Curriculum vitae Patrizia Francia

Graduated in Physics at the University of L'Aquila (1981, 110/110 cum laude).
Assistent professor from 1983 at the University of L'Aquila.
Associate professor from 2015 at the University of L'Aquila.

Research activity

From the beginning of her scientific activity, she was involved in the study of the interplanetary medium and of the interaction of the solar wind with the magnetosphere. In particular, using data from the Helios 1 and 2 spacecraft she carried out a model of the IMF-magnetosphere interaction to simulate the geomagnetic response and, applying spectral analysis methods, she found the same periodicities observed in the geomagnetic activity. Moreover, she participated to the analysis of the plasma data from the ISEE 2 spacecraft (in collaboration with prof. A. Egidi, Univ. of Roma-Tor Vergata) obtaining several interesting results on the heavy ion component of the solar wind and investigating through a simple model the presence at the Earth orbit of hydrogen ions originated from geocoronal and/or interstellar neutral hydrogen.

During the first nineties, in the frame of a cooperation with the University of Roma-Tor Vergata, the University of Firenze and the Astrophysical Observatory of Arcetri, she was involved in the study of solar oscillations and participated to the development of the IPM (Italian Panoramic Monochromator) experiment installed at the THEMIS telescope (Canary Islands).

She continued the research activity on the solar wind-magnetosphere interaction processes, in the framework of international programs such as ILWS and CAWSES, with particular attention on: the geomagnetic effects at both high and low latitude of solar wind structures, such as interplanetary shocks and CMEs. Using data at the two stations at Terra Nova Bay and Dome C in Antarctica, she studied ULF waves at polar latitudes, investigating generation processes and propagation paths in the magnetosphere.

In the framework of the COST Action ES1005 activities, she has been involved in the study of solar wind driven geomagnetic effects on the polar atmosphere and has been an author of the chapter "Impact of solar variability on the magnetosphere" in the handbook "Earth's climate response to a changing Sun", J. Lilestein, T. Dudok de Wit and K. Matthes coords., 255, EDP Sciences, ISBN: 978-2-7598-1733-7, 2015.

She is author of 67 scientific publications in refereed international journals, 24 contributions in conference proceedings, 88 participations in national and international conference, 5 invited talks.

Her h-index is 15 (WoS and Scopus).

She is referee for the following journals: Annales Geophysicae, Journal of Geophysical Research, Journal of Space Weather and Space Climate, Annals of Geophysics, Journal of Atmospheric and Solar-Terrestrial Physics.

Scientific collaborations:

Istituto Nazionale di Geofisica e Vulcanologia (INGV)
Istituto di Fisica dello Spazio Interplanetario (IAPS/INAF)
Bell Laboratories, Lucent Technologies (Murray Hill, New Jersey, USA)
Institute of the Physics of the Earth (Moscow, Russia).

Department of Electronics and Nanoengineering, Aalto University of Technology, Finland
Sodankylä Geophysical Observatory, University of Oulu, Finland

Research projects and responsabilities:

She participated to research projects funded by MIUR-PRIN, ENEA-PNRA, ASI and was responsible of the local research unit in the following projects:

“Magnetismo Solare (THEMIS)" funded by CNR during 1996-1997,

Biennal project CNR-Agenzia 2000 “Telescopio THEMIS: studio delle proprietà di scala nellestrutture convettive della fotosfera solare”

Space Weather Pilot Project ESA “GIFINT” (2003-2005).

2013-14 PNRA project "Studio bipolare di fenomeni magnetosferici con SuperDARN ed osservazioni ottiche e magnetiche".

She was a member of the management committee of the COST Action ES1005 "Towards a more complete assessment of the impact of solar variability on the Earth's climate", 2011-2015).

She was a member of the Academic Board of the PhD School of Polar Sciences of the University of Siena from 2007 to 2011.

She was director (with dr. E. Amata, IFSI-INAF) of the course “Magnetospheric Dynamics” of the International School of Space Science (L’Aquila, 9-15 April, 2007).

