

## Why a radiative transfer course?

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Radiative transfer is used in a number of applications and projects at NILU and elsewhere. libRadtran is a well-known and much used radiative software package that I am a co-author of. The aim of the course is to introduce the theory behind the libRadtran software package and show examples of its use.

## Course outline

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The course will run over two days. Day 1 is general and will cover the theory behind libRadtran and show typical examples of its use. Day 2 is initially aimed to be COMTESSA specific.

### Day 1

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0900-1130: General radiative transfer theory

- \* The radiative transfer equation in 1D and 3D
- \* How libradtran solves the radiative transfer equation
- \* What libradtran can do and what it can't do
- \* Spectral resolution
- \* Validation of libRadtran

1200-1500: Using libRadtran

- \* The libRadtran Graphical User Interface
- \* Calculation of UV-visible spectra
- \* Inclusion of clouds, aerosol, surface albedo
- \* Infrared examples
- \* Remote sensing of volcanic ash
- \* Radiative forcing
- \* How to run libRadtran on NILU's clusters
- \* python and libRadtran including plotting of output

### Day 2

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0900-1130: Radiative transfer for COMTESSA

- \* 1D versus 3D radiative transfer
- \* Monte Carlo solution of the radiative transfer equation

1200-1500: COMTESSA examples including

- \* Camera views of:
  - Puff release
  - Horizontal plume
  - Vertical plume
- \* Spectral simulations
- \* Aerosol effects
- \* Python scripts for COMTESSA
- \* How to run on NILU's clusters (python scripting)
- \* Python scripts for plotting of 3D input and 2D output.

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For the practical parts it is recommended to have libRadtran installed and running on your laptop. There will not be time for installation of libRadtran during the course. If you need help to install libRadtran please contact me before the course. You may download libRadtran from [www.libradtran.org](http://www.libradtran.org).

If you want to read up a little before the course the following is recommended:

<http://www.atmos-chem-phys.net/5/1855/2005/acp-5-1855-2005.html>

<http://www.geosci-model-dev-discuss.net/8/10237/2015/gmdd-8-10237-2015.html>