

Резултати от българо-австрийския проект за слънчева и коронална активност

Автори:

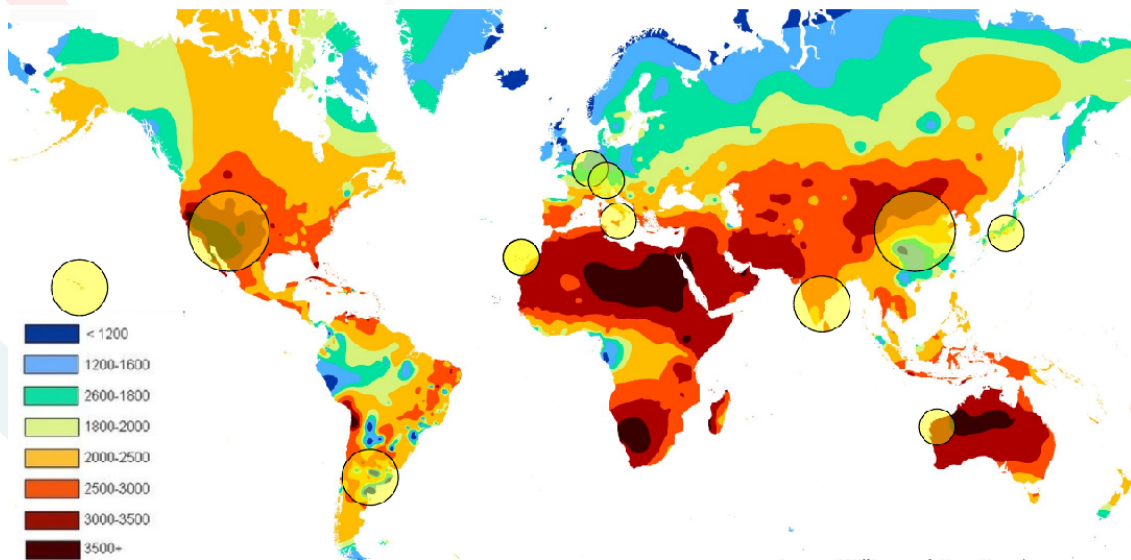
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Камен Козарев⁽¹⁾, Олег Степанюк⁽¹⁾, Пенчо
Маркишки⁽¹⁾, Георги Латев⁽¹⁾

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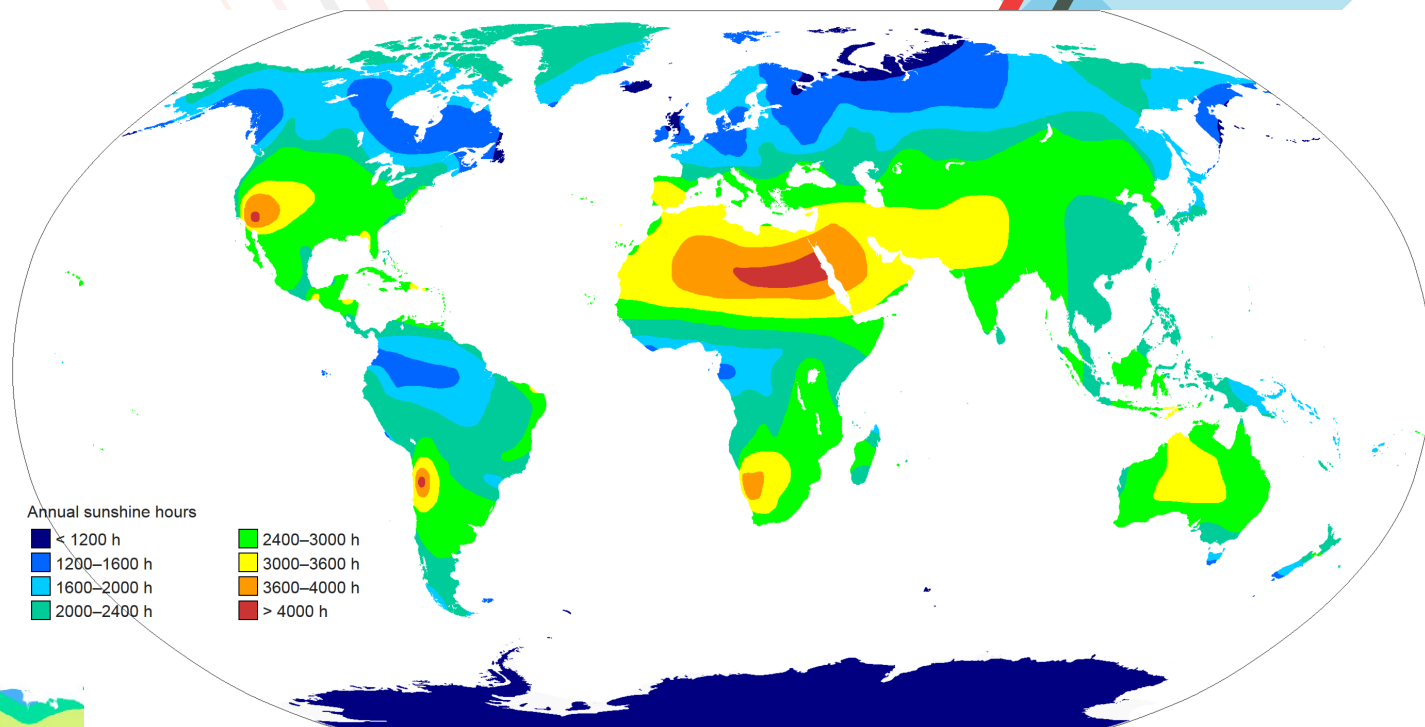
⁽²⁾ Univeristy of Graz and Kanzelhöhe Solar Observatory,
Austria

