

Curriculum vitae of Alessandro Caporali

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Education

Alessandro Caporali was born in Padova on 16/01/1952. He received his high school diploma in classical studies in 1970 at the Tito Livio Gymnasium and a degree in Physics in Padua in 1975 with a thesis titled 'Isolated self gravitating systems in General Relativity ', supervisor Prof. Fernando de Felice, with the 110/110 and distinction.

In 1979, with a Stipendium of the Max Planck Gesellschaft (Max Planck Society), he received his PhD at the German Max Planck Institut fuer Physik und Astrophysik / Ludwig Maximilian Universitaet of Munich in relativistic gravitation with a thesis titled 'Eine Naehrungsmethode fuer die Beschreibung der Bewegung Ausgedehnten Koerper in der Allgemeine Relativitaetstheorie ', supervisor Prof. Juergen Ehlers, bringing the vote 'sehr gut'. From 1979 to 1983 he carried out research in gravitational physics in the United States, at the Marshall Space Flight Center of NASA as a postdoctoral fellow of the National Academy of Sciences, and at the Department of Earth and Planetary Sciences at the Massachusetts Institute of Technology in Cambridge, Massachusetts , specializing in satellite geodesy, laser telemetry and microwave radio interferometry, with extragalactic radio sources and the first GPS satellites, under the direction of Profs. Giuseppe Colombo (Padua University and Harvard) and Irwin Shapiro (MIT).

Employee of the Company Telespazio S.p.A. Rome until 1984 he was involved in the design and construction of the Center of Space Geodesy of Matera, on behalf of the National Space Plan (now ASI), directed by prof. Luciano Guerriero. He was Assistant Professor at the Department of Physics of the University of Padua until 1987, Associate Professor of

Experimental Physics at the University of Bari until 1992. Professor of Geodesy at the Department of Geology, Paleontology and Geophysics of the University of Padova.

Full Professor of Solid Earth Geophysics at the Faculty of Engineering, University of Padova, from June 2010.

Scientific Research

In Padua he installed in 1994 a permanent station GPS that works in support to the International GPS Service (CalTech / JPL) and of EUREF. In Padua he is responsible for the Data Processing Centre GNSS called UPA, for the maintenance of the geodetic network European EUREF, serving as a Local Analysis Center of the EPN since 1999, with a special interest in fundamental reference systems (astronomic/terrestrial) using space techniques.

He served as responsible of geodetic / geophysical campaigns for gravity measurements (gravimetry, astronomic deflection of the vertical) in China, Nepal and Pakistan for the Project Everest-K2 CNR, directed by Professor Ardito Desio, in the years 1987, 1988, 1990, 1992, 1994, 1998. The research resulted in a new map of the Bouguer gravity anomalies in the western Himalayas, with the demonstration of the folding of the lithosphere at various wavelengths as a result of the India-Eurasia collision. He was the national coordinator of the project of the Italian National Research Council on the Geodynamics of the Alpine Mediterranean Area. He served as Co-PI of Projects S2 (2006-2008) and S1 (2009-2010) of the National Institute of Geophysics and Volcanology and the Civil Protection Department on the 'Evaluation of the seismic potential and probability of large earthquakes in Italy', with the task of estimating the speed and the rate of deformation of the crust in Italy based on GPS data, and assess the relationship with the seismicity of the main Italian seismic zones in order to estimate an budget energy accumulation / release.

Applied Research

1991-1992: Responsible of the local geoid determination in the area of the Calibration of the Radar Altimeter on board the ERS 1 satellite offshore Venice, under contract to ESA-ESTEC.

1994-1996: in collaboration with Alenia Spa, orbit determination by GPS of scientific satellites in low orbit used for observations of the Earth, such as the German CHAMP, the Canadian Radarsat 1 and the Argentine SAC - C, all regularly launched

1996 - 1998: with MARIPERMAN (Italian Military Navy, La Spezia) and the Navy Centre NATO SACLANT of La Spezia, development of GPS sensors mounted on buoys drifting, for monitoring operations.

2006: In Scope 6 of the Framework Programme of the EU, Co-PI in a project on the use of networking techniques for producing signals for improvement of the Galileo signal, for applications systems and GIS positioning precision, in collaboration with the Space Engineering SpA in Rome and four other European partners.

2004 - 2006: research on behalf of the Company GEM Elettronica Spa of San Benedetto del Tronto to the development of a heading sensor arrangement for boats, and flux gate magnetometers, based on interferometry GPS in real time and the use of dedicated processors FPGA for signal processing.

2005 - present: activities on contract with the Cartographic Office of the Veneto Region for the realization and management of the Regional GPS Network and innovative solutions in the regional mapping, such as switching to UTM coordinates from the previous cylindrical and equal area mappings, the adoption of a single zone and the introduction of a precision geoid,

in line with the European Directive INSPIRE. The Regional GPS Network of Veneto now has 28 operating permanent sites and over 1000 registered Users of the RTK data.

2005- 2007: as part of a three-year contract with the Military Geographical Institute new procedures were developed based on the BPE (Bernese Processing Engine) for the processing of the national geodetic network. Civilian and military personnel was trained in the field of processing GPS data accuracy and management of permanent GPS networks for purposes geographic / cartographic;

2005 - 2006: investigations have been carried out under contracts with Consorzio Catania Ricerche and the company ANTECH Spa Catania for the realization on a Rabbit board of a pointing system of antennas for satellite telecommunications installed on mobile units of the Civil Protection, using the interferometric system GPS for the definition of the geographical North with precision of 0.3 degrees in times of the order of a few seconds .

