

# ecCodes

## GRIB Fortran 90 - Python APIs Practicals 1

Dominique Lucas and Xavi Abellan

[Dominique.Lucas@ecmwf.int](mailto:Dominique.Lucas@ecmwf.int) [Xavier.Abellan@ecmwf.int](mailto:Xavier.Abellan@ecmwf.int)

# Practical 1: Intro to ecCodes APIs

For these practicals, **work on ecgate!** Get the practical's archive:

```
ecgate$ cd $SCRATCH
ecgate$ tar xvf ~trx/ecCodes/eccodes_api_practicals.tar.gz
ecgate$ cd eccodes_api_practicals/exercise1/
# select F90 or Python
ecgate$ cd F90
ecgate$ ls
Makefile exercise.f90 exercise_eccodes.f90 exercise_grib_api.f90
exercise_mod.f90 u v
ecgate$ make ← Compile/link exercise.f90 with the old
ecgate$ ./exercise
                   version of EMOSLIB
```

- The Fortran code `exercise.f90` decodes two GRIB files and to compute wind field and direction. The objective is to make all the necessary changes in `exercise_grib_api.f90` (or `exercise_eccodes.f90`) using ecCodes to obtain the same results.

# Practical 1: Main program

```
program exercise_grib_api
  use exercise_mod
  implicit none

  ! Global variables
  real (kind = nbytes_dp), dimension(:), allocatable :: u,v,speed, direction

  call read_fields('u',u)
  call read_fields('v',v)
  call compute_fields()
  call clean_fields()
end program exercise_grib_api
```

*You have to modify the subroutine read\_fields*

```
ecgate$ grib_ls -p parameter,shortName,dataDate,numberOfCodedValues,gridType,packingType u v
```

parameter	shortName	dataDate	numberOfCodedValues	gridType	packingType
131	u	20080201	4131	regular_ll	grid_simple
...					
132	v	20080201	4131	regular_ll	grid_simple
...					

2 of 2 total grib messages in 2 files

# Practical 1: The objectives

- You will only have to include the ecCodes I/O statements and make the appropriate calls to `grib_get` in `exercise_grib_api.f90` (or `codes_get` in `exercise_eccodes.f90`).
  - You can use the `'grib_'` or `'codes_'` names for the calls to ecCodes.

- Compile/link the Fortran examples with:

```
ecgate$ gfortran -o exercise_eccodes exercise_grib_api.f90 exercise_mod.f90 \  
$ECCODES_INCLUDE $ECCODES_LIB
```

```
ecgate$ gfortran -o exercise_eccodes exercise_eccodes.f90 exercise_mod.f90 \  
$ECCODES_INCLUDE $ECCODES_LIB
```

or use the Makefile (`'make grib_api'` or `'make eccodes'`)

- For Python, run with:

```
ecgate$ python exercise_grib_api.py
```

# Practical 1: The objectives

- Run the resulting code

```
ecgate$ ./exercise_grib_api (or ./exercise_eccodes) # for Fortran
```

```
ecgate$ python exercise_grib_api.py (or exercise_eccodes.py) # for python
```

- Compare with the output produced by ./exercise
- Now change the links for the input files to u.grib2 and v.grib2 (GRIB-2) and run the two executables again

```
ecgate$ make grib2
```

```
ecgate$ ./exercise_grib_api (or ./exercise_eccodes) # for Fortran
```

- You can also compare the usage of ecCodes with the usage of the GRIB API:

```
ecgate$ module swap eccodes grib_api
```

```
ecgate$ make clean gribapi
```

```
ecgate$ ./exercise_grib_api
```

```
ecgate$ module swap grib_api eccodes
```

# Tips

- Use **ecgate**, not the local desktop!
- For C and Fortran, use make ('make [-f <Makefile>] [clean]')
- Documentation for ecCodes can be found at  
<https://software.ecmwf.int/wiki/display/ECC/ecCodes+Home>
- Documentation for GRIB API can be found at  
<https://software.ecmwf.int/wiki/display/GRIB/GRIB+API>
- Error codes are listed under:  
<https://software.ecmwf.int/wiki/display/GRIB/Error+codes>
- See lecture notes, ask one of us or ...
- Suggested solutions are in the sub-directory '.solution'