Защо?

- “Дупка” м/у UT+1 и UT+6
- Неизгодно да се качи на сателит

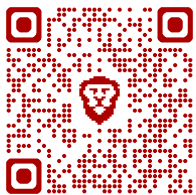


Logan Williams, <https://exclav.es>



Joint **Observations** and Investigations of
Solar Chromospheric and Coronal
Activity
(2023-2025)

Bg-PI: R. Miteva
At-PI: W. Poetzi



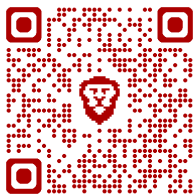
Цели

Техническа: Инсталиране на хромосферен телескоп (СТ) и разработване на стандартизирана методология за наблюдение, допълваща данните от патрулния инструмент в Канцелхое (KPI).

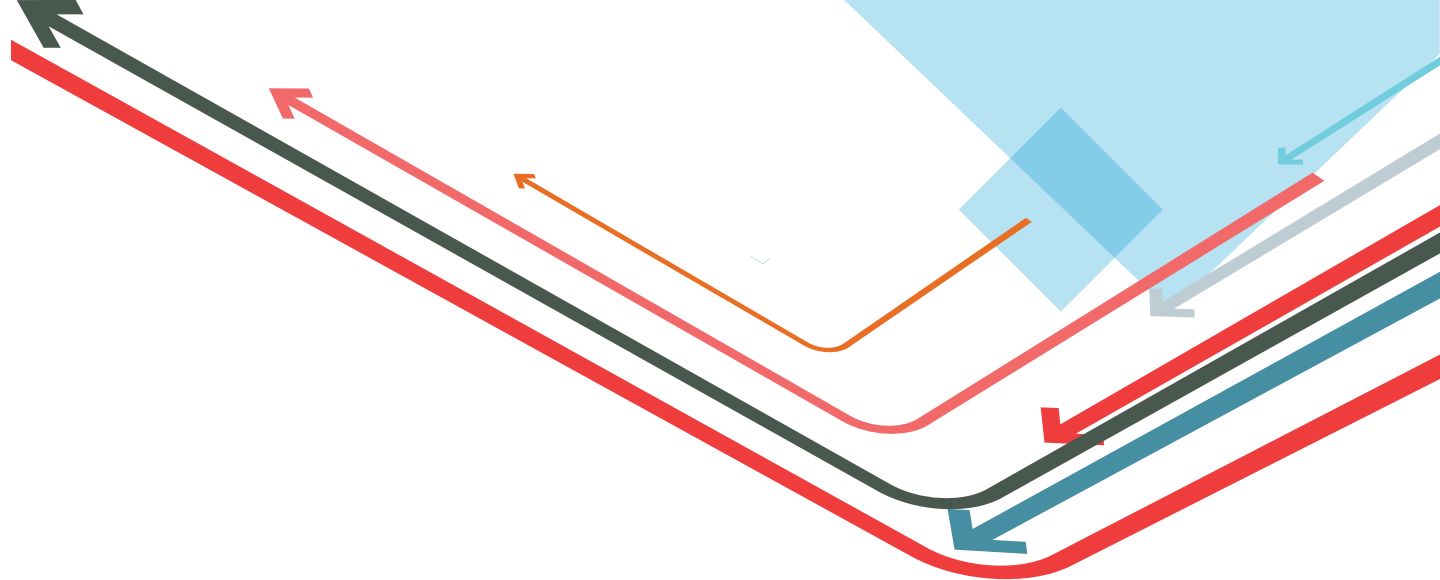
Научна: Провеждане на комбинирани слънчеви наблюдения (наземни и космически) за изследване на:

- Хромосферни характеристики на спокойното Слънце.
- Предеруптивни активни региони.
- Многовъълнови прояви на слънчеви еруптивни феномени (морфология и кинематика).





