



ISWI Space Weather Report Bulgaria

Prepared by:

Simeon Asenovski,

Space Research and Technology Institute,

Bulgarian Academy of Sciences

Sofia, Bulgaria

Space weather investigations based on Liulin-MO FRENDO dosimeter onboard ExoMars TGO measurements

- Liulin-MO data are used for validation of the radiation environment models in Mars orbit and for assessment of the radiation risk to future manned and robotic missions.
- Obtained are unique data for the radiation environment in Mars orbit during SEP events in 2021- 2023.
- Based on the measured fluxes in TGO MSO, the fluxes in free space at 1.5 AU can be calculated, which can be used to benchmark the GCR models for free space at 1.5 AU
- <http://esa-pro.space.bas.bg/database>

 **DOSIMETRY: Dosimetry science payloads for ExoMars TGO & surface platform**
Unified webbased database with Liulin-type instruments' cosmic radiation data

HOME LIULIN-MO NEWS LIULIN DATA & LITERATURE GALLERY PROJECT TEAM DATA SOURCES DATABASE

Source selection

- LIULIN, Inside MIR SS | 01/01/1991-31/12/1991 ¹
- Liulin-E094, Part of ESA "DOSMAP, Inside American segment of ISS | 11/05/2001-26/07/2001 ¹
- R3D-B2, Inside ESA Biopan-5, Outside Foton M2 satellite | 01/06/2005-12/06/2005 ¹
- R3D-B3, Inside ESA Biopan-6, Outside Foton M3 satellite | 14/09/2007-26/09/2007 ¹
- R3DE, Inside ESA EXPOSE-E, Outside "Columbus" module of ISS | 17/02/2008-03/09/2009 ¹
- R3DR, Inside ESA EXPOSE-R, Outside "Zvezda" module of ISS | 11/03/2009-20/08/2010 ¹
- Liulin-5, Part of "Matroshka-R", Inside Russian segment of ISS | 17/05/2007- ¹
- RD3-B3, Inside "BION-M" №1 satellite | 19/04/2013-13.05.2013 ¹
- R3DR2, Inside ESA EXPOSE-R2, Outside "Zvezda" module of ISS | 23/10/2014-10/01/2016 ¹
- Liulin-MO Cruise to Mars, on board ESA-ROSCOSMOS ExoMars TGO satellite | 22.04.2016 – 15/09/2016 ¹
- Liulin-MO in Mars Elliptic, on board ESA-ROSCOSMOS ExoMars TGO satellite | 01/11/2016 – 14/01/2017 ¹
- Liulin-MO in Mars Circular orbit, on board ESA-ROSCOSMOS ExoMars TGO | 16/04/2018 – ¹



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European Space Agency

 **DOSIMETRY: Dosimetry science payloads for ExoMars TGO & surface platform**
Unified webbased database with Liulin-type instruments' cosmic radiation data

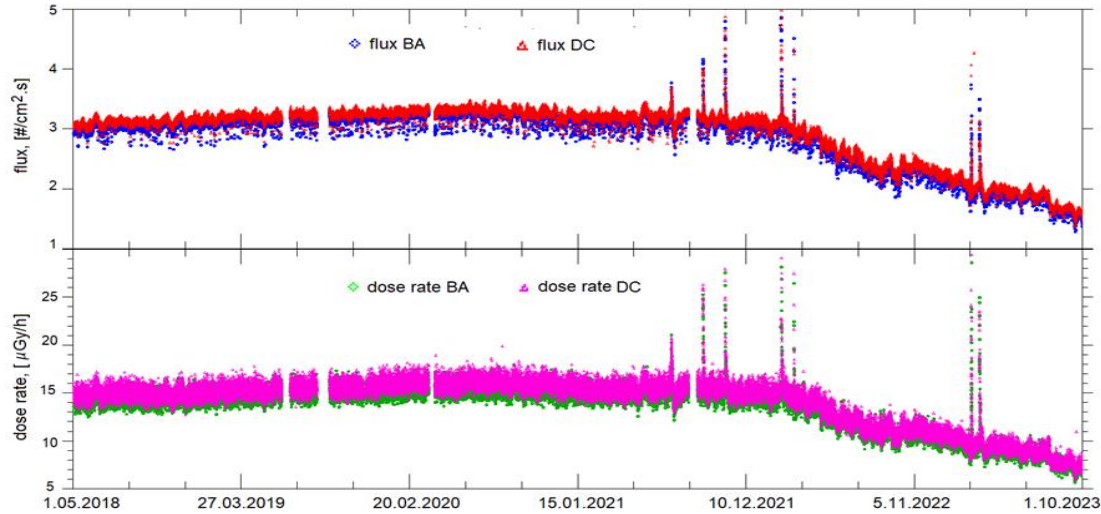
HOME LIULIN-MO NEWS LIULIN DATA & LITERATURE GALLERY PROJECT TEAM DATA SOURCES DATABASE



