Geophysical flows and global change awareness

The aim of this course is twofold: firstly giving an introductory course to the study of large-scale flows that occur in the atmosphere and the oceans on Earth: we will examine how the combined, or separated, effects of stratification and rotation lead to the specifics of these naturally occurring flows. Secondly the oceans and the atmosphere are among the main supports of life on Earth and the global warming currently underway will lead to significant changes in the next few decades. So we will focus on some aspects of these drastic changes and their impact on land planning.

Summary:

1st part: Geophysical flows

- Introduction
- Atmospheric general circulation
- Back to basics: equations of fluid motion, effects of rotation and stratification
- Shallow water flows
- Geostrophic theory
- Planet boundary layer

2nd part: Global impacts of climate change

- Global impacts of climate change
- Impacts of climate change on water resources and food chains
- Integrated (physical) water resources management
- Adaptation to climate change (societal), multi-stakeholder, consultation, taking into account uncertainties (e.g. sea level rise)
- Valorization of data available on the internet, without GIS integration
- Case study of a watershed school case study

On-line resources:

Webinar/Mooc:

youtube channel Science Utile (in french, Pascal Maugis)

MOOC Avenir Climatique (in french)

Bibliography:

Gleick, Basic water needs

Hoekstra, Water footprint humanity

Giordano and Shah, From IWRM back to integrated water resources management

Appaerl et al, Water value multi-stakeholders

Dalin et al, Groundwater depletion embedded in international food trade

Harding, Water resources and climate changes

Hansen et al, 2°C highly dangerous

Funtowicz, Post normal science

Van der Sluijs, Uncertainty and decision making

Guston, Boundary policy-science

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