Работни пакети



Work Package #1

Technical support of NAO-Rozhen Chromosphere Telescope and observation campaigns with KSO facilities

- Task 1.1: Telescope installation
- Task 1.2: Data processing
- Task 1.3: Observation Campaign
- Task 1.4: Image enhancement

Work Package #2

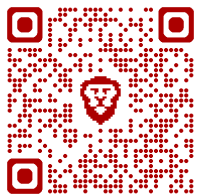
Joint investigations of solar chromospheric and coronal activity

- Task 2.1: Chromospheric Signatures of Quiet Sun and Pre-Eruptive Configurations
- Task 2.2: Multi-wavelength study of solar activity phenomena, their morphology and kinematics

Work Package #3

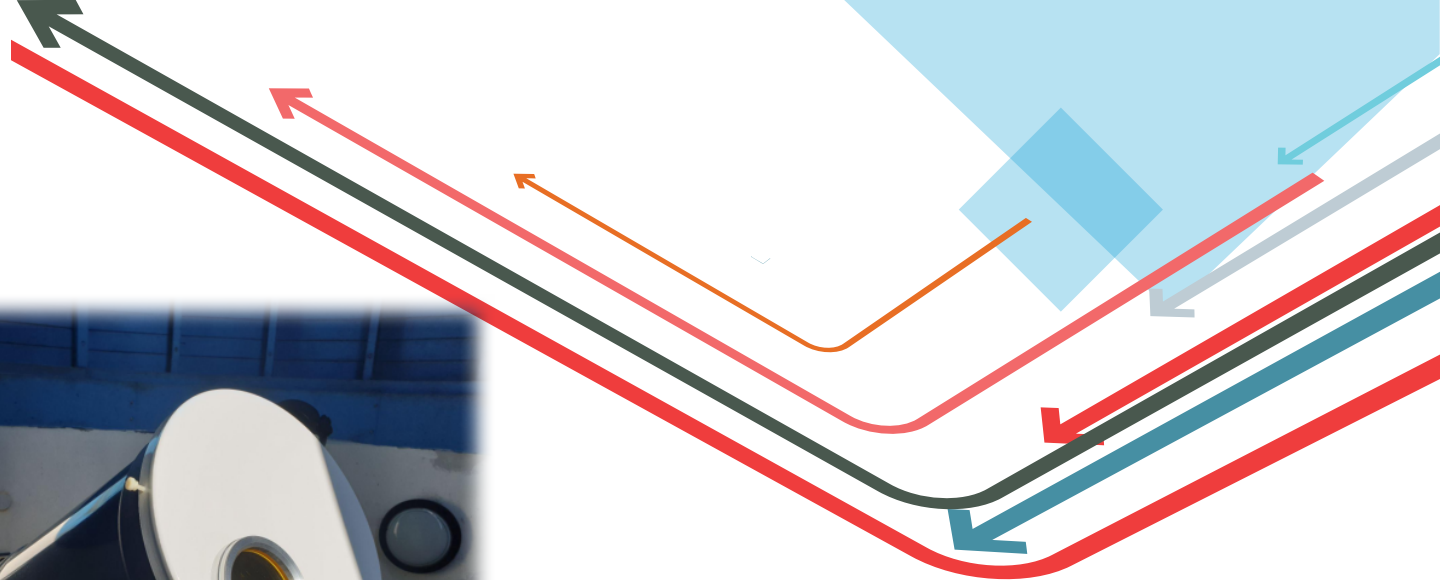
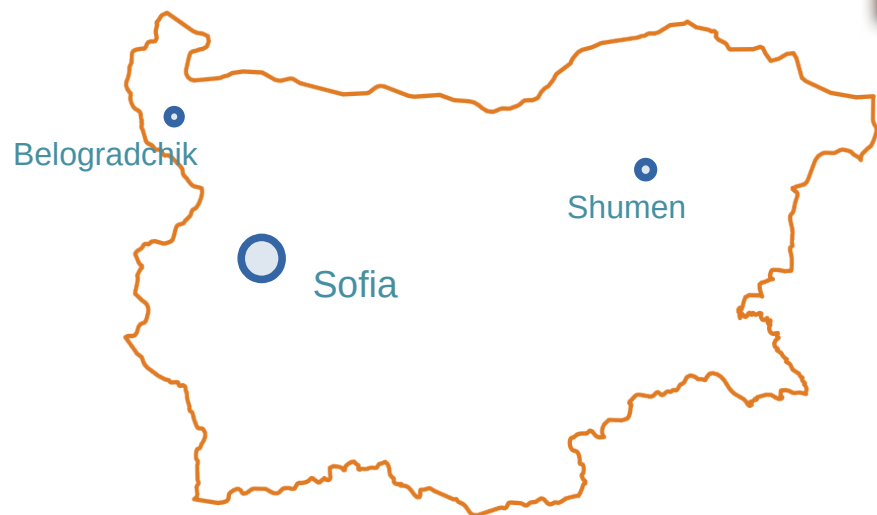
Dissemination of the project results