Liulin Image Gallery



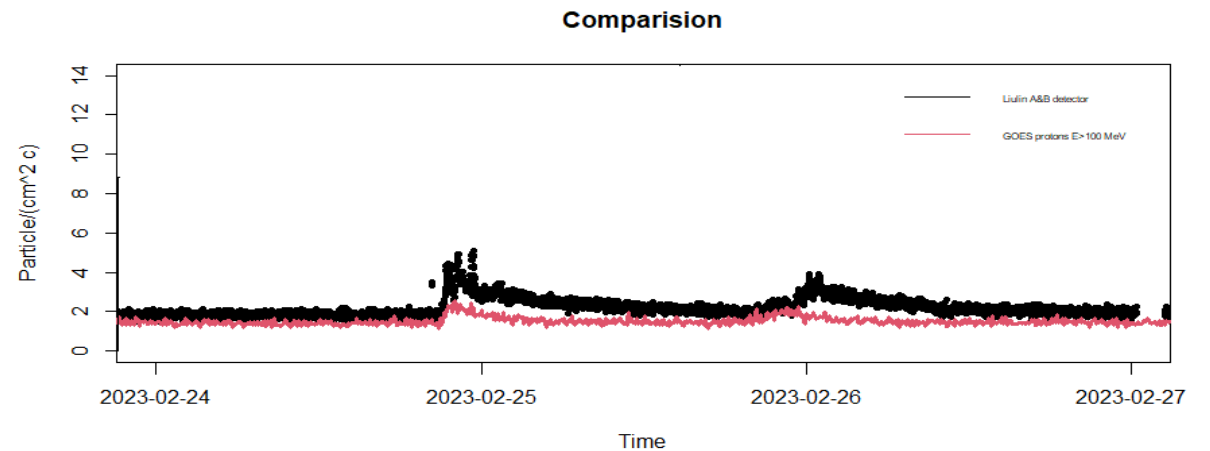
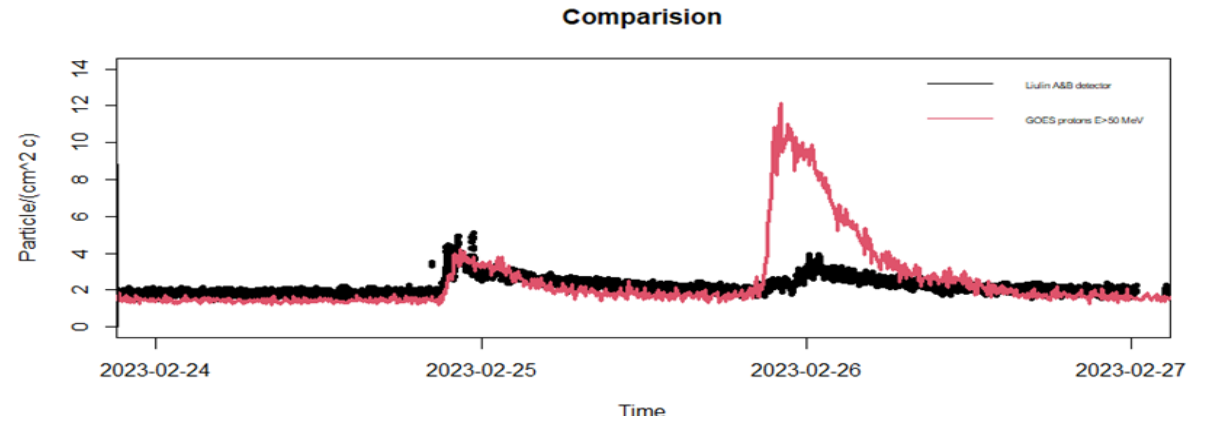
Data obtained in Mars orbit of TGO (2018-2023)



Comparison of particle fluxes measured on ExoMars TGO and GOES during SEP events on 24 and 26 February 2023 (Semkova et al, in print)



Since September 2020- a decrease of the GCR dose rates and fluxes. In September 2023 the dose rate, flux and dose equivalent rate are about 47% of the corresponding values measured during the 24th solar cycle minimum.