Teaching:

General Physics II (Bachelor degree in Industrial Engineering)

General Physics I with Laboratory (Bachelor degree in Chemical and Material Sciences and Technologies)

Magnetospheric Physics (Master degree in Physics)

Space Weather (Master degree in Atmospheric Science and Technologies)

Publications

1. Villante U., F. Mariani, P. Francia, The IMF sector pattern through the solar minimum: two spacecraft observations during 1974-1978, J. Geophys. Res., 87, 249, 1982

2. Villante U., P. Francia, M. Vellante, Geomagnetic implications of a simple IMF model, Annales Geophysicae, 1, 277, 1983

3. Egidi A., P. Francia, U. Villante, Interaction between neutral hydrogen and solar wind: spacecraft measurements of H+ at the Earth's orbit, Geophys. Res. Lett., 11, 709, 1984

4. Egidi A., P. Francia, U. Villante, E. Pelacà, On the temperature of alpha particles and heavy ions in the solar wind, Il Nuovo Cimento, 7C, 632, 1984

5. Villante U., P. Francia, Geomagnetic activity and current sheet, Annales Geophysicae, 4A, 75, 1986

6. Francia P., U. Villante, Spectral analysis of the geomagnetic activity index Ap during different IMF conditions (1947-1978), Il Nuovo Cimento, 9C, 1085, 1986

7. Villante U., P. Francia, Comments on "Periodicities in the interplanetary magnetic field polarity" by A.L.C. Gonzalez and W.D. Gonzalez, J. Geophys. Res., 93, 4141, 1988

8. Francia P., E. Pietropaolo, U. Villante, A. Egidi, A spherical harmonics filter for solar oscillations research, Solar Phys., 125, 233, 1990

9. Bertello L., Caccin B., Francia P., Pietropaolo E., New observations of 5-minutes oscillations in the opposite flanks of solar Fraunhofer lines, Astrophys. J., 401, 768, 1992

10. Francia P., Villante U., Meloni A., An analysis of geomagnetic field variations (3 min - 2 hrs) at a low latitude observatory (L = 1.6), Annales Geophysicae, 13, 522, 1995

11. Francia P., Villante U., Some evidence for ground power enhancements at frequencies of global magnetospheric modes at low latitude, Annales Geophysicae, 15, 17, 1997

12. Villante U., Francia P., Low frequency geomagnetic field fluctuations at low latitude during the passage of a higher pressure solar wind region, Annales Geophysicae, 15, 656, 1997

13. Villante U., Lepidi S., Francia P., Meloni A., Palangio P., Long period geomagnetic field fluctuations at Terra Nova Bay, Geophys. Res. Lett., 24, 1443, 1997

14. Kleimenova N.G., Kozyreva O.V., Villante U., Francia P., Bitterly J., Best A., Two types of Pc5 range geomagnetic pulsations at middle and low latitudes in strong magnetic storm, Geomagnetism and Aeronomy, 38, 61, 1998

15. Villante U., P. Francia, S. Lepidi, M. De Lauretis, E. Pietropaolo, L. Cafarella, A. Meloni, A.J. Lazarus, R.P. Lepping, F. Mariani, Geomagnetic field variations at low and high latitude during the January 10-11, 1997 magnetic cloud, Geophys. Res. Lett., 25, 2593, 1998

16. Lepidi S., P. Francia, U. Villante, L.J. Lanzerotti, A. Meloni, Polarization pattern of low frequency geomagnetic field fluctuations (0.8-3.6 mHz) at high and low latitude, J. Geophys. Res., 104, 305, 1999

17. Villante U., S. Lepidi, P. Francia, M. Vellante, A. Meloni, R.P. Lepping and F. Mariani, Pc3 pulsations during variable IMF conditions, Annales Geophysicae, 17, 490, 1999

18. Francia P., S. Lepidi, U. Villante, P. Di Giuseppe, A.J. Lazarus, Geomagnetic response at low latitude to continuous solar wind pressure variations during northward interplanetary magnetic field, J. Geophys. Res., 104, 19923, 1999

19. Lepidi S., P. Francia, U. Villante, A. Meloni, A.J. Lazarus, R.P. Lepping, The Earth's passage of the April 11, 1997 coronal ejecta: geomagnetic field fluctuations at high and low latitude during northward interplanetary magnetic field conditions, Annales Geophysicae, 17, 1245, 1999

20. Kleimenova N.G., P. Francia, U. Villante, O.V. Kozyreva, J. Bitterly, J. Schott, The temporal and spatial variations of low frequency geomagnetic pulsations at polar cusp and cap latitudes, Annali di Geofisica, 42, 675, 1999

21. Villante U., S. Lepidi, P. Francia, M. Vellante, A. Meloni, P. Palangio, ULF fluctuations at Terra Nova Bay, Annali di Geofisica, 43, 217, 2000

