SEIBERSDORF

UP2DATE

Book of Abstracts

Briefing: Space Weather and Aviation Safety

January 22nd, 2019

Seibersdorf, Austria

www.seibersdorf-laboratories.at/up2date-en

SEIBERSDORF LABORATORIES

Imprint

Editor: Dr. Peter Beck, Seibersdorf Labor GmbH, 2444 Seibersdorf, Austria
Layout: Seibersdorf Labor GmbH, Marketing, 2444 Seibersdorf, Austria
Publisher: Seibersdorf Laboratories Publishing, Austria
Print: Seibersdorf Labor GmbH, 2444 Seibersdorf, Austria

ISBN (Print) 978-3-902780-14-0
ISBN (Ebook) 978-3-902780-15-7

www.seibersdorf-laboratories.at

Chairmans‘s Invitation

On behalf of the Briefing: Space Weather and Aviation Safety organizing team, it is my pleasure to invite you to the 1st up2date event, a new service held at the Seibersdorf Laboratories, Austria.

The mission of our up2date events is to provide information for you on:

- Changes in laws and regulations
- New standard requirements
- Important technical innovations

and to give you a first overview and assistance.

Our vision is that we always keep you up-to-date on the topics that matter to you!

The 1st up2date event on Briefing: Space Weather and Aviation Safety will focus on radiation effects on aviation:

- Space weather effects on aviation - radiation, communication and navigation
- New European Basic Safety Standard (BSS) on ionizing radiation
- Current space weather activities of ICAO

Our Briefing: Space Weather and Aviation Safety addresses all aviation stakeholders, such as:

- Airline managers for operation, quality and safety
- Pilots, flight attendants and their organizations
- Governmental agencies
- Private and professional frequent air-travellers

You benefit from international lecturers from ESA and other organizations, which bring you „up2date“ on new aviation safety trends and regulations for airline crews.

Keynotes and lectures on topics such as “ESA SSA Space Weather Activities”, “European Basic Safety Standard on Ionising Radiation”, “PECASUS – Pan-European Consortium for Aviation Space Weather User”, “Space Weather for Airline Pilots”, “Space Weather for Airline Pilots”, “Radiation Aspects of Space Weather Affecting the Flight Crew”, and “AVIDOS - Aviation Dosimetry” are given by prominent, international experts.

Seibersdorf Laboratories is organizing the Briefing: Space Weather and Aviation Safety.

The Briefing: Space Weather and Aviation Safety is held on 22nd January 2019.

I wish you a successful and interesting event that will keep you up2date!

Peter Beck

On behalf of the Briefing: Space Weather and Aviation Safety event Organizing Team

Table of Content

Program - Tuesday, January 22nd, 2019 7

Invited Keynotes 8

ESA SSA Space Weather Activities 8

European Basic Safety Standard on Ionising Radiation 9

PECASUS – Pan-European Consortium for Aviation Space Weather User Service 10

Space Weather for Airline Pilots 11

Radiation Aspects of Space Weather Affecting the Flight Crew 12

AVIDOS - Aviation Dosimetry 13

List of Lecturers 14

Notes 15

Program Tuesday, January 22nd, 2019

08:30	Registration
09:30	**Welcome Notes** M. Schwaiger, Seibersdorf Laboratories St. Mayer, Austrian Aeronautics and Space Agency, Austria
09:45	**Introduction Talk** P. Beck, Seibersdorf Laboratories
	Invited Keynotes
10:00	**ESA SSA Space Weather Activities** J. Luntama, European Space Agency
10:45	**European Basic Safety Standard on Ionising Radiation** C. Raith, Federal Ministry Republic of Austria
11:30	**Coffee Break**
12:00	**PECASUS – Pan-European Consortium for Aviation Space Weather User Service** K. Kauristie, Finish Metrological Institute
12:45	**Space Weather for Airline Pilots** K. Sievers, European Cockpit Association
13:30	**Lunch Buffet**
14:15	**Radiation Aspects of Space Weather Affecting the Flight Crew** T. Eberbach, Vereinigung Cockpit e.V.
15:00	**AVIDOS - Aviation Dosimetry** M. Latocha, Seibersdorf Laboratories
15:30	**Networking and Visits of Labs**
17:00	**Closing**

Program status at the editorial deadline.

