UCLouvain

lphys2269

2020

Remote sensing of climate change

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h	Q2

This biannual learning is being organized in 2020-2021

Teacher(s)	Dekemper Emmanuel ;
Language :	English
Place of the course	Louvain-la-Neuve
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.
Aims	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. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** Oral examination based on a global analysis of a scientific paper describing a remote sensing space mission.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** 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	Aims
Master [120] in Geography : Climatology	CLIM2M	5		
Master [60] in Physics	PHYS2M1	5		
Master [120] in Physics	PHYS2M	5		