Space, Ecology, Safety – SES 2023

Sofia, Bulgaria 2023



- The Nineteenth International Scientific Conference “Space, Ecology, Safety - SES 2023”, Sofia, Bulgaria, was held from October 24 to 26, 2023
- THE 35-TH ANNIVERSARY OF THE SHIPKA SCIENTIFIC PROGRAMME AND THE MISSION OF THE BULGARIAN ASTRONAUT ALEXANDER ALEXANDROV
- Aerospace Technologies, Remote Sensing and Geoinformation Systems, Ecology and Risk Management, Space Material Science and Nanotechnology, **Space Weather**, (<http://www.space.bas.bg>)

Aut Inventiam Viam, Aut Faciam! ЛОСІМ Ханнибал (247 - 181 BC)
Или ще намеря път, или ще го прокарам! Ханибал (247 - 181 г. пр.н.е.)



SES 2023

SES 2023
 Nineteenth International Scientific Conference
 SPACE, ECOLOGY, SAFETY
 24 - 26 October 2023, Sofia, Bulgaria



From 22 to 25 October 2024 will be held the Twentieth anniversary International Scientific Conference Space, Ecology, Safety - SES 2024

dedicated to

The 45-th anniversary of the mission of the first Bulgarian astronaut Georgi Ivanov

<http://space.bas.bg/SES/EN/index.html>

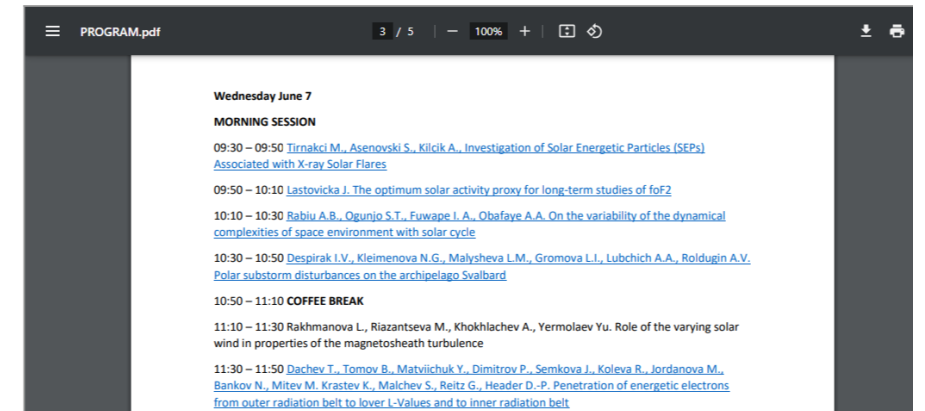
<https://spaceclimate.bas.bg/ws-sozopol/>

Welcome to 2023 Workshop
Solar Influences on the Magnetosphere, Ionosphere and Atmosphere



ФОНД
НАУЧНИ
ИЗСЛЕДВАНИЯ
МИНИСТЕРСТВО НА ОБРАЗОВАНИЕТО И НАУКАТА

Workshop Program



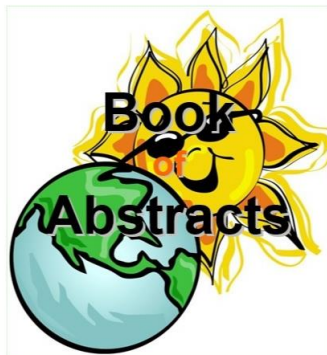
- About
- Practical Information
- 13th Workshop
- 14th Workshop
- 15th Workshop
- 16th Workshop
- Proceedings
- Publication Ethics
- Old Website
- Contact Us

The 15th Workshop will be held during 5-9 June 2023 in Primorsko, Bulgaria.

