



Meteorology Group

Department of Geophysics

Universidad de Chile

1. Presentation

The Department of Geophysics, Universidad de Chile, performs advanced research and offers programs of pre- and post-graduated study in Atmospheric Sciences through its Meteorology Group.

The Meteorology Group was formally established in 1965 and it currently has 9 professors and a similar number of research assistants and graduate students. The research, teaching and outreach activities of the group are supported by a specialized and updated library, a modern computer network, and meteorological observation systems.

The research of the Group focuses on the understanding of atmospheric phenomena and processes in Chile, South America and the adjacent oceans. Consistent with the quality of its work, the Meteorology Group is actively involved in national and international research programs.

2. Faculty & Research Associates

Patricio Aceituno G. (Professor)

Ph.D. in Meteorology, University of Wisconsin, USA.

Electrical Engineer, Universidad de Chile.

Research interests: South American climate - climate prediction

Mark Falvey (Research Associate)

Ph.D. in Geophysics, Victoria University of Wellington, New Zealand.

Research interests: Regional Climate Modeling – Mountain Meteorology – NWP Applications.

Humberto Fuenzalida P. (Professor)

Ph.D. in Atmospheric Sciences, University of Michigan, USA.

Industrial Engineer, Universidad de Chile.

Research interests: Climate and paleoclimate – Radiative transfer

Laura Gallardo K. (part time Professor)

Ph.D. in Meteorology. Stockholm University, Sweden.

Research interests: Atmospheric chemistry – Climate change.

René Garreaud S. (Associated Professor)

Ph.D. in Atmospheric Sciences, University of Washington, USA.

Civil Engineer, Universidad de Chile

Research interests: Synoptic meteorology – Mountain meteorology

Ricardo Muñoz M. (Assistant Professor)

Ph.D. in Meteorology, Pennsylvania State University. USA.

Civil Engineer, Universidad de Chile

Research interests: Atmospheric boundary layer – Numerical modeling

Maisa Rojas (Research Associate)

Ph.D. Atmospheric Sciences, Oxford University, UK

Research interests: Climate Variability and Paleoclimate. Dynamical downscaling.

Roberto Rondanelli R. (Instructor)

M.Sc. in Geophysics, Universidad de Chile.

Chemistry Engineer, Universidad de Chile.

Currently: Ph.D. candidate in Meteorology. Massachusetts Institute of Technology (MIT).

Research interests: Climate change – Atmospheric chemistry.

José Rutllant C. (Professor)

Ph.D. in Meteorology, University of Wisconsin (Madison), USA.

Electrical Engineer, Universidad de Chile.

Research interests: Dynamics of the arid climates – Air-sea interaction

Rainer Schmitz (Research Associate)

Ph.D. Chemical Engineering, University of Birmingham, UK

Research interests: Urban/regional atmospheric modeling, tropospheric ozone, aerosols.

3. Research Areas

The research of the Meteorology Group is organized in three major areas. For each of them, we list here the current/recent research projects that have been conducted. For sake of brevity we only list those peer-reviewed projects supported by grants from the Chilean National Science Foundation (CONICYT). For a list of recent publication generated by our group please visit our [web site](#).

South American Climate and Climate Variability

- Climate Variability in Chile: Evaluation, Interpretation and Projections. (2006-2008). In collaboration with Physical Oceanography group at Universidad de Concepción and National Weather Service. (project [web site](#))
- On the interannual and interdecadal rainfall variability in South-Central Chile (2001-2003)
- Predictive models for the rainfall patterns over the Americas, based on ocean-atmosphere interaction (1998-1999)
- Dynamic of the coastal climate in the hyper-arid northern Chile (1997-2000)
- Climate Change evidence in the temperature and rainfall records in the southern tip of South America (1995-1997)
- Mechanisms associated with episodes of deep convection in the S.A Altiplano (1995-1997)
- Rainfall regime over the South American Altiplano: interannual variability and associated teleconnections (1993-1994)

Synoptic Meteorology

- Cut-off lows in the western subtropical South America: Climatology, associated mechanisms and their impacts on rainfall (2003-2005)
- Forced downslope flow over the Andes in Central Chile (2000-2002)