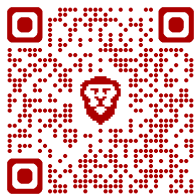
- Task 3.1: Project web-site
- Task 3.2: Scientific dissemination



Работни пакети

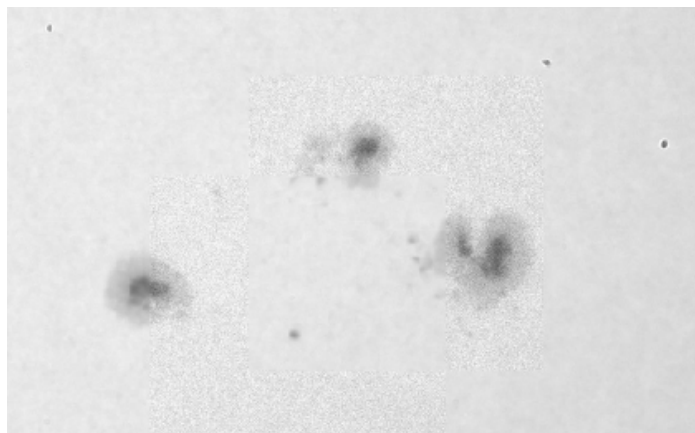
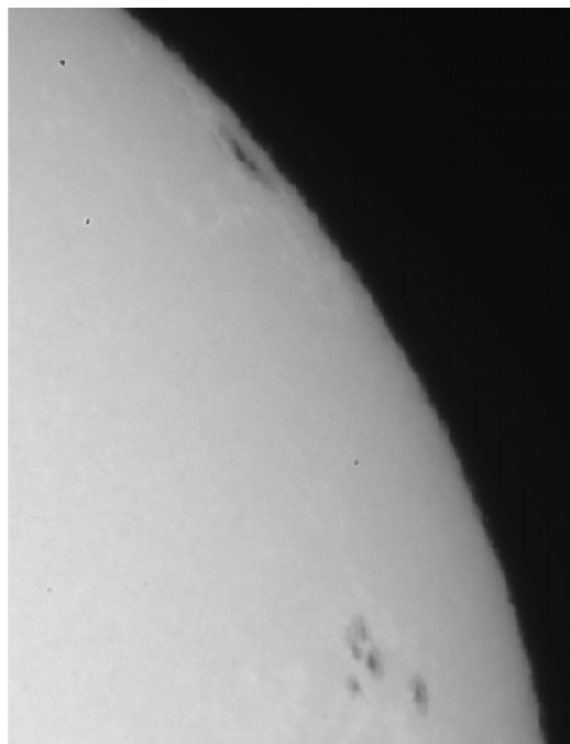
Задача 1.1



