UE Radiative transfer and remote sensing

ECTS
6 credits

Component
UFR PhITEM (physique, ingénierie, terre, environnement, mécanique)

Semester
Automne

- **Teaching language(s):** French
- **Open to exchange students:** Yes
- **Code d'export Apogée:** PAX9ACAF

Presentation

Description

This course describes the processes of solar and terrestrial energy transfer through environmental mediums, particularly the atmosphere, for applications in climate science (greenhouse effect) and in space and terrestrial remote sensing. Theoretically, the course introduces radiative variables (radiance, irradiance, albedo, emissivity), absorption and scattering processes, the radiative transfer equation, blackbody radiation, and the energy balance of surfaces.

These theoretical elements will enable students to understand and quantify the greenhouse effect in detail, particularly the different roles played by CO2 and water vapor. The same tools will be applied in space remote sensing to understand how surface properties (soil, snow, water, ice) influence signals recorded by satellites, and in turn, how these signals can be used to quantify surface properties.

The second part of the course will cover a detailed application: the use of weather radar to estimate precipitation rates and other hydrometeorological information.

The third part consists of a GIS project (9 hours) independently completed by each student, aimed at improving their skills in Geographic Information System software (QGIS) to create digital maps and perform quantitative analyses. This project differs from the Master 1 project by involving more advanced use of QGIS and possibly the use of Python for large-scale geospatial processing.

Overall, this course is designed for students who want to deepen their knowledge in space and terrestrial remote sensing (in a quantitative manner) and in climate system functioning (energy balance). It is also relevant for instrumentalists who use light sources, microwaves, or infrared to probe the environment (laser, GPR, thermal camera, etc.).

Course parts

UE Radiative transfer and remote sensing - CMTD	Lectures (CM) & Teaching Unit (UE)	42h

Period : Semester 9

Useful info

Place

Grenoble

Campus

Grenoble - Saint-Martin d'Hères