- Coastal lows: Observational study of their structure and propagation (1995-1997)
- Summertime rainfall episodes in the subtropical Andes western slope (1995-1996)

Boundary Layer Meteorology – Regional Air Pollution

- The Stratocumulus cloud deck off the subtropical west coast of South America: High frequency variability (2002-2004)
- Air pollution in Santiago: (1) Development of a photo-chemistry model for ozone; (2) Characterization of the Santiago ABL during wintertime
- Numerical modeling of global UV radiation observed in Chile: Air pollution effects over Santiago (1998-200)
- Meteorological processes associated with the water caption from the coastal stratocumulus in northern Chile (1994-1995)
- Interannual variability of the upwelling atmospheric forcing along the west coast of South America (1994-1996)
- On the atmospheric boundary layer along the coast of northern Chile (1993-1994)
- Operational forecast of the air pollution meteorological potential in Santiago, Chile. (1994-1995)

4. Applied Meteorology and Climatology

The group has lead major projects of national interest in applied meteorology and climatology, directly funded by National Agencies or private companies. Recent and in-progress projects:

- Meteorological air pollution potential in Santiago (CONAMA-RM)
- Ozone Operational Forecast for Santiago using WRF-CHEM (CONAMA-RM) ([project web site](#))
- Wind-energy National Assessment (CNE)
- Intraseasonal climate prediction (DGA, CEDEC-SIC, ENDESA, COLBUN)
- Regional Climate Scenarios for the end of the XXI Century (CONAMA) ([project web site](#))
- Real time Weather Information Server ([web site](#))
- Climate Information Server ([web site](#))
- Outreach in Meteorology [Web Site](#) (EXPLORA)

5. Academic Programs

The Meteorology Group offers since 1990 a program of graduate study leading to the degree of [Master of Sciences \(M.S.\) in Meteorology and Climate](#). The program has duration of two years and it brings a solid foundation in theoretical and applied aspects of Meteorology. In addition to intense class work, the student must submit a thesis to obtain the M.S. degree.

Additionally, the Group offers several classes and seminars in Meteorology for undergraduate students in Engineering and Sciences, and it also participates in the Ph.D. program in Fluid Dynamics at the Campus of Physical and Mathematical Sciences, Universidad de Chile.

6. Resources

The Department of Geophysics is located in a modern building at the interior of the Campus of Physical and Mathematical Sciences, Universidad de Chile, near downtown Santiago.

Library

- Historical collection and updated subscription to all the Journals of the American Meteorological Society (MWR, JCL, JAS, WAF, etc.); Journal Geophysical Research – Atmosphere; Geophysical Research Letter; Nature; Tellus.
- Over 2000 books in Meteorology and related Sciences
- Direct connection to Universidad de Chile Collective Catalog and AMS Database.

Computational Resources (Hardware)

- Volcan: Cluster Linux (Scali) 8 Processors (AMD Opteron 2.3 GHz).
- Andes: Cluster Linux (Scali) 20 Processors (Intel Xeon 2 GHz).
- Unix-Linux Workstation network and Peripherals
- 16+ workstation [computer laboratory](#) (mainly in support of teaching activities)
- Internet connection: 100 MBPS Optical fiber

Computational Resources (Software)

- Numerical models: MM5, single column MM5, WRF, WRF-Chem, ROMS, CALMET.
- Specialized software: Unix and Linux versions of GrADS; HYSPLIT, GEMPAK.
- General software: Unix and Linux versions of Matlab (including several toolboxes); ENVI, ARCGis, IDL, GMT; Fortran and C compilers;

Observation systems

- GOES High resolution Ground Station (GTI Electronics)
- 10 Full automatic weather stations (Campbell Sci.); spare sensors for air temperature and humidity, wind (including 4 sonic anemometers), atmospheric pressure, solar and net radiation, soil temperature, and energy budget; and calibration equipment. ([MetLab web site](#))
- 1 AIR radiosonde and tethered balloon station
- 1 Pilot balloon system
- 1 Laser ceilometer ([MetLab web site](#))