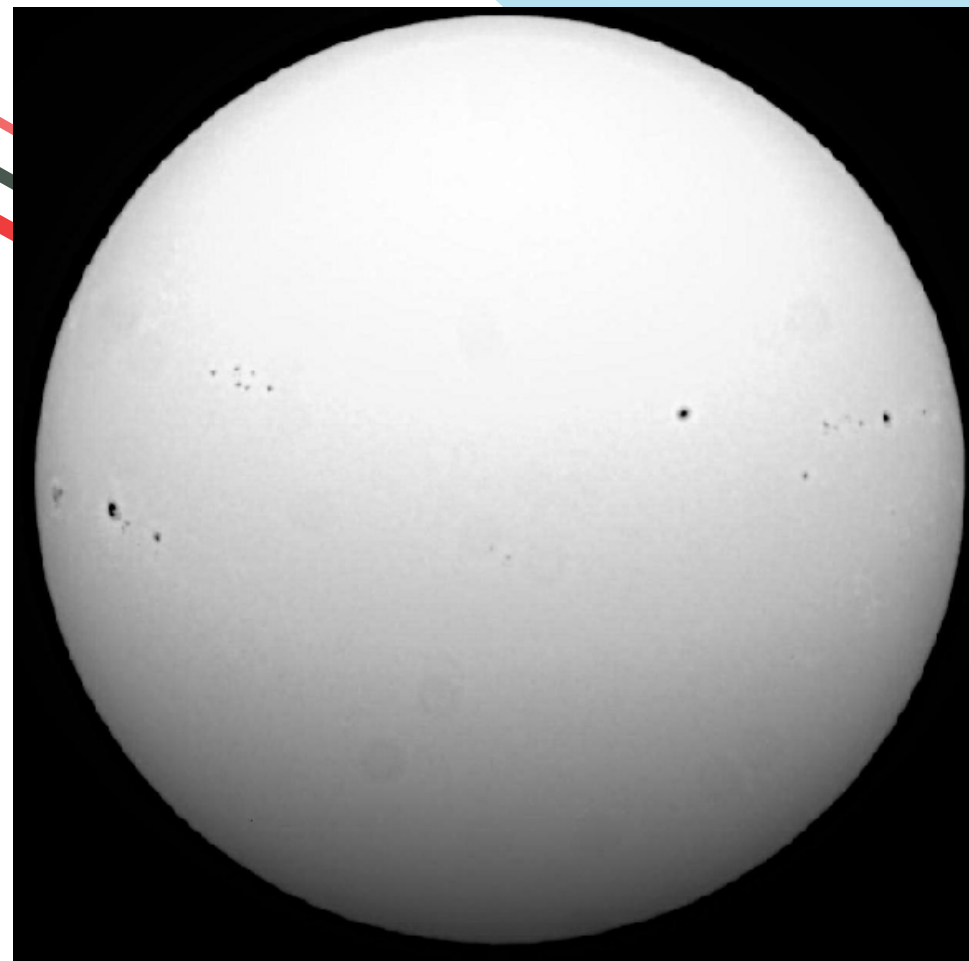


Работни пакети

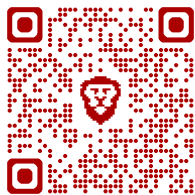
Задача 1.1



Белоградчик

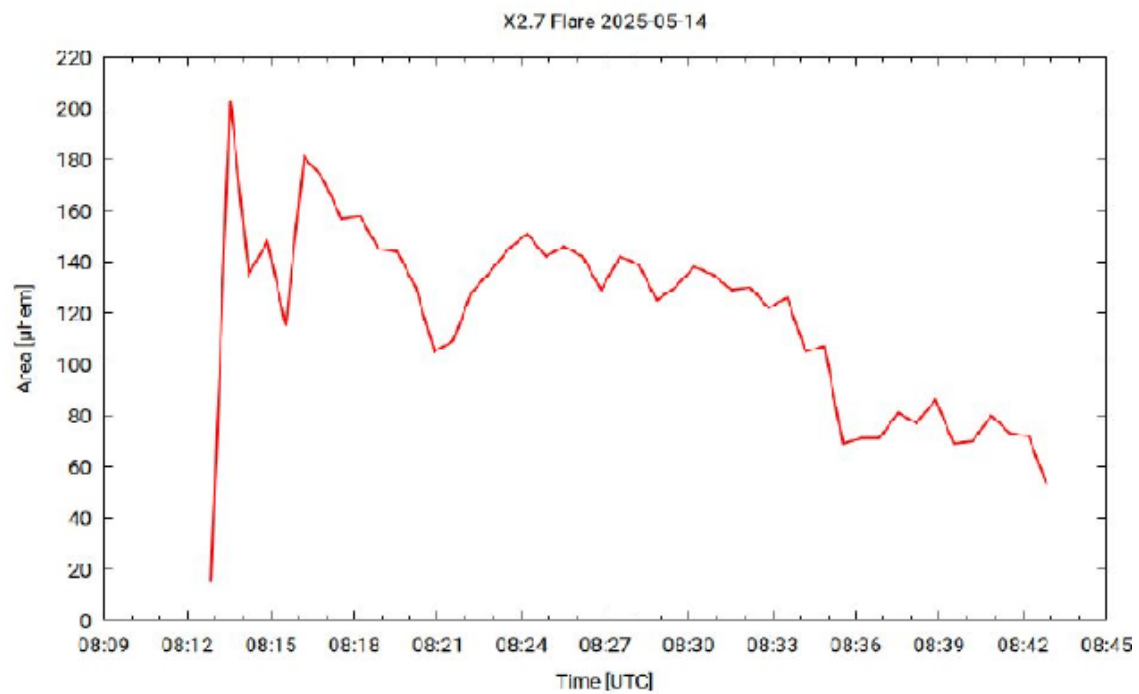
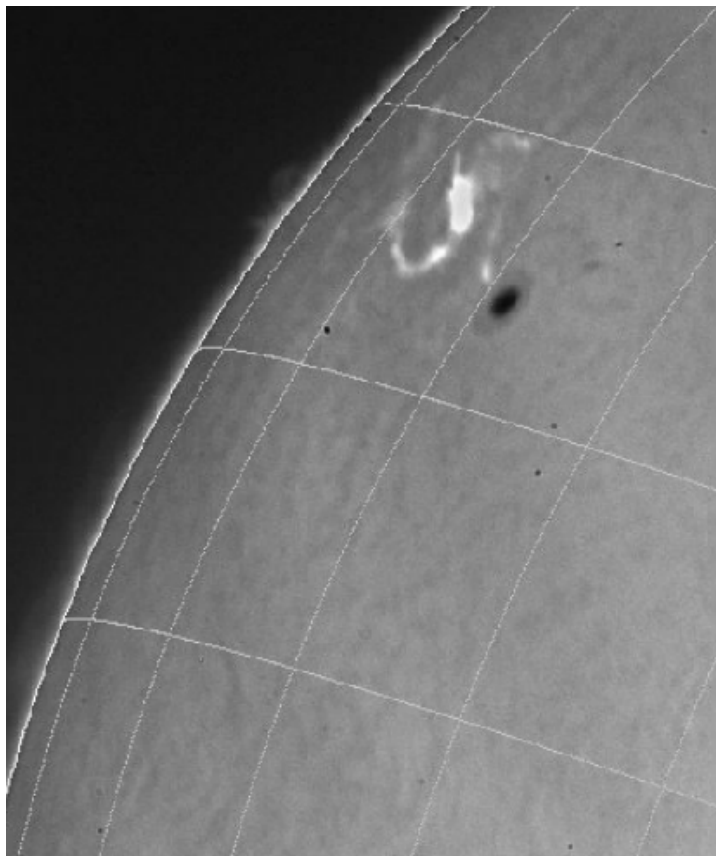


