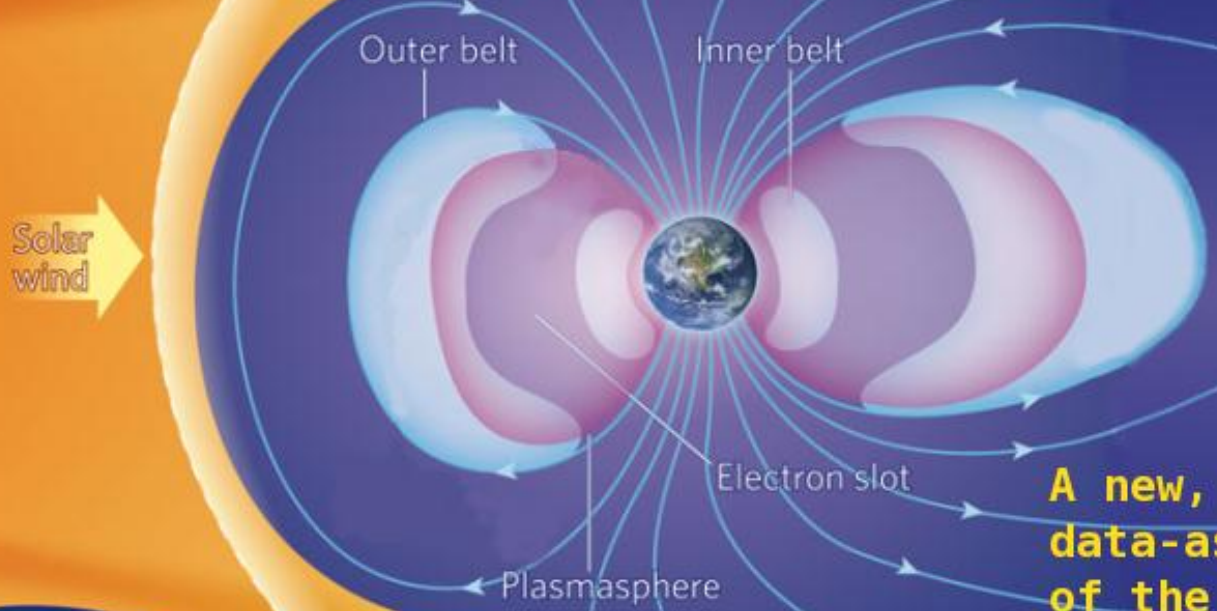
FP7-SPACE-2010-1
Collaborative Project

PLASMON



A new, ground based data-assimilative model of the Earth's Plasmasphere – a critical contribution to Radiation Belt modeling for Space Weather purposes

SEVENTH FRAMEWORK PROGRAMME

Workpackages and methology

***WP1*: Automatic retrieval of equatorial electron densities and density profiles by Automatic Whistler detector and Analyzer Network (AWDANet)**

