RESOURCE: an International Initiative for Radio Sciences Research on Antarctic Atmosphere

SM51C-2760

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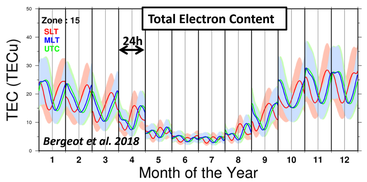
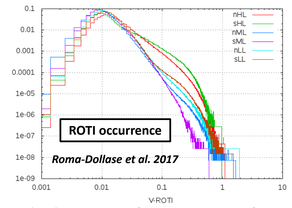
RESOURCE (Radio Sciences Research on AntarCtic AtmosphEre) is a new proposed Scientific Research Program (SRP) regrouping Physical and Geoscience Science Groups from SCAR (Scientific Committee on Antarctic Research). **RESOURCE aims to establish and reinforce the link between the communities that investigate the polar atmosphere in the Northern and Southern Hemispheres with the users on the field such as, e.g., glaciologist, astrophysicist or polar base managers.**

Ionized atmosphere

Climatology

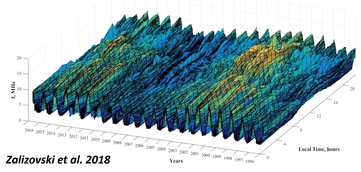


Monthly climatological behavior of the vTEC for an identified pattern and different time definitions: SLT (red), UTC (green) and MLT (blue). The colored lines are the daily vTEC (grey line is noon) for medium solar activity level (F10.7P = 120 sfu). The spread of the colors stands for low and high solar activity (F10.7P= 80 and 160 sfu respectively).



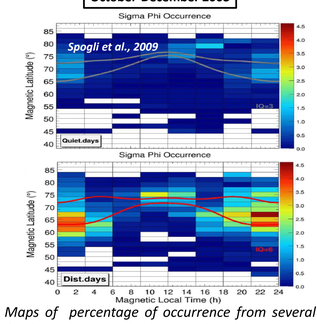
Log-log histograms of ROTI occurrence for xYL (x = n,s for north, south, Y=H,M,L for high, mid., low latitudes).

Long-term foF2 observations



Long-term variations of ionospheric parameters at Ukrainian Antarctic station Akademik Vernadsky for the period 1996-2016

σ_Φ Climatology in Arctic October-December 2003

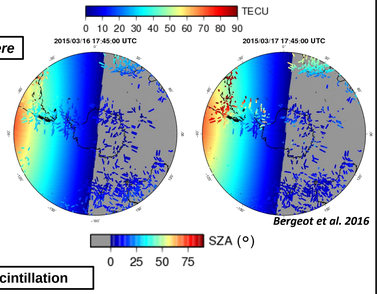


Maps of percentage of occurrence from several Arctic stations: top is for the quiet magnetic days (IQ=3, aurora oval in grey); bottom is for disturbed days (IQ=6, aurora oval in red).

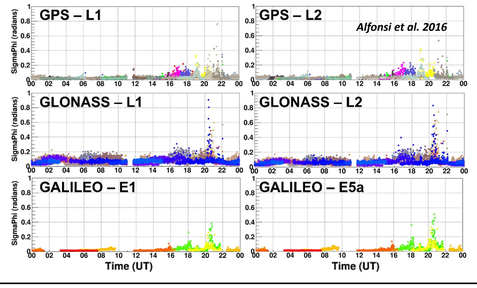
Stormy periods

Effect of extreme solar events on polar ionosphere

Impact of CME on ionospheric Total Electron Content over Antarctica. The grids are the solar zenith angle for the days and hours of interest. The dots are the TEC values at Ionospheric Pierce Points estimated from the GNSS data described in section 2. Event on March 17, 2015. Geomagnetic indices Kp = 8; Ap = 179. Also shown the quiet ionospheric conditions (Kp < 2; Ap < 9) during the day before the storm.



First observations of GALILEO ionospheric scintillation

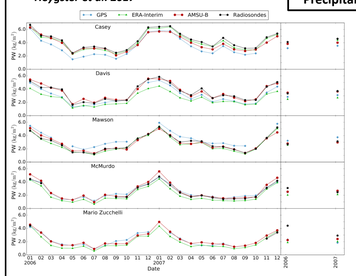


GPS, GLONASS, and Galileo phase scintillations recorded at SANAE on 20 January 2016. Different colors identify the satellites in view.
The events occurred during a moderate geomagnetic storm that started on 19 January and peaked on 20 January 2016 caused by a transit of a coronal mass ejection erupting filament recorded on 14 January.