София – у-ще “св. Георги” юни 2025г.

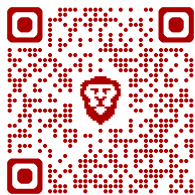


Работни пакети

Задача 1.1



X-ray: X2.7 Flare
14.05.2025г.



Работни пакети

Задачи 1.2, 1.3, 1.4



Ноември 2023 (България):

Д-р Вернер Пьотци – инспекция на възможностите за наблюдение в НАО Рожен и работни дискусии в ИА с НАО.



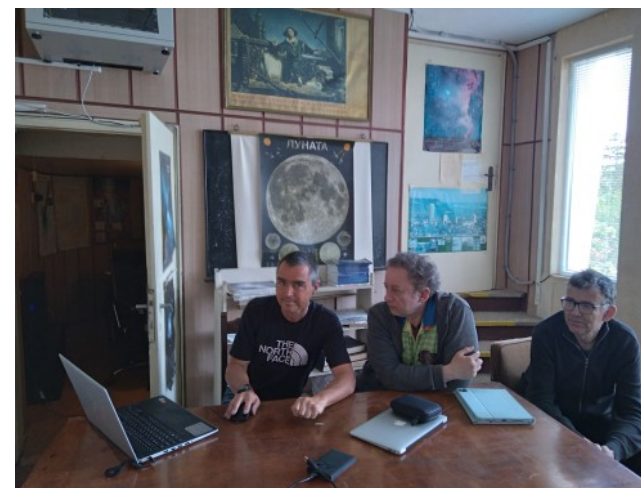
Април 2024 (Австрия): Д-р Олег Степанюк – запознаване с австрийските инструменти и методи за обработка на данни.



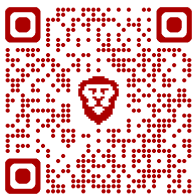
Октомври 2024 (София): Докторант Кристоф Ширнингер.



Юни 2025 (Австрия): Д-р Росица Митева и д-р Момчил Дечев.