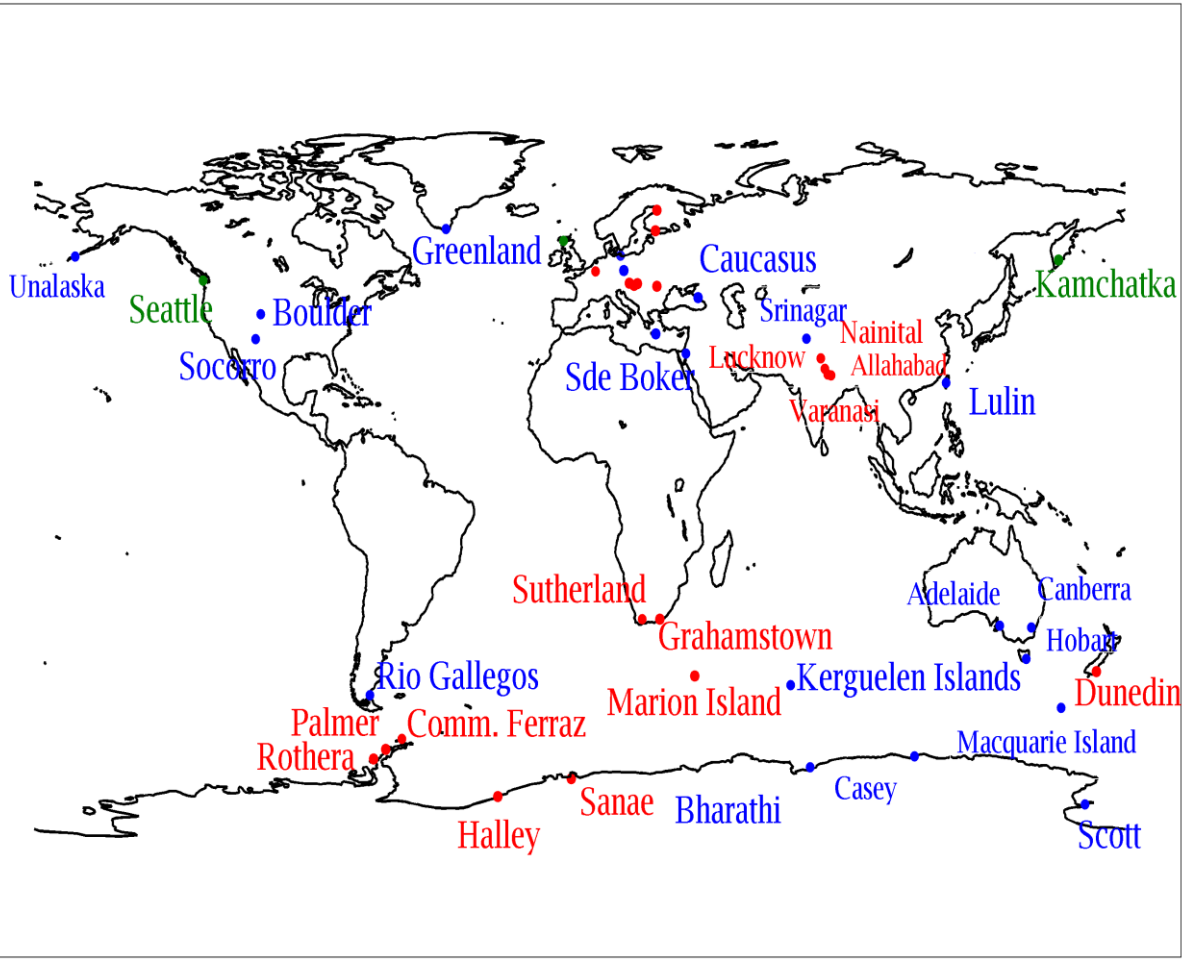
***WP2*: Retrieval of equatorial plasma mass densities by European quasi-Meridional Magnetometer Array (EMMA) magnetometer arrays and cross-calibration of whistler and Field Line Resonance method**

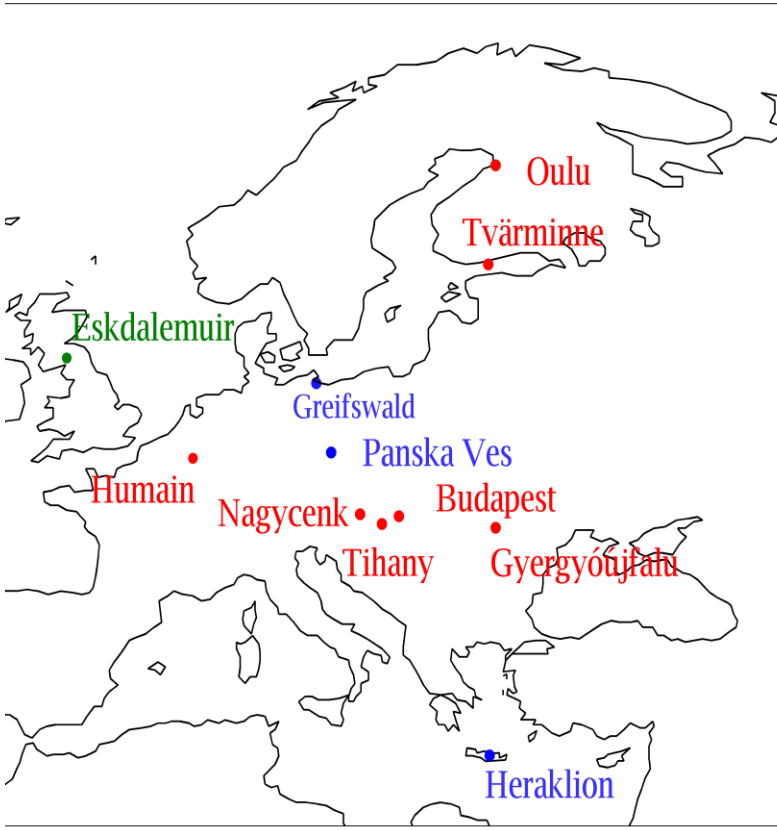
***WP3*: Data assimilative modeling of the Earth's plasmasphere**

