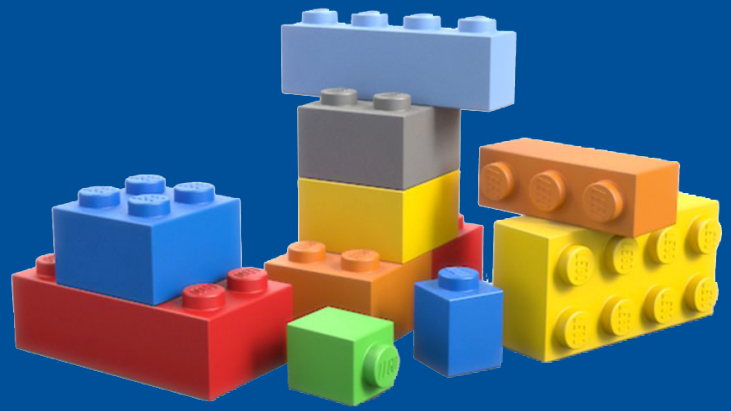
# Object Orientation In Post-Processing

*After two years of code refactoring : where are we now ?*



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# Plan

- **Objects concerning the post-processing**
- **Methods with these objects**
  - Forecast
  - Simple post-processing server
  - Multi-post-processor
  - FIELDS transformer for the 4Dvar assimilation
- **Status in cycle 46**
- **Developments beyond OOPS**

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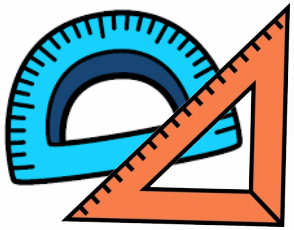
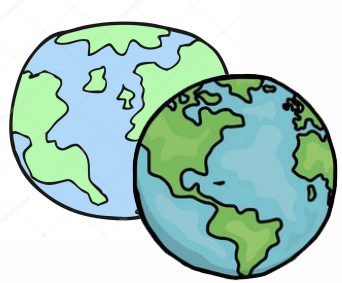
# Objects concerning the post-processing

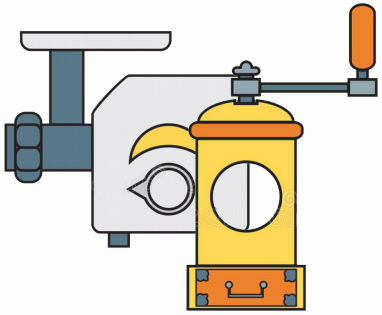


**Geometries**
*spectral dimensions,*
*gridpoint dimensions,*
*orography*



**Fields**
*spectral fields,surface fields,*
*Gridpoint upper-air fields*

**IFS initializer**
*MPI,*
*spectral transforms, …*
*and orphan things*



**Post-processors**
*Interpolators, filters*

**Models**
*Dynamics,Physics,*
*GFL attributes*

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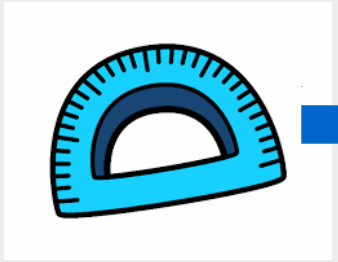
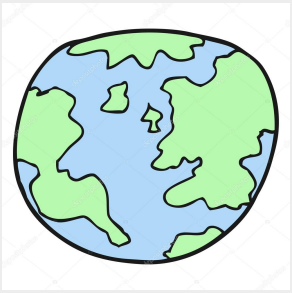
# A Forecast made from these objects

IFS_init



Sugeometry

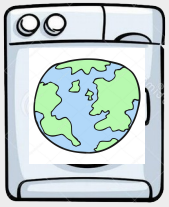
Create_model



Fields_create || Read_fields

Constructor

Model_step



Method

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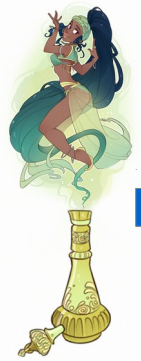
# Simple post-processing server



IFS_init

Sugeometry

Create_model

Fields_create
(metadata)