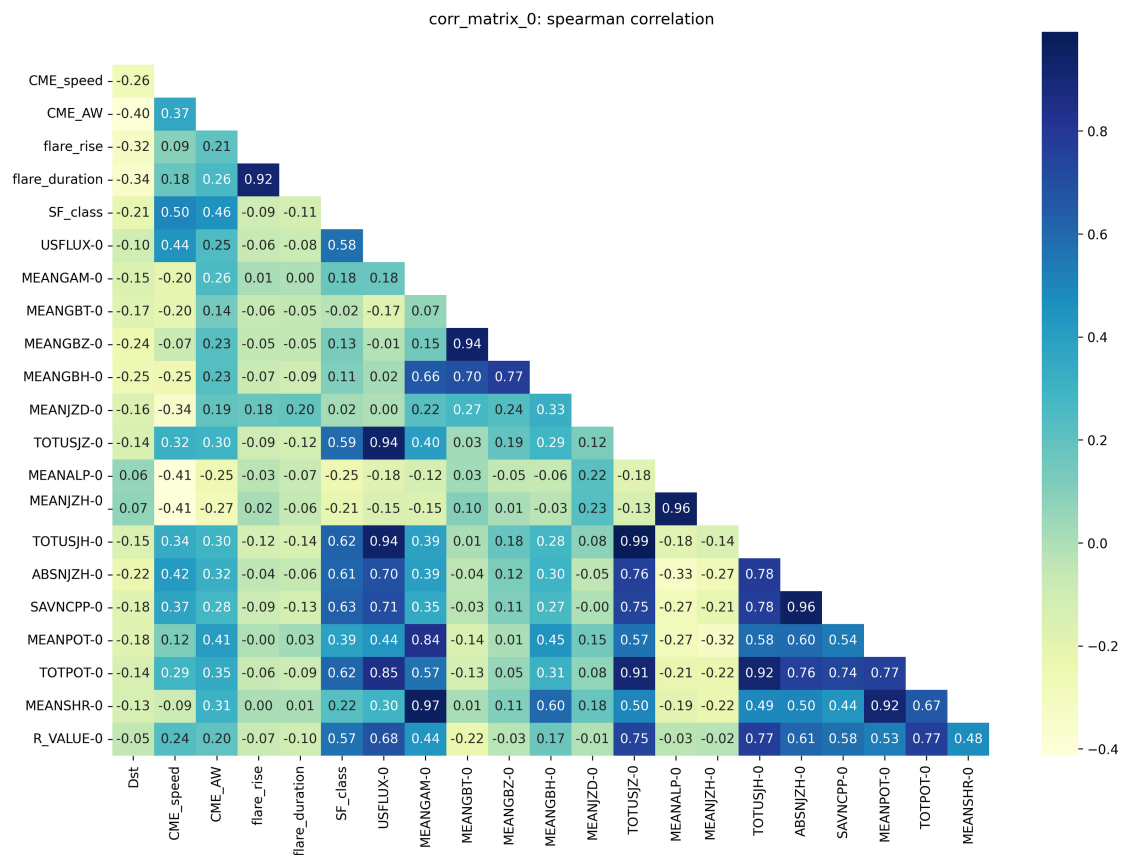


Май 2025 (Белоградчик): Д-р Вернер Пьотци.



Работен пакет 2

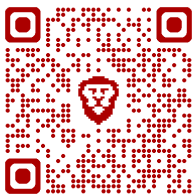
Резултати



Параметрично изследване на геоэффективни активни региони:

- Изследвани са 60 геоэффективни активни региони (ARs), избрани от базата данни SHARP (HMI).
- Методология: Използвана е корелационна матрица на Спирман за анализ на магнитните свойства.
- Анализирани периоди:
 - Преди началото на слънчевото изригване.
 - По време на фазата на нарастване.
 - По време на фазата на затихване.
 - През цялата продължителност на изригването.

Изследвани са корелациите при силни ($Dst < -100$ nT) и слаби (Dst между -50 и -100 nT) геомагнитни бури.



Работен пакет 2

Резултати



Article

Parameter Study of Geoeffective Active Regions

Rositsa Miteva ^{1,*}, Mohamed Nedal ², Astrid Veronig ³ and Werner Pötzi ³

¹ Institute of Astronomy and National Astronomical Observatory (IANAO), Bulgarian Academy of Sciences, 1784 Sofia, Bulgaria

² Astronomy & Astrophysics Section, Dublin Institute of Technology, D15 XR2R Dublin, Ireland; mohamed.nedal@dias.ie

³ Institute of Physics, Kanzelshöhe Observatory for Solar and Environmental Research, 8010 Graz, Austria; astrid.veronig@uni-graz.at (A.V)

* Correspondence: rmiteva@nao-roszhen.org

Abstract: Geomagnetic storms (GSs) are major disturbances of the Earth's magnetosphere. The strongest GSs can lead to aurora, satellite and ground-based infrastructure malfunctions. In this study, we explore 16 magnetic HMI Active Region Patch (SHARP) database from 64 active regions that produced strong GS during the solar cycle 23. We present the statistical results between the SHARP Spearman correlation coefficients, and discuss the

Keywords: active regions; geomagnetic storms; solar mass ejections; statistical analysis

Solar Physics
DOI: 10.1007/978-3-031-11111-1_1

Data-driven segmentation and tracking of solar filaments based on ground-based instrument data

Oleg Stepanyuk ¹ · Werner Pötzi ² · Momchil Dechev ¹ · Rositsa Miteva ¹ · Kamen Kozarev ¹