***WP4*: Modeling REP losses from the radiation belts using the Antarctic-Arctic Radiation-belt (Dynamic) Deposition – VLF Atmospheric Research Konsortia (AARDDVARK) network**

Participant		Country
Eötvös University	János Lichtenberger	Hungary
British Antarctic Survey	Mark Clilverd	UK
Eötvös Loránd Geophysical Institute	Balázs Heilig	Hungary
University of L'Aquila	Massimo Vellante	Italy
Sodankyla Geophysical Observatory	Jyrki Manninen	Finland
University of Otago	Craig Rodger	New Zealand
Hermanus Magnetic Observatory	Andrew Collier	South Africa
New Mexico Institute of Mining and Technology	Anders Jorgensen	USA
Institute of Geophysics, Polish Academy of Sciences	Jan Reda	Poland
University of Washington	Robert Holzworth	USA
Los Alamos National Laboratory	Reiner Friedel	USA

Extension of ground base networks in PLASMON: *AWDANet*

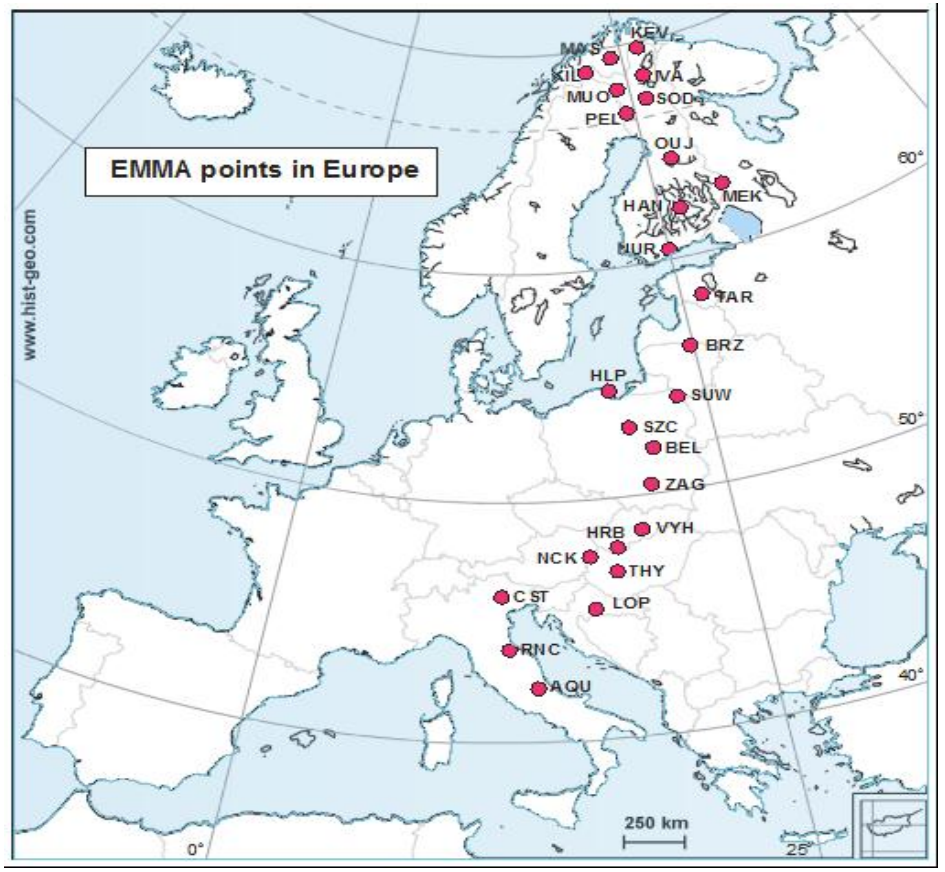


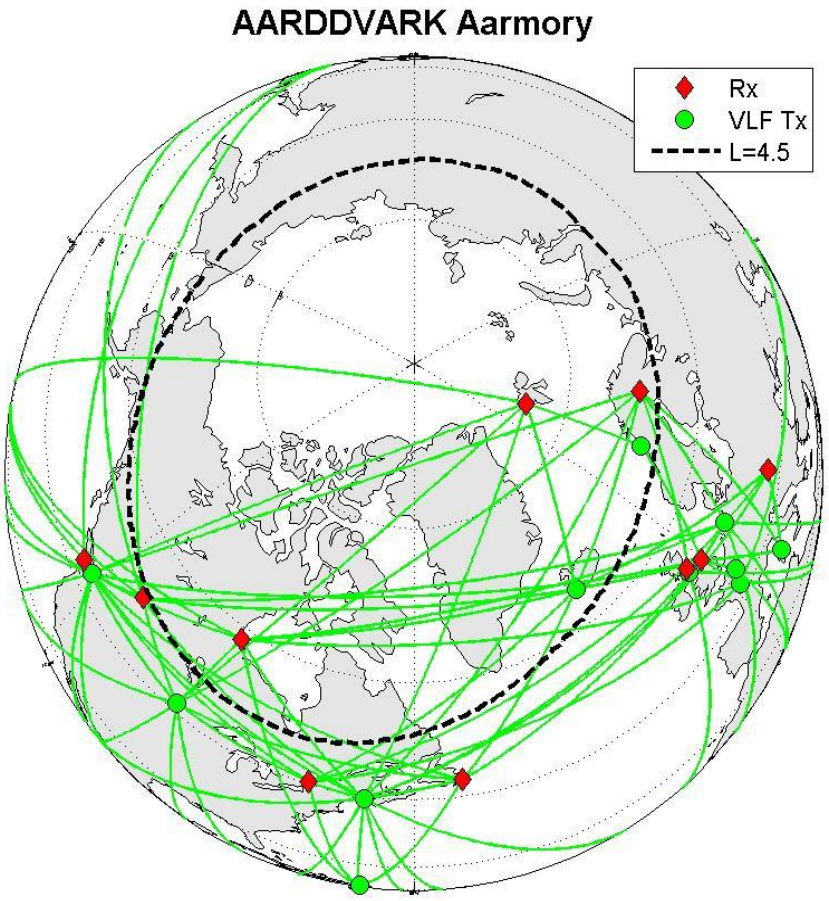


Operating stations installed in PLASMON

Planned stations

Extension of ground base networks in PLASMON: EMMA and AARDDVARK





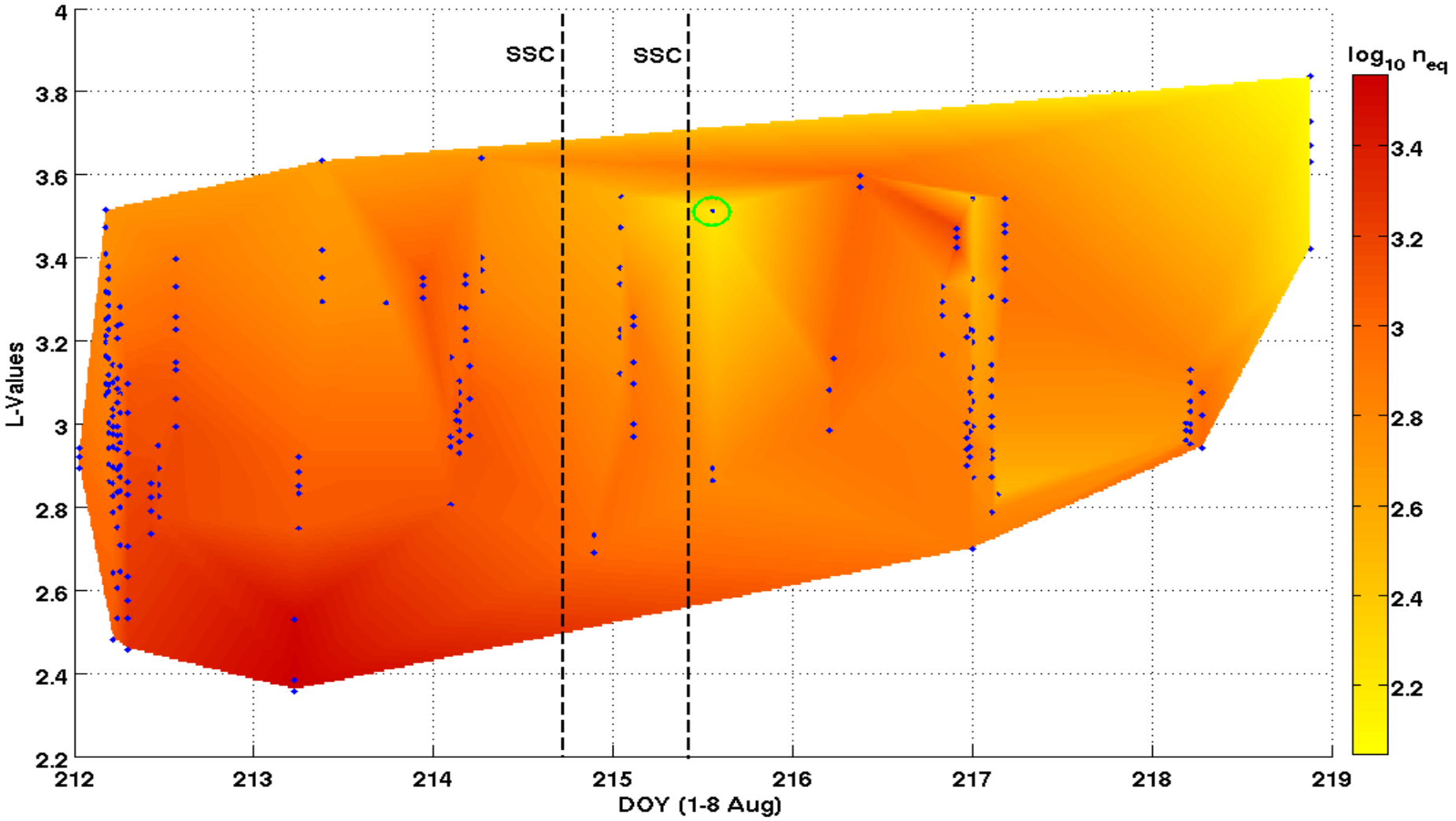
New EMMA stations:

LOP, HRG, VYH, ZAG, SZC , HLP and BRZ

New AARDVVARK stations:

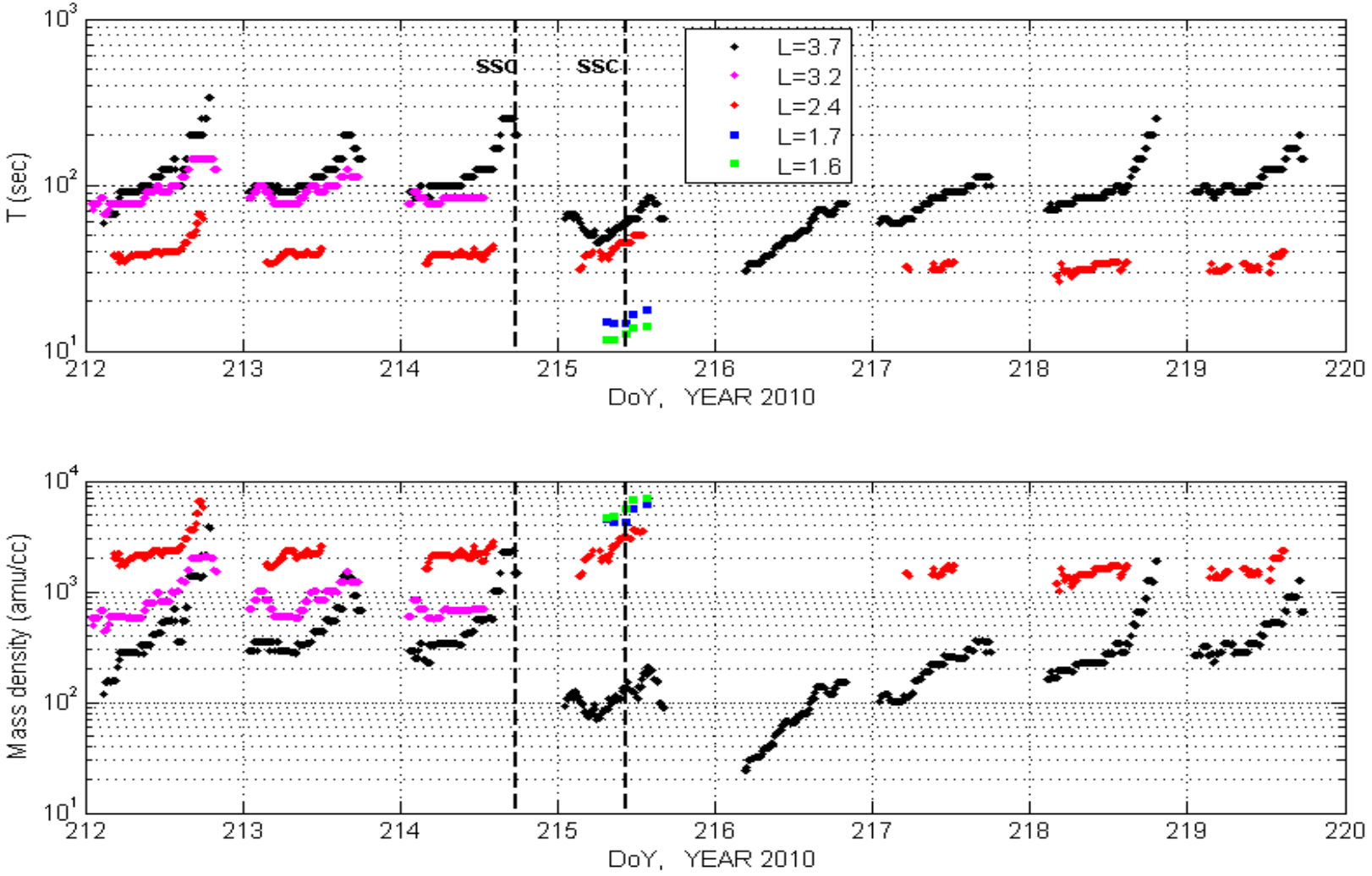
Forks (Seattle, US), Ottawa

The plasmasphere during a space weather event