ESA SSA Space Weather Activities

Juha-Pekka Luntama

European Space Agency

Abstract

Development of a European Space Weather System was started in the framework of European Space Agency's Space Situational Awareness (SSA) Programme in 2009. By the end of 2018 the system has reached a high level of maturity with over 40 European university groups, research institutes and industry participating into the network of Expert Service Centres (ESCs) that form the backbone of the European space weather service provision capability. The Space Weather Service Network that includes, in addition to the Expert Groups in the ESCs, also the Space Weather Service Coordination Centre (SSCC) and a space weather data system, offers today 25 tested and validated space weather services based on over 170 data products. The available services cover a wide range of user domains from human space flight to operations of ground-based power grids and gas pipes. Many of the services related to space weather related disturbances in the ionosphere impacting telecommunications and satellite navigation, and estimates of the radiation doses for airline crew members and passengers are closely related to aviation safety and efficiency.

This presentation will cover the status of the ESA's SSA Space Weather System, the available service capabilities and products, with particular focus on services and products that are important for aviation. The presentation will also address ESA's short- and long-term plans for enhancing the services and developing new space weather capabilities for Europe including physics based models and new space and ground based observation systems.

European Basic Safety Standard on Ionising Radiation

Christina Raith

Federal Ministry for Sustainability and Tourism, Division I/7 – Radiation Protection

Abstract

The Basic Safety Standards were established by the European Commission (Euratom Treaty). Since the first Basic Safety Standards have been published in 1959, several amendments have been made the latest of which is the Council Directive 2013/59/Euratom published on the 17th of January 2014.

Council Directive 2013/59/Euratom is laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation. The operation of an aircraft can lead to a significant exposure of the aircrew and is therefore included in the scope of the directive.

The Austrian Radiation Protection Act (StrSchG) includes regulations for aircrew members in § 36k. The regulations are complemented by the Ordinance on Radiation Protection for Aircrew Members (FlP-StrSchV). To transpose the latest Basic Safety Standards the Austrian regulations on radiation protection will be amended in 2019.

References

Council Directive 2013/59/Euratom (OJ L13, 17.01.2014)
Austrian Radiation Protection Act (StrSchG, BGBl Nr. 227/1969)
Ordinance on Radiation Protection for Air Crew Members (FlP-StrSchV, BGBl. II Nr. 235/2006)

PECASUS – Pan-European Consortium for Aviation Space Weather User Service

Kirsti Kauristie[1], Jesse Andries[2], Nicolas Bergeot[2], Peter Beck[3], David Berghmans[2], Claudio Cesaroni[4], Norma Crosby[3], Erwin De Donder[3], Mark Dierckxsens[3], Mark Gibbs[5], Haris Haralambous[6], Ari-Matti Harri[1], Marcin Latocha[3], Loredana Perrone[4], Vincenzo Romano[4], Luca Spogli[4], Iwona Stanislawska[7], Peter Thorn[5], Lukasz Tomasik[7], Bert van den Oord[8], Petra Vanlommel[2], Volker Wilken[9], Martin Kriegel[9] and Kari Österberg[1]

[1] Finnish Meteorological Institute, Finland
[2] Solar-Terrestrial Centre of Excellence, Belgium
[3] Seibersdorf Labor GmbH, Austria
[4] Istituto Nazionale di Geofisica e Vulcanologia, Italy
[5] UK Met Office, United Kingdom
[6] Frederick University, Cyprus
[7] Centrum Badan Kosmiccznych Polskiej Akademii Nauk (SRC), Poland
[8] Royal Netherlands Meteorological Institute, the Netherlands
[9] Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany

Abstract

The PECASUS (Pan-European Consortium for Aviation Space weather User Services) consortium was created in response to the call from the International Civil Aviation Organization (ICAO) to create a Global Space Weather Information Service. The requested service focuses on the dissemination of warning messages (‚advisories') towards aviation actors and corresponds to extreme space weather events with impact on aviation GNSS systems, on satellite and HF communication and on radiation levels at flight altitudes. The Council of ICAO has designated in its 215th session (in November 2018) three global space weather service centers to be operated by PECASUS, US, and the consortium of Australia, Canada, France and Japan. The presentation will review the assets that PECASUS plans to use in the ICAO service and discuss the planned operation concept in order to ensure high reliability, availability and maintainability of the system. We will report also about the coordination work among ICAO Meteorology Panel and the three services providers which was started in December 2018.

Space Weather for Airline Pilots

Klaus Sievers

European Cockpit Association

Abstract

Where are we today? Space weather has an influence on aviation: Is it a myth or reality? Is it, perhaps, dangerous? If it can be dangerous, when, and under which circumstances? Are measurements or forecasts available?

Those questions come to mind, when one thinks of space weather. Answers are available and from many places. In my presentation, I´ll introduce some key cases where space weather affected aviation. A few websites and information sources that are simple to use and easy to understand will be introduced, too.

The key part of the presentation is about new space weather information provisions of International Civil Aviation Organization (ICAO), that have become valid on paper, and are about to become a part of every-day aviation weather in 2019. An overview will be provided as well as information on the status of implementation.

