UCLouvain

lphys2269

2021

Remote sensing of climate change

5.00 credits	30.0 h	Q2

This biannual learning unit is not being organized in 2021-2022 !

Teacher(s)	Dekemper Emmanuel ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Basic training in physics and mathematics (level of bachelor in sciences or applied sciences).
Main themes	Physico-chemical characteristics of the upper atmosphere and of radiative transfer of solar radiation ; ground-based and space-borne spectroscopic methods ; data processing algorithm and inverse methods.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 **a. Contribution of the teaching unit to the learning outcomes of the programme (PHYS2M and PHYS2M1)** AA1: A1.1, A1.5 AA2: A2.5 **b. Expected learning outcomes** At the end of this teaching unit, the student will be able to : 1. describe the main processes defining the trace gas composition of the upper atmosphere ; 2. understand the basic principles of atmospheric remote sensing: geometry, spectral domains and observation methods ; 3. understand the inverse problems related to ground-based and space-borne observations ; 4. assess the error budgets for several remote sensing modes and identify their intrinsic limitations ; 5. understand the design principles of a space remote sensor and its operational use.
Evaluation methods	Oral examination based on a global analysis of a scientific paper describing a remote sensing space mission.
Teaching methods	Lectures. Integrative project. Tutorial of MODTRAN 6.
Content	**1. Basic concepts about the atmospheric system and radiative transfer** a. atmospheric vertical structure b. global dynamics and chemical composition c. solar irradiance and Earth's radiative balance d. light-particle interaction and multiple scattering : albedo, aerosols and clouds **2.Observation methods** a. observation geometries from space : emission and absorption, nadir and limb views b. spectrometers and imagers from UV to mm waves c. 40 years of space remote sensing : achievements and perspectives d. ground-based networks and validation of space observations **3. Data processing in space remote sounding** a. scope : orders of magnitude and spatio-temporal resolutions b. atmospheric corrections c. specific inverse methods for atmospheric remote sensing **4. Climate variables : measurements and climatologies** a. review of the main climate variables b related open questions for atmospheric remote sensing
Bibliography	« Inverse Methods for Atmospheric Sounding : Theory and Practice », Clive Rodgers, World Scientific, https://doi.org/10.1142/3171.

Faculty or entity in charge	PHYS

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Geography : Climatology	CLIM2M	5		
Master [120] in Physics	PHYS2M	5		
Master [60] in Physics	PHYS2M1	5		