Dual SSC on 4-5 August 2010:



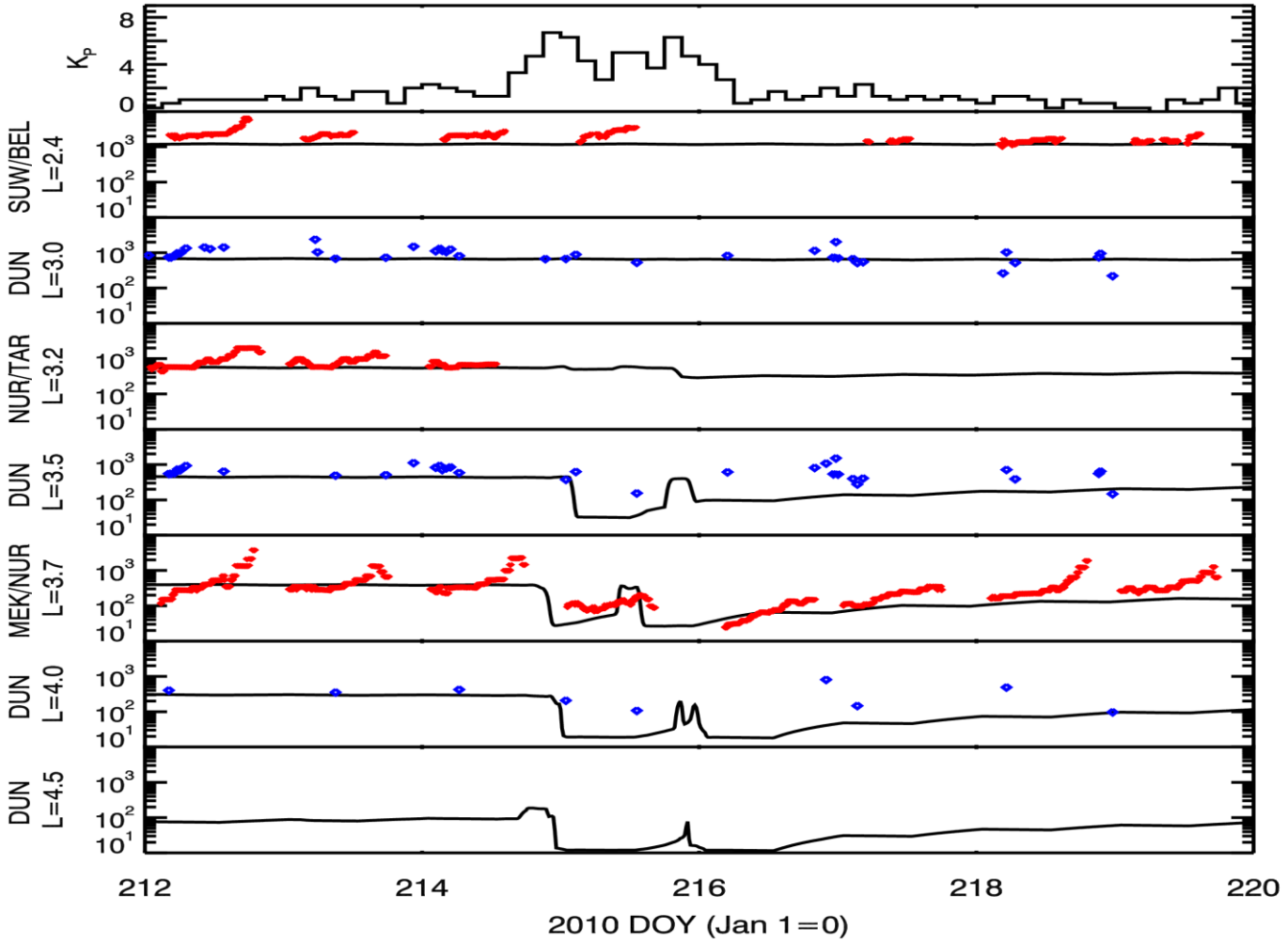
Equatorial electron densities obtained by inversion of 224 whistlers in 41 events

