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RAISING PUBLIC AWARENESS OF SPACE WEATHER-INDUCED EFFECTS ON GNSS PERFORMANCE IN CROATIA

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Filjar, Kos, Brcic: Raising public awareness of space weather-induced effects on GNSS performance in Croatia

- Content of presentation:
  - Introduction
  - Overview of space weather effects on GNSS
  - Rationale behind raising public awareness of GNSS space weather effects
  - Methods for raising public awareness of GNSS space weather effects in Croatia
  - Conclusion

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- Introduction
  - Space weather – major natural contributor to GPS performance deterioration and operation failure
  - GNSS performance deterioration duue to ionospheric effects, caused mostly by space weather distrbances
  - GNSS operation failures results from solar activity's effects on GNSS infrastructure
  - All subjects of GNSS utilisation need GNSS space weather risk assessment and continuous awareness of space weather effects on GNSS performance and operation

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- Space weather effects on GNSS performance and operation
  - Space weather – major natural contributor to GPS performance deterioration and operation failure
  - Increased reliance on GNSS calls for mitigation measures, following from problem awareness
  - Public awareness as the means for space weather-induced GNSS effects mitigation

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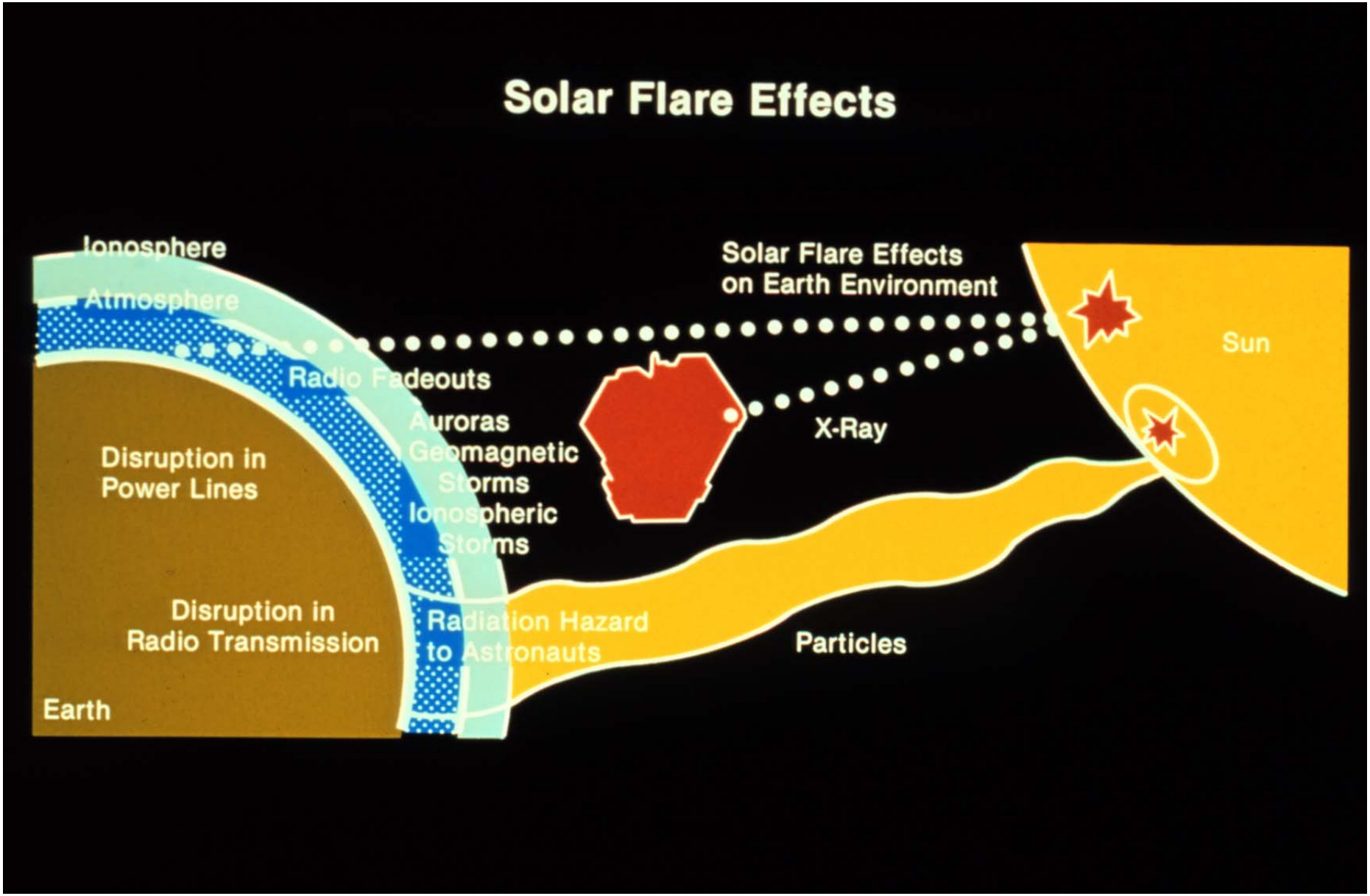