2006 -2008 research under contracts with SEPA Spa of Torino and the Torino Wireless Consortium for the development of a real-time GPS satellite interferometric sensor for detecting displacements and deformations in structures (dams, bridges..) or areas at risk of landslide or subsidence.

2007 - 2010: Co-responsible, together with the Politecnico di Milano and University of Bologna/ Faculty of Engineering, of the calculation of the National Dynamic Network, the new geodetic network of IGM, consisting of 100 permanent GPS stations. The network was validated by the TWG at the Euref Symposium in Florence in 2009 as a class B regional realization of ETRS89.

Activities in support of EUREF

- Organization and management of the permanent GNSS site PADO (formerly UPAD) since 1996, with capability of tracking GPS, GLONASS, Galileo, BeiDou, QZSS, Navic and SBAS satellites, in support of the EPN and the IGS, including the MGEX experiment
- Organization and management of the UPA Local Analysis Center in support of the weekly analysis and maintenance of the EPN (European Permanent Network of GNSS stations)
- Member of the EUREF Technical Working Group since 1999: active participation in the activities of the Working Groups/Special Project on Dense Velocity field, Densification of the EPN, Deformation Monitoring, MultiGNSS.
- EUREF Secretary 2011-2015, Honorary Member since 2015
- Member of the INSPIRE TWG 1 (Coordinate Systems) and 2 (2d and 3D grids)
- Participant to the activities of the IGC as part of UNOOSA (United Nations Office for Outer SpaceAffairs)
- EUREF representative in the WEGENER Board.

Teaching activity in Italy

At the University of Padua, as Assistant Professor:

- 1984 to 1987: Exercises to Physics II Degree in Chemistry;
- 1984-1987: Physics Laboratory II Degree in Electronic Engineering

At the University of Bari, as Associate Professor:

- 1988-1992: Relativistic Theory of Gravitation for CDL in Physics;

At the University of Padua, as Associate Professor of Geodesy, since 1992:

- 1993 1994 Geodesy for C.d.L. in Geology;
- 1995 2009 Topography and Cartography / Geomatics Laboratory for CDL in Geology
- 2000 to present Solid Earth Geophysics C.d.L. in Geology
- 1994 present: Orbital Determination of Artificial Satellites and Satellite Navigation, Course in Space Systems, Faculty of Engineering, Department of Mechanical Engineering
- 1996 2002: Director of the Postgraduate Course in Space Systems, Faculty of Engineering, Department of Mechanical Engineering
- 2002 2004: Director of the Master in Astronautics and Satellite Sciences (interfaculty: Engineering and Science)
- 2009 present: Satellite Navigation, CDL in Aerospace Engineering, School of Industrial Engineering, University of Padova

Teaching Activities Abroad

1980- at the NASA Marshall Space Flight Center- Seminars on Relativistic Theory of Gravitation, for Doctorate courses at the University of Alabama, Huntsville campus.

1982- At the Massachusetts Institute of Technology, Department of Earth and Planetary Sciences, Series of seminars for the doctorate on the measurability of the relativistic effects of the gravitational deflection of light, relativistic delay in radar signals, the precession of gyroscopes and orbital perturbations periastron and in the longitude of the node (Lense Thirring effect)

1984- at the NASA Goddard Space Flight Center - Office for Earth and Planetary Sciences- Seminars on laser tracking of satellites for geodetic applications, for Doctorate courses at the University of Maryland campus in Greenbelt.

Academic appointments

Member of the Board of the Department of Geology, Paleontology and Geophysics, AA. 1999-2001.

Member of the Board of the Center of Studies and Activities for Space 'CISAS G. Colombo', AA. 1996-1999 and 2000-2004.

Representative of the Department of Geosciences in the CISAS Board (2004 - present)

CISAS representative of the Scientific Committee of the Graduate School in Space Science and Technology

Member of the Scientific Commission of the Department of Geosciences

Assignments Editorials

Member of the Editorial Board of the Journal of Asian Earth Sciences, Elsevier Group (2000-2003).

Guest Editor of Bulletin of Geomatics

Reviewer for Tectonophysics, Journal of Geophysical Research/Solid Earth, Journal of Geodynamics.

Main research interests

- Determination of the current speed of the major lithospheric plates in the Alpine Mediterranean area using satellite techniques, and the associated strain field between plates and intraplate; correlation with the recent seismicity, focal mechanisms and structural geology.
- Interfacing satellite positioning with numerical cartography.
- Techniques of satellite positioning in real time via the Internet
- Precision Orbit Determination of terrestrial satellites
- MultiGNSS positioning, interoperability of different GNSSs, Time scale synchronization of different GNSSs

Service/Membership in Scientific Associations

He served until 2009 as Co-chairman of the Central European geodynamic Research Network. In 2010 he was elected Chairman for the period 2010-2015. Since 1999 he serves as member of the Technical Working Group of EUREF. In 2011 he was elected Secretary General of EUREF. He has served in the Thematic Working Group 1 (Reference Frames) and 2 (2D and 3D grids) of the European Directive INSPIRE for the harmonization of spatial data. He is member of the National Group of Solid Earth Geophysics, CNR, European Geophysical Society and the American Geophysical Union. He serves as EUREF representative in the WEGENER Governing Board.

Other Service Activities

He served as President of the Italian Alpine Club, Section of Este, in the period 2000-2002, and as President of the Rotary Club of Padua, 2004-2005.