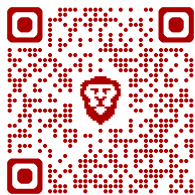
© The author(s) 2024

Abstract The dynamic behavior of solar prominences and filaments is a precursor to coronal mass ejections (CMEs), which can disrupt Earth's magnetosphere and affect satellite communications. Systematic ground-based solar observations, conducted with high temporal resolution, are instrumental in monitoring these structures. Analysis of the morphological changes and destabilization processes of filaments and prominences captured in datasets can help identify early warn-

4 Publications:

- 1) Miteva et al., "New Bulgaria-Austrian project 'Joint observations and investigations of solar chromospheric and coronal activity'", Proceedings of the SES-2023 conference, e-ISSN 2603-3321, pp. 63-66;
- 2) Rositsa Miteva, Mohamed Nedal, Astrid Veronig, Werner Poetzi, "Parameter Study of Geoeffective Active Regions", Atmosphere 2024, 15(8), 930, <https://doi.org/10.3390/atmos15080930>;
- 3) Miteva, R., Poetzi, W., "Confined vs. eruptive M-class flares in solar cycles 23 and 24", Bulgarian Astronomical Journal, 43, 2025, 34-44, <http://astro.bas.bg/AIJ/issues/n43/RMiteva.pdf>;
- 4) Markishki, P., Dechev, M., Poetzi, W., Miteva, R., Kozarev, K., "H α Imaging of Solar Phenomena Using a Modified Schmidt-Cassegrain Telescope at Astronomical Observatory – Belogradchik", Bulgarian Astronomical Journal, 43, 2025, 89-97, <https://astro.bas.bg/AIJ/issues/n43/Pmarkishki.pdf>;

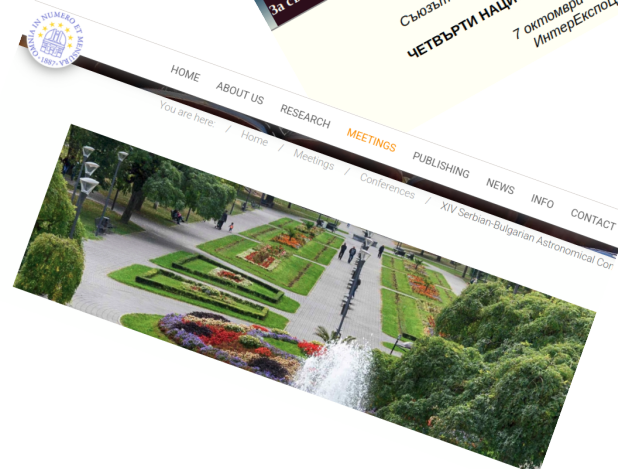
Oleg Stepanyuk Werner Poetzi Momchil Dechev Rositsa Miteva Kamen Kozarev, "Data-driven segmentation and tracking of solar filaments based on ground-based instrument data", Solar Phys.... – in preparation



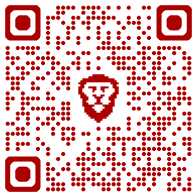
Работен пакет 2

Резултати

21 презентации



The Arab Conference on Astronomy and Geophysics (ACAG 9)



Работен пакет 3

Резултати

 **Project-SUN**

HOMEWORK PACKAGESTEAMRESULTSCONTACT



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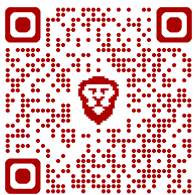
72, Tsarigradsko chaussee Blvd.,
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Бъдещи насоки

Две основни възможности:

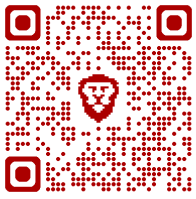
1. 📡 **Правим това, което правят всички останали:**

Наблюдения и патрул на хромосферата и фотосферата.

Служим като допълнителна станция за преодоляване на пропуски (в данните) поради метеорологичната обстановка и цикъла ден/нощ.

2. 🔥 **Не правим това, което правят всички останали:**

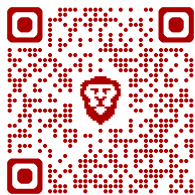
Фокусираме се върху наблюдения на събития, т.е. наблюдения с **висока резолюция** и може би с **висока кадрова честота (каденс)** на слънчеви изригвания в Н-алфа или бяла светлина.



Acknowledgements

Bilateral project: Bulgaria-Austria (<https://astro.bas.bg/project-sun/>)
‘Joint observations and investigations of solar chromospheric and coronal activity’ (2023-2025) Bulgarian National Science Foundation project No. KP-06-Austria/5 (14-08-2023) and Austria’s Agency for Education and Internationalisation (OeAD) project No. BG 04/2023





*Благодаря за
вниманието!*