Courtesy: NOAA

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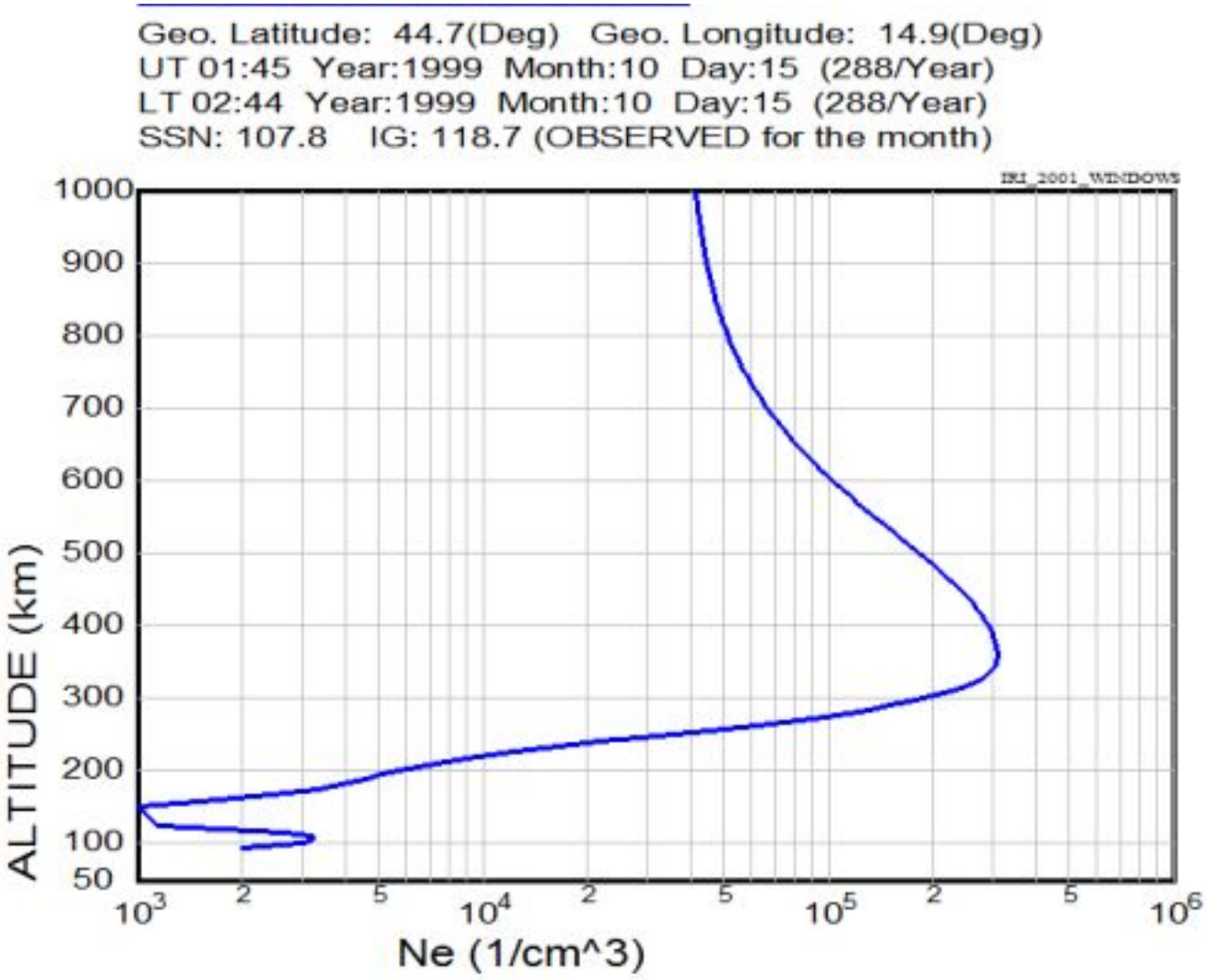