At the end of the presentation, an outlook on the near future will be attempted.

Radiation Aspects of Space Weather Affecting the Flight Crew

Theresa Eberbach

Vereinigung Cockpit e.V.

Abstract

Space Weather does not only affect flight crew - it affects all stakeholders from authorities to airline operators to frequent flyers. Everyone has an opinion about cosmic radiation. Most wish it were not there at all, few are willing to take action.

What are the key aspects regarding radiation protection? How can we breathe life into the EU Basic Safety Standards? How can each stakeholder make the most of the seemingly limited possibilities of ALARA? Moreover, how can we string these threads together to pull all in the same direction?

My presentation will provide an overview of the radiation impact of space weather on the flight crew and give critical discussion of the most pressing issues.

AVIDOS - Aviation Dosimetry

Marcin Latocha

Seibersdorf Labor GmbH

Abstract

Radiation environment at aviation altitudes is shaped by galactic and solar cosmic rays (GCR and SCR). Galactic cosmic rays come from outside of our solar system. GCR flux is isotropic outside Earth's magnetosphere and shows a fairly regular pattern of lower and higher intensity following the approximately 11-years cycle of solar activity. On the other hand, sudden, eruptive phenomena occurring on the Sun like solar flares (SF) or coronal mass ejections (CME) are sources of solar high-energy particles (SEP) which may hit Earth and lead to short-term enhanced radiation levels in atmosphere or even on ground – so called Ground Level Enhancements (GLEs). Cosmic radiation (GCR and SCR) accounts for space weather as it can affect functioning and reliability of space-borne, air-borne and ground-based systems and services or endanger human health. Therefore, monitoring, nowcasting and forecasting of space weather induced Earth's radiation environment is important for space agencies, aviation businesses, radiation protection institutions, governmental organizations, research and also public.

To address this need, Seibersdorf Laboratories developed the aviation dosimetry software AVIDOS. AVIDOS can assess radiation exposure in atmosphere due to GCR for up to one year in advance [1]. AVIDOS also provides nowcast information on radiation exposure due to SEP. The solution developed by Seibersdorf Laboratories is based on a simulation model coupled with real-time data from a neutron monitor station and a real-time GLE-alerting service [2]. A public version of AVIDOS is available on ESA's Space Weather portal [3] as a federated web service of the Seibersdorf Laboratories. It is an online, informational and educational software for the assessment of radiation exposure on-board aircrafts. Its aim is to increase public awareness on radiation aspects of space weather. Seibersdorf Laboratories contributes with AVIDOS to the global space weather service center PECASUS for ICAO's (International Civil Aviation Organization) requests on space weather advisory information [4].
Seibersdorf Laboratories runs also an offline version of AVIDOS that is a core component of an EN ISO/IEC 17025 accredited aviation dosimetry service for radiation protection purposes and routine dose assessment compliant with European regulations.The presentation will provide background information on GCR and SEP, overview on the AVIDOS on ESA's Space Weather portal, contribution to PECASUS, as well as short introduction to aviation dosimetry service of Seibersdorf Laboratories.

References

[1] M. Latocha, P. Beck, Forecasting and Nowcasting of Radiation Exposure On-Board Aircraft, presented at the 13th ESWW, Ostende, Belgium, Nov. 2016
[2] M. Latocha, P. Beck, Cosmic Radiation Assessment at ESA's Space Weather Portal with AVIDOS, IEEE TNS proceedings of the RADECS 2016 Bremen, Germany, Sep. 2016
[3] AVIDOS at ESA Space Weather Portal http://swe.ssa.esa.int/web/guest/avidos-federated
[4] PECASUS Consortium http://pecasus.eu/

Acknowledgements

The development of AVIDOS was supported by the European Space Agency (ESA Contract: No. 44000105734/12/D/MRP), the Austrian Federal Ministry of Transport and Innovation, and the Austrian Agency for Aviation and Space (ALR) as part of the Austrian Promotion Agency, FFG.

List of Lecturers

Eberbach T.
Radiation Aspects of Space Weather Affecting the Flight Crew

Kauristie K.
PECASUS – Pan-European Consortium for Aviation Space Weather User Service

Latocha M.
AVIDOS - Aviation Dosimetry

Luntama J.
ESA SSA Space Weather Activities

Raith C.
European Basic Safety Standard on Ionising Radiation

Sievers K.
Space Weather for Airline Pilots

Notes

CONTACT

Seibersdorf Labor GmbH
2444 Seibersdorf, Austria

www.seibersdorf-laboratories.at
Fax: +43 50550 - 2502

Secretary
+43 50550 - 2500
office@seibersdorf-laboratories.at