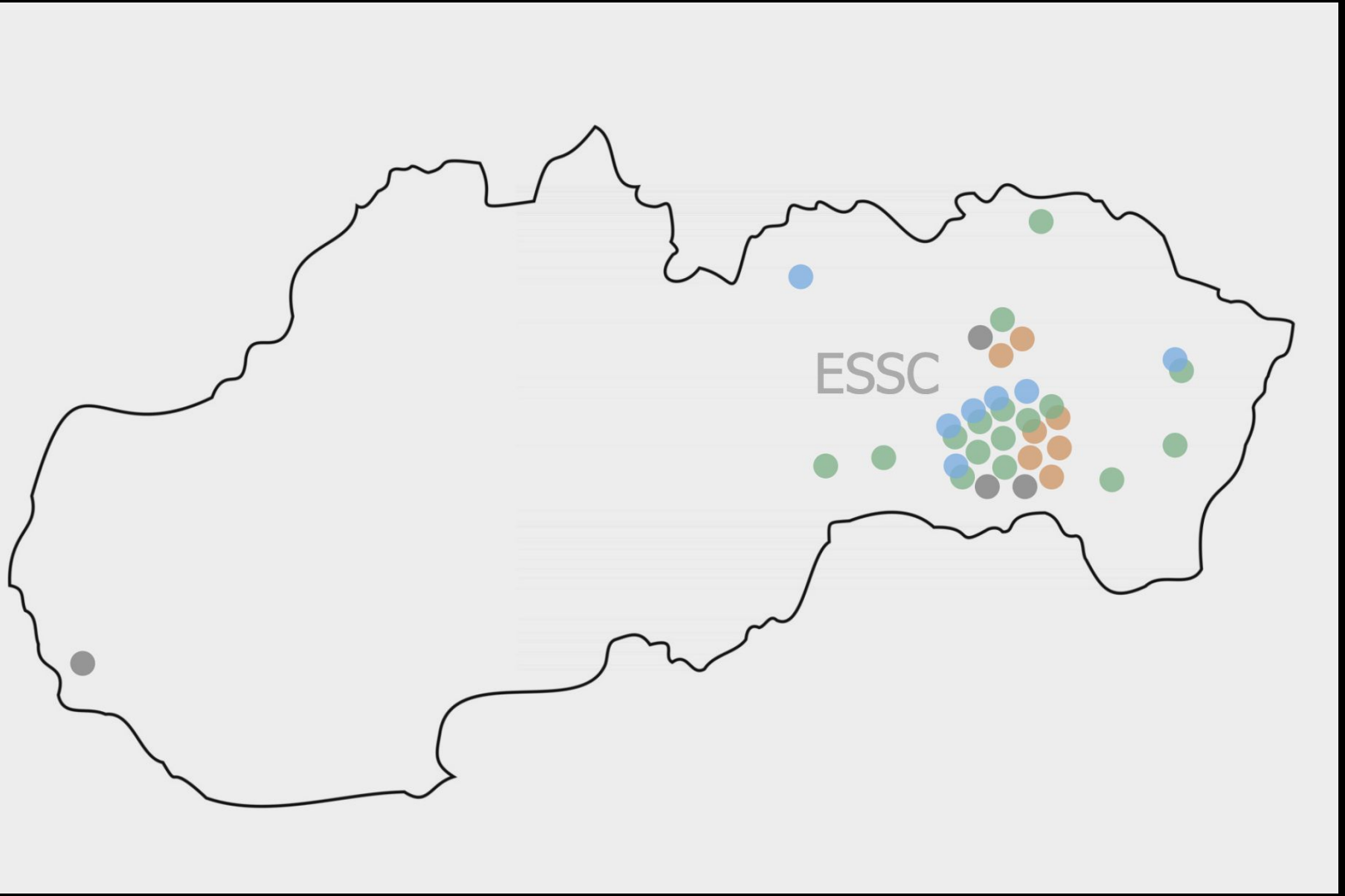
https://kozmickystrazca.sk

Space Hackathon - Košice, Nov 2022

East Slovak Space Cluster

East Slovak Space Cluster




ESSC

Memorandum of Understanding - Košice, 18 Sep 2023

CIELE

- Rast ekonomiky vesmírneho sektora vo Východoslovenskom regióne.
- Byť lídrom vo výskume a vývoji.
- Úzka spolupráca s ESA a EÚ.
- Využívanie vesmíru pre potreby a dobro občanov.
- Inšpirovať talent a Slovensko.
- Dostať región na mapu vesmírneho priemyslu a výskumu.

AKO DOSIAHNEME STANOVENÉ CIELE

- Podporovať rast vesmírneho sektora pomocou presadzovania a zastupovania spoločných záujmov.
- Rozvoj vesmírneho výskumu a technológií.
- Spolupracovať lokálne, na národnej úrovni a medzinárodne.
- Budovanie kapacít a tvorba projektov a udržateľných služieb a produktov.
- Zaujať talent a popularizovať vesmírny výskum a priemysel.
- Vyhľadávanie a tvorba finančných zdrojov pre realizáciu aktivít.

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Summary

- The ‘New space’ era has started

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- We need to provide perspective for young talents

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