FIELDS constructor

Subfpos

Fullpos
constructor

Read_fields

Sufpdata

*Fullpos*
*data initializer*

Allfpos

*A Fullpos*
*method*

Output data

Method

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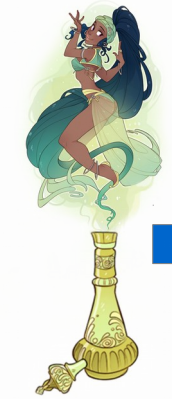
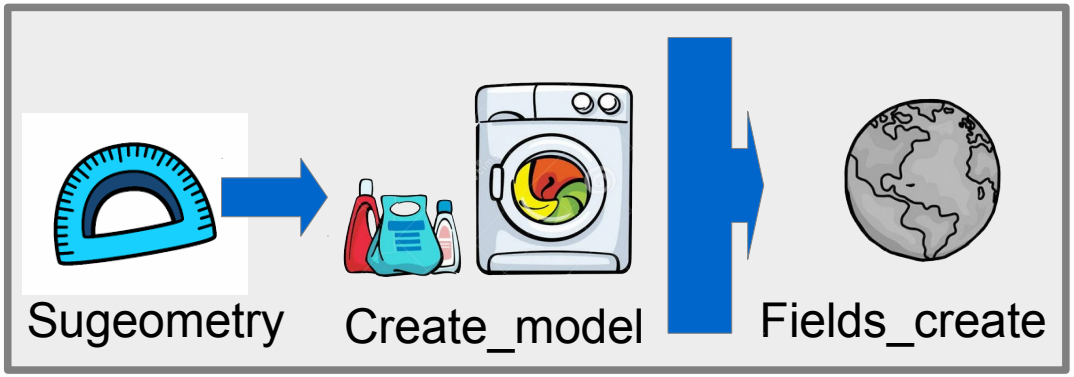
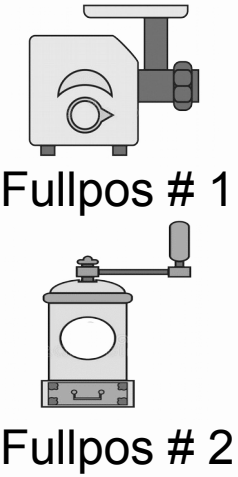
# (transportable) multi post-processor



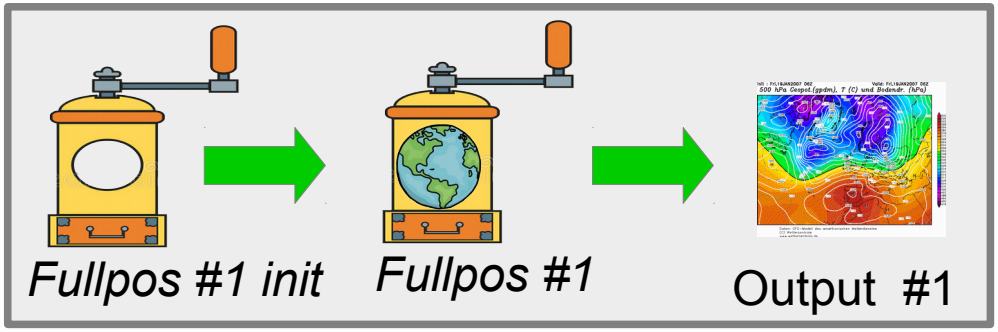
IFS_init

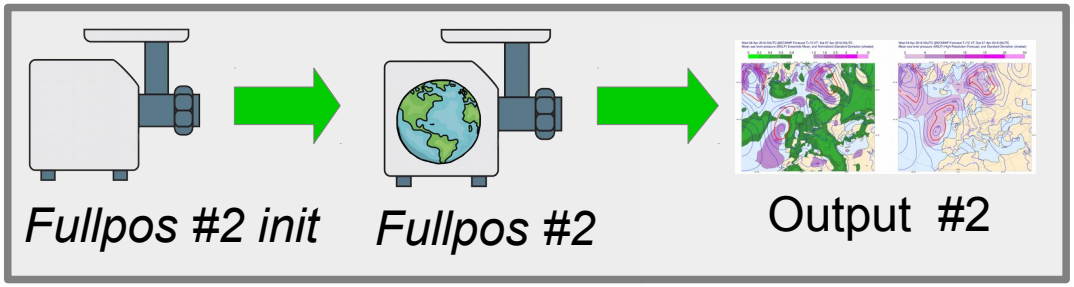



FIELDS

*(initialized)*




Constructors

Methods

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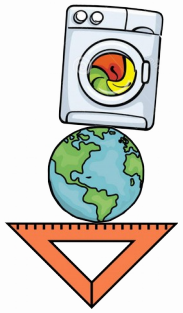
# Beware of the power of the objects !

