Seminários CGE/UE

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Observations of aerosols and clouds from a multi-instrumented site: aerosol direct, semi-direct and indirect radiative effects

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Resumo

Solar radiation incident on Earth is the main source of energy for life and is a key component of the climate system. Particles in suspension in the atmosphere, which are aerosols and cloud droplets, interact with solar radiation and consequently modulate the energy absorbed by the Earth's surface and atmosphere. Nowadays, aerosol and cloud properties are under study in a twofold context of climate change and anthropogenic modification of the atmosphere composition.

Aerosol radiative impacts are declared main sources of uncertainties in the climate projections. We distinguish three effects: i) Aerosols decrease solar radiation incident at the Earth's surface, with implications on evaporation, photosynthesis, and surface temperature: aerosol direct radiative effect. ii) Aerosols increase absorption of radiation in the residence atmospheric layer, modifying the vertical profile of temperature which affects the atmospheric circulation and the cloud life cycle: aerosol semi-direct radiative effect. iii) Aerosols providing condensation nuclei for cloud formation, both their

concentration and nature affect cloud microphysical and optical properties: aerosol indirect radiative effect.

Observation of aerosols and clouds from a ground-based multi-instrumented station offers coupled advantages: i) best precision, ii) high temporal resolution, ii) multi-parameter and iv) long-term souding. Ground-based data sets are then defined as reference for calibrating data analysis algorithms of satellite observations and for validating results. Ground-based data sets also permit to investigate badly-known physical processes, for improvement of climate and weather modelling.

I will present studies on the aerosol radiative impacts, relying on measurements acquired by the stations of Evora (Portugal) and SIRTA (Palaiseau, France) and also on METEOSAT-7 data sets.