

The Center of Studies on Air Quality and Climate Change (C-STACC) in ICEHT

Air quality and climate change are two of the most important environmental problems of our time. The World Health Organization is estimating that 4.2 million people die every year as a result of exposure to ambient (outdoor) air pollution and another 3.8 million die as a result of household exposure to smoke from dirty cook stoves and fuels. At the same time climate change poses major risks to human health and security, food security, water supply and economic growth.

The new Center of Studies on Air quality and Climate Change (C-STACC) aims to understand how atmospheric processes impact climate, health and ecosystems through a combination of theory, measurements and simulations. A central focus in our research program is atmospheric particulate matter (aerosols) which are responsible for most of the health problems caused by air pollution. Aerosol interactions with clouds, and their description in models represents one of the major sources of uncertainty in climate projections. Aerosol can also supply limiting nutrients to ecosystems, and have a profound impact on primary productivity, biogeochemical cycles and climate.

The C-STACC teams are involved in the development of instrumentation for the measurement of gas and particulate-phase pollutants and measurement techniques required to study atmospheric processes. The atmospheric simulation chamber of the Center is a state-of-the-art facility, part of the EUROCHAMP-2020 European infrastructure, which allows studies of how pollutants evolve after they are released in the atmosphere. We participate in field studies around the world (Pittsburgh, Mexico City, Paris, Po Valley, Finland, Greece, etc.) to characterize air pollution, identify its sources, study atmospheric processes, and propose solutions to various problems.

The modeling groups of the Center develop open-source atmospheric chemical transport models and modules, as well as tools for advanced sensitivity analysis of large codes and model reduction/data discovery through emulation and network analysis. The codes developed by C-STACC are now also used in Climate Models and Earth System Models and by air pollution regulatory agencies in Europe, the US, Canada, Mexico, Chile, China, Australia.