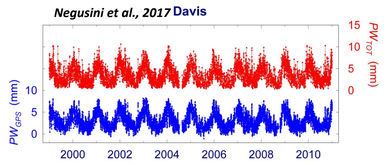
Neutral components

Integrated Water Vapor

Precipitable Water Vapor

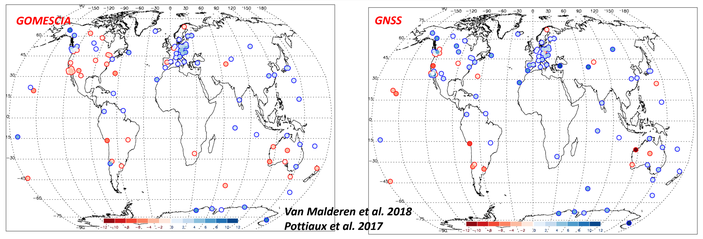


Monthly and Yearly means of Precipitable Water vapor from different methods at five different Antarctica location. GPS; ERA-Interim (long term data assimilation system); AMSU-B (satellites radiometers); ground based radiosondes.



Precipitable Water vapor time series from GPS observations (PW_{GPS}, as shown by bleu dots in the scale on the left in millimeters) and radio sounding data (PW_{TOT}), as shown by red circles in the scale on the right in millimeters].

Long-term trends in Integrated Water vapor

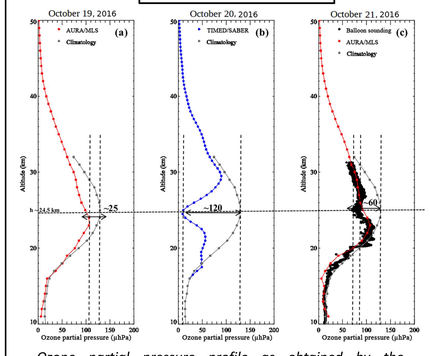


Integrated Water Vapor trends [%/dec] using GNSS data and GOMESCIA satellite measurements for the period January 1996-Dec 2010.

Other Components

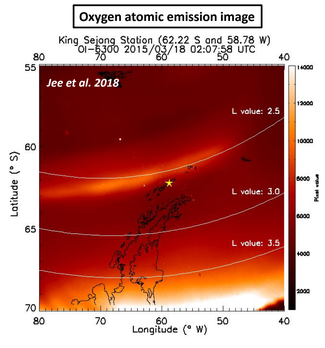
Bresciani et al. 2018
Correia et al .2018

Ozone vertical soundings



Ozone partial pressure profile as obtained by the ozonesonde (black), satellites based data AURA/MLS (red) and TIMED/SABER (blue) and climatology from ozonesonde balloons campaigns between 1996 and 1998 .

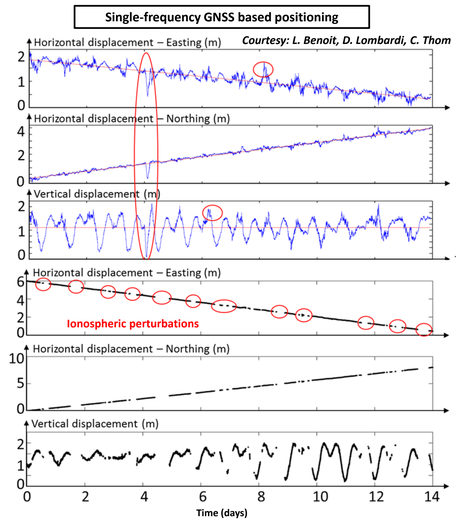
Oxygen atomic emission image

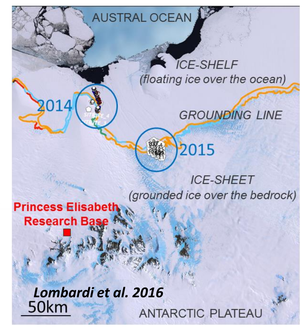


Stable Red Auroral (SAR) arcs Oxygen atomic 630.0 nm emission image by ASC at King Sejong Station (KSS) at 02:07 UT, 18 March, 2015.

Support to geophysical studies

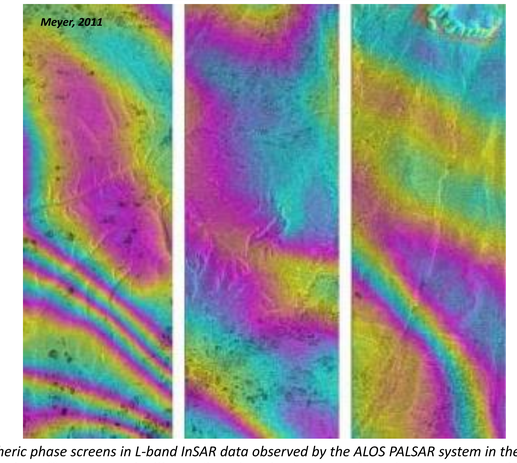
Single-frequency GNSS based positioning





Ionospheric activity impact on GNSS single frequency positioning for two different locations close to Antarctica grounding line. Ionospheric un-modelled electron content is the main obstacle to extend single-frequency GPS positioning from <1km to 1-10km baselines.

INSAR images distortions



Examples of ionospheric phase screens in L-band InSAR data observed by the ALOS PALSAR system in the Arctic (Alaska). Ionospheric propagation effects cause significant distortions in the data of low-frequency synthetic aperture radar (SAR) systems, whose severity is increasing with decreasing system frequency. The magnitude and pattern of ionospheric phase screens depend on the strength of the ionospheric turbulence signal and on the type of ionospheric instability during the time of image acquisition.

Join us!

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