The plasmasphere during a space weather event
Dual SSC on 4-5 August 2010:



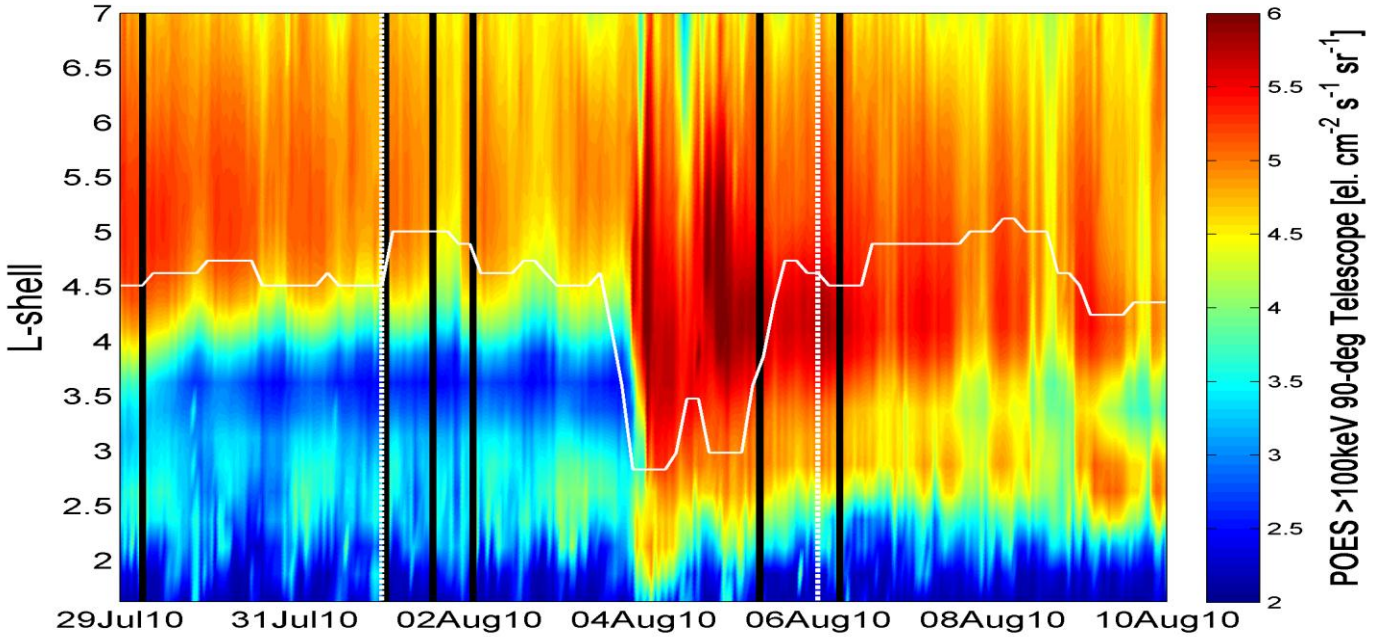
Equatorial plasma mass densities obtained by inversion of FLRs