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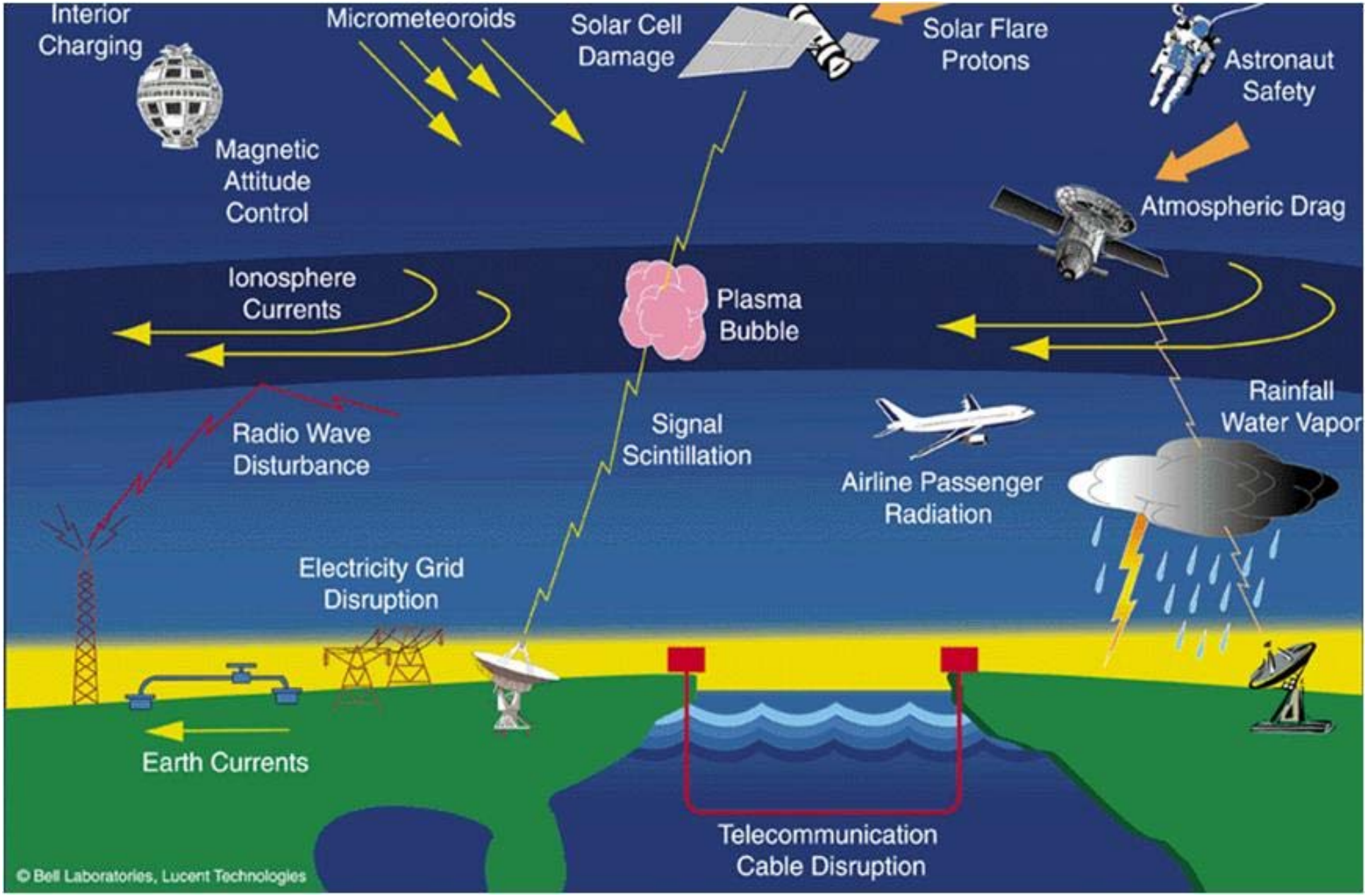

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- Rationale behind raising public awareness on GNSS space weather effects
- GNSS as enabling and underlying technology
- GNSS end-users do not realise dependence on technology -> non-awareness causes lack of proper risks mitigation actions

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- Methods for raising public awareness in Croatia
- Acadenic education and professional advancement
- Seminars and public lectures for general audience
- Continuous monitoring of space weather and (local) ionospheric conditions
- Internet-based dissemination of space weather and ionospheric status data and forecasts

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- Academic education and professional advancement
- Academic courses at graduate and post-graduate level
- Visiting lecturers under national and EU schemes
- Theoretical and practical scientific activities in accorance to reuirements of specific market segments (GNSS applications)

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- Seminars and public lectures for general audience
- Croatian scientists tradditionally present the latest developments in their fields of scientific expertise to general audience
- Seminars and public lectures organised by faculties/universities and professional organisations (The Royal Institute of Navigation, IEEE Croatian Section etc.)