**THERE ARE LINKS BETWEEN OBJECTS :**



YRMODEL%YRML_GCONF%GEOM => YRGEOMETRY
YRFIELDS%GEOM => YRGEOMETRY
YRFIELDS%STATE_MODEL => YRMODEL
YRFIELDS%YRGFL%YGFL => YRMODEL%YRML_GCONF%YGFL

**My_Beloved_Method (YDGEOMETRY,YDMODEL,YDFIELDS)**

```
If (I_am_your_father) Call My_Beloved_Method &
& (YRGEOMETRY_1, &
&  YRMODEL_2, &
&  YRFIELDS_3)
```

If (the_Force_is_with_you) Call My_Beloved_Method &
& (**YRFIELDS_1**%GEOM, &
& **YRFIELDS_1**%STATE_MODEL,&
& **YRFIELDS_1**)

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# Fields transformer for the 4DVar assimilation (1/3)

IFS_init

Model # 1

Fields # 1 metadata

Fpos 1=>2

Geometry # 1

Geometry # 2

Model # 2

Fields # 2 metadata

Fpos 2=>1

Constructors

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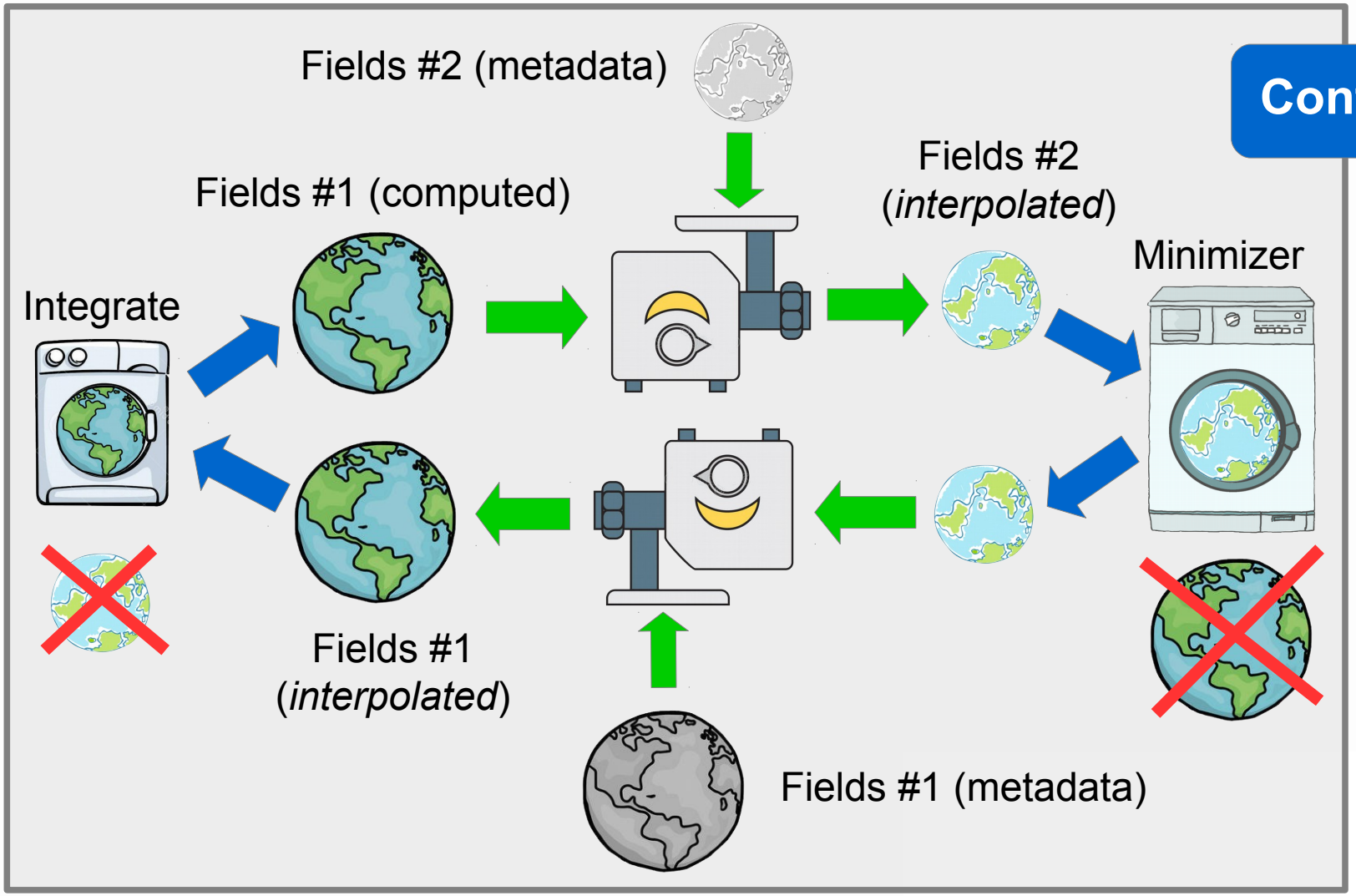
# Fields transformer for the 4DVar assimilation (2/3)