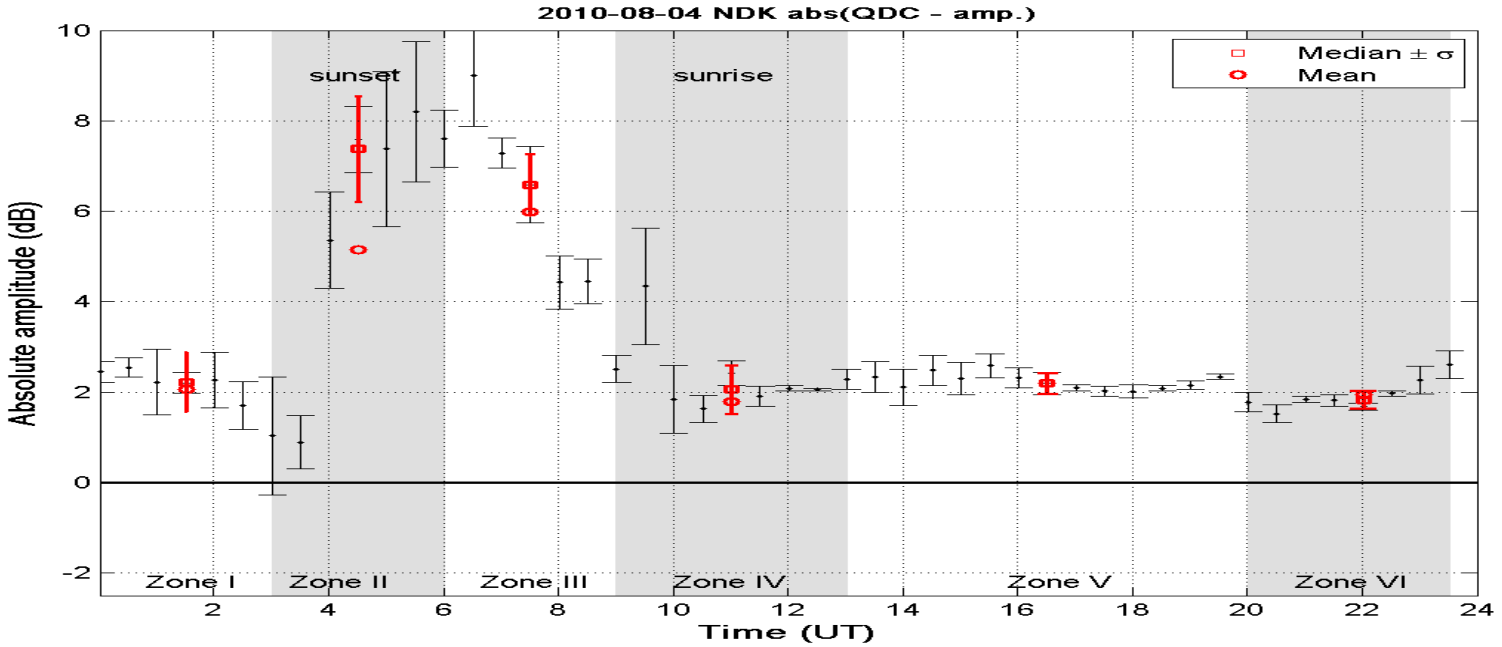
The plasmasphere during a space weather event
Dual SSC on 4-5 August 2010:



Data assimilative model of the plasmasphere and *ground based* mass densities

The plasmasphere during a space weather event
Dual SSC on 4-5 August 2010:





AARDDVARK measurements of REP

Conclusions and future work

- During the first 18 months of PLASMON project, we have extended our ground based VLF and 249 ULF networks, installing three new stations in *AWDANet*, four new stations in *AARDDVARK* and nine new stations in our ULF network (seven in the Europen *EMMA* and two in the Southern African *SANSA* network). The extended networks will be used to achieve the objective of the project.

- We have developed algorithm that allows us to retrieve electron density profiles *automatically* and we are working on the port the algorithm to a GPU-based processing unit to reach a quasi real-time mode of operation.

- An automated algorithm for identification of field line resonances is being developed in PLASMON, which will then serve the input for the automatic inversion procedure being developed in the second half of the project.

- The *assimilative model* of the plasmasphere is the central core of the project. It is based on the Dynamic Global Core Plasma Model, and a Ensemble Kalman Filter. We have started to test the assimilation using density data from our two ground based networks (*AWDANet* and EMMA).

- The third ground based network (*AARDDVARK*) is used to contrast the plasmasphere model through comparison of REP losses.

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