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- Continuous monitoring of space weather and (local) ionospheric conditions
- No history of systematic space weather & ionospheric research in Croatia
- Faculty of Maritime Studies in Rijeka has established GNSS-space weather laboratory to provide research facility
- Croatian LION network

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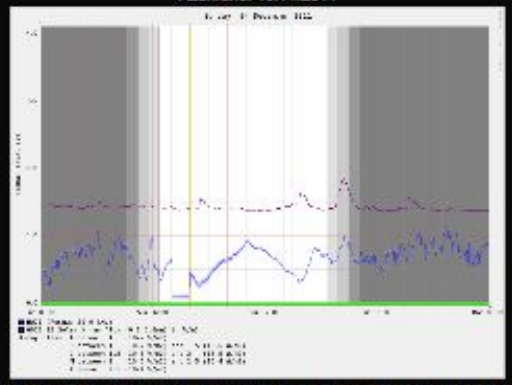
- Internet-based dissemination of space weather and ionospheric status data and forecasts
- Results of GNSS performance analysis available on the web-site www.ionosphere.hr (in Croatian), along with space weather analysis, local ionospheric observables and ionospherc disturbances forecasts

SVEMIRSKO VRIJEME - REPUBLIKA HRVATSKA

07 December, 2011 13:35:50 UTC / 14:35:50 LT

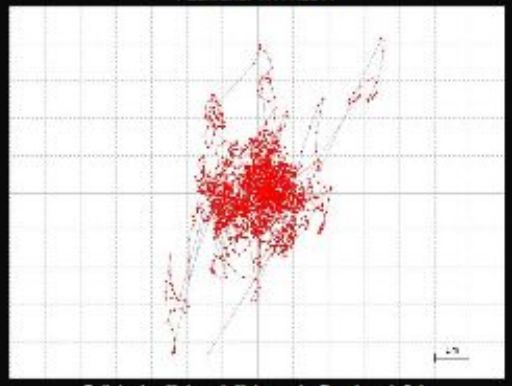
Svemirsko vrijeme je skup fizikalnih i kemijskih pojava vezanih za transfer energije u sustavu Sunce - Zemlja. Slično meteorološkim pojavama, svemirsko vrijeme utječe na rad brojnih tehničkih sustava (uključujući satelitske navigacijske sustave), djelujući na taj način na nacionalnu infrastrukturu, gospodarstvo i svakodnevni život.

Ažurirano: 18.11.2011



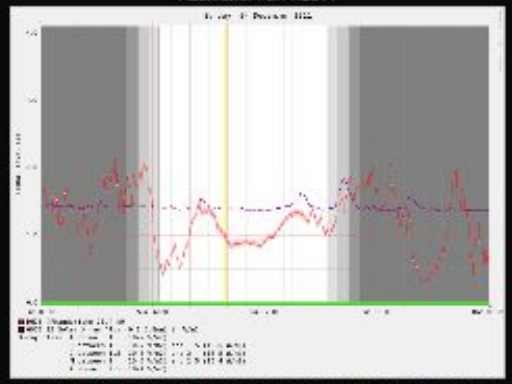
Grafikon SID podataka u stvarnom vremenu - stanica Rosnay / GOES-15 grafikon solarnog x-zračenja

Ažurirano: 17.11.2011



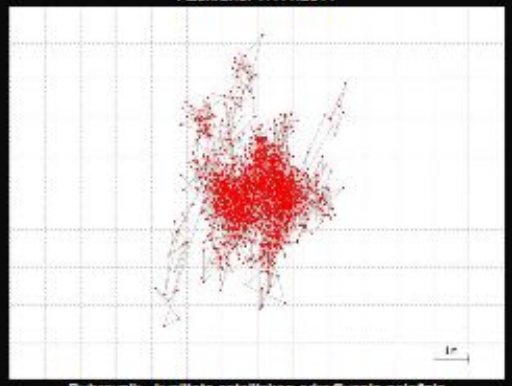
Osijek - kvaliteta satelitskog određivanja položaja

Ažurirano: 18.11.2011



Grafikon SID podataka u stvarnom vremenu - stanica Rhauderfehn / GOES-15 grafikon solarnog x-zračenja

Ažurirano: 17.11.2011



Dubrovnik - kvaliteta satelitskog određivanja položaja

ARHIVA

Prognoza svemirskog vremena za 18. i 19.11 (0-48h)

Stanje svemirskog vremena: Solarna aktivnost intenzivna je, uz povećan broj Sunčevih pjega.

Prognoza svemirskog vremena za Hrvatsku i Jadran: Nema naznaka pojave geomagnetskih i ionosferskih oluja iznad područja Republike Hrvatske u sljedećih 48 sati. Zbog tog se u istom vremenu ne očekuje degradacija kvalitete određivanja položaja satelitskim sustavima usljed ionosferskih učinaka.

- Conclusion
  - Causes of GNSS performance deterioration and operation failures are essential for developing mitigation techniques and actions for sustainable positioning.
  - GNSS users needs risk assessment and continued up-date on space weather effects on GNSS.
  - Continuous efforts needed in education and information of a broad area of GNSS users on space weather-induced GNSS effects.
  - Croatia as a case-study.

THANK YOU FOR YOUR ATTENTION!

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