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# Fields transformer for the 4DVar assimilation (3/3)

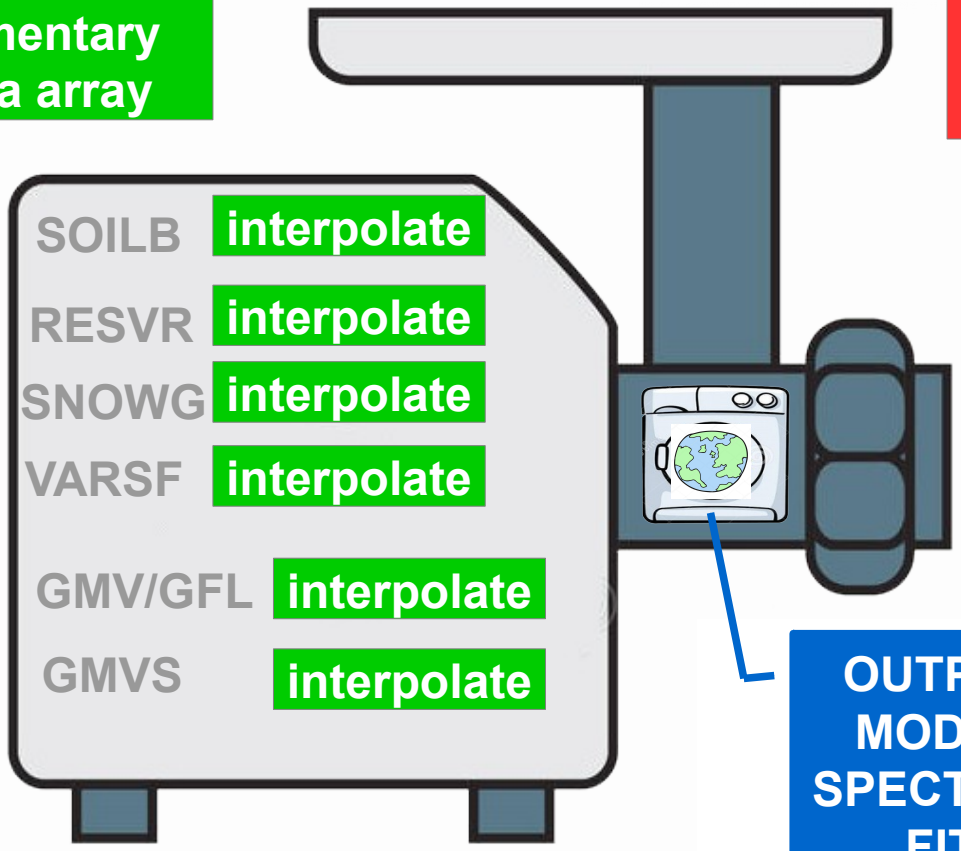
**ordinary Fullpos request for gridpoint interpolations**

**On each elementary 2D or 3D data array**

Output :
- geometry
- fields request

**As Fullpos knows 2D arrays only, use of Fortran 2003 pointer remapping : n=n1*n2 P(1:n)=>T(1:n1,1:n2)**

**Input :**
- **geometry**
- **model physics**
- **fields**




Spectrally-consistent output FIELDS object

**OUTPUT MODEL SPECTRAL FIT**

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# Post-processing refactoring status in cycle 46

- **Post-processing *self* refactoring complete**
  - ✔ Can be called from the OOPS layer
  - ✔ Consecutive multiple instantiation possible
  - ■ I/O server support with multiple instantiations to be tested
  - ✖ Simultaneous multi-instantiations requires the refactoring of the spectral transforms
- **Test program for FIELDS object transformation available**
  - ■ Robustness to be confirmed by intensive testing
  - ■ May need optimization
  - ■ Written in fortran ; not yet in OOPS
  - ✖ Vertical definition not fully encapsulated yet

    => change of vertical levels not possible yet

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# Post-processing developments beyond OOPS

- **Refactoring of internal methods :**
  - For optimizations
  - To simplify developments by newcomers
- **FIELDS object transformator :**