The topics include but are not restricted to:

- Sun and solar activity
- Solar wind-magnetosphere-ionosphere interactions
- Solar influences on the lower atmosphere and climate
- Solar effects in the biosphere and lithosphere
- Instrumentation for space weather monitoring
- Data processing and modelling

FIFTEENTH WORKSHOP
Solar Influences on the Magnetosphere,
Ionosphere and Atmosphere
Primorsko, Bulgaria, June 05-09, 2023



DOI: 10.31401/WSoz.2023.abs

Book of Abstracts, Fifteenth Workshop, 2023

ISSN 2367-7570

Workshop
"Solar Influences on the Magnetosphere,
Ionosphere and Atmosphere"

**Book
of
Proceedings**

Fifteenth Workshop
June, 2023

DOI: 10.31401/WS.2023.proc

Book of Proceedings, Fifteenth Workshop, 2023

The 16th Workshop in 2024...

Important deadlines:

- Pre-registration: April 1, 2024 - - - **Pre-register HERE!**
- Abstract submission deadline: April 25, 2024 - - - **Abstract submission HERE!**
- Final registration: May 6, 2024

- 15th Workshop
- 16th Workshop
- Proceedings

New research: Space weather effects on satellites



<https://doi.org/10.3390/astronomy2030012>



Article

Space Weather Effects on Satellites

Rositsa Miteva ^{1,*}, Susan W. Samwel ² and Stela Tkatchova ³

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

² National Research Institute of Astronomy and Geophysics (NRIAG), Helwan 11421, Egypt; samwelsw@nriag.sci.eg

³ European Innovation Council and SMEs Executive Agency (EISMEA), 1049 Brussels, Belgium; stela.tkatchova@ec.europa.eu

* Correspondence: rmiteva@nao-rozhen.org

Example:

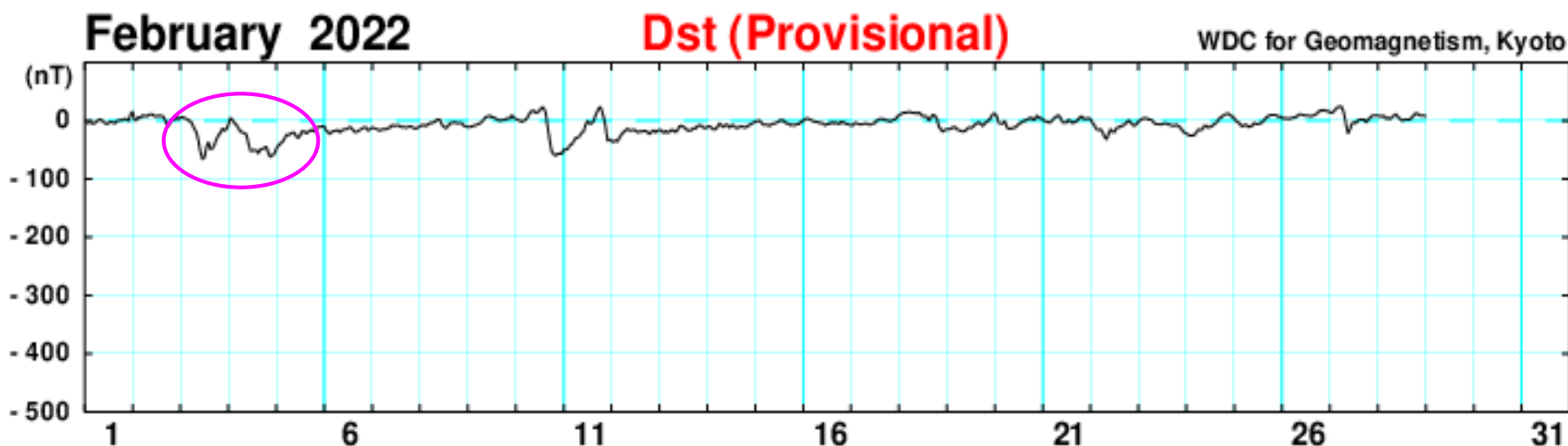
‘SpaceX’ storm: 2022-02-03

Loss of 38/49 Starlink satellites

(orbit: 200 km) due to:

1. increased atmospheric drag (previous reports) &
2. weak geomagnetic storm, but with double-dip profile (this study)

(Note: weak solar and IP activity in 2019-2022)



https://wdc.kugi.kyoto-u.ac.jp/dst_provisional/202202/index.html