22. Lepidi S., P. Francia, M. De Lauretis, Local time behaviour of low frequency geomagnetic field fluctuation power at low latitude, Annali di Geofisica, 44, 119, 2001

23. Francia P., S. Lepidi, P. Di Giuseppe, U. Villante, Geomagnetic sudden impulses at low latitude during northward interplanetary magnetic field conditions, J. Geophys. Res., 106, 21231-21236, 2001

24. Villante U., P. Francia, S. Lepidi, Pc5 geomagnetic field fluctuations at discrete frequencies at a low latitude station, Annales Geophysicae, 19, 321-325, 2001

25. Lepidi S., Francia P., Cafarella L., Low frequency (0.7-7.4 mHz) geomagnetic field fluctuations at high latitude: frequency dependence of the polarization pattern, Annali di Geofisica, 44, 571-578, 2001

26. Yagova N., Lanzerotti L., Villante U., Pilipenko V., Lepidi S., Francia P., Papitashvili V., Rodger A., ULF Pc5-6 magnetic activity in the polar cap as observed along a geomagnetic meridian in Antarctica, J. Geophys. Res., 107(A8), 1195, doi:10.1029/2001JA900143, 2002.

27. Francia P., Lepidi S., K. Yumoto, Geomagnetic field fluctuations during the passage at the Earth's orbit of the tail of the July 15-16, 2000 ejecta, Annales Geophysicae, 20, 1143-1152, 2002.

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29. Villante U., Francia P., Vellante M., Di Giuseppe P., Some aspects of the low latitude geomagnetic response under different solar wind conditions, Space Sci. Rev., 107, 207-217, 2003.

30. Lepidi S., Francia P., Diurnal polarization pattern of ULF geomagnetic pulsations in the Pc5 band from low to polar latitudes, J. Atm. Solar Terr. Phys., 65, 1179-1185, 2003.

31. Villante U., Lepidi S., Francia P., Bruno T., Some aspects of the interaction of interplanetary shocks with the Earth's magnetosphere: an estimate of the propagation time through the magnetosheath, J. Atm. Solar Terr. Phys., 66, 337-341, 2004.

32. Francia P., U. Villante, N. Adorante, W.D. Gonzalez, The storm-time ring current: a statistical analysis at two widely separated low latitude stations, Annales Geophysicae, 22, 3699-3705, 2004.

33. Francia P., L.J. Lanzerotti, U. Villante, S. Lepidi, D. Di Memmo, A statistical analysis of low frequency magnetic pulsations at cusp and cap latitudes in Antartica, J. Geophys. Res, 110(A2), A02205, doi:10.1029/2004JA010680, 2005.

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57. Romano P., F. Zuccarello et al. Recurrent flares in active region NOAA 11283, Astr. Astrophys., doi: http://dx.doi.org/10.1051/0004-6361/201525887, 2015

58. Regi, M., M. De Lauretis, G. Redaelli, and P. Francia (2016), ULF geomagnetic and polar cap potential signatures in the temperature and zonal wind re-analysis data in Antarctica, J. Geophys. Res. Space Physics, 120, doi:10.1002/2015JA022104.

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61. Regi M., G. Redaelli, P. Francia, and M. De Lauretis (2017), ULF geomagnetic activity effects on tropospheric temperature, specific humidity and cloud cover in Antarctica during 2003-2010, J. Geophys. Res. Atmosphere, doi: 10.1002/2017JD027107.

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63. Regi, M., M. De Lauretis, P. Francia, S. Lepidi, A. Piancatelli, and S. Urbini (2018), The geomagnetic coast effect at two 80 S stations in Antarctica, observed in the ULF range, Ann. Geophys., 36, 193–203, doi:10.5194/angeo-36-193-2018.

64. Francia, P., M. Regi, M. De Lauretis (2018), Solar wind signatures throughout the high latitude atmosphere, J. Geophys. Res. Space Physics, doi: 10.1029/2018JA025411.

65. Marzocchetti M., S. Lepidi, P. Francia, L. Cafarella, D. Di Mauro (2019), The longitudinal polar cusp displacement from geomagnetic measurements in Antarctica, Annals of Geophysics, 62, 4, GM446, 2019; doi: 10.4401/ag-7779.

66. Francia P., M. Regi, M. De Lauretis, M. Pezzopane, C. Cesaroni, L. Spogli and T. Raita (2020), A case study of correspondence between Pc1 activity and ionospheric irregularities at polar latitudes, Earth, Planets and Space (2020) 72:59, doi: 10.1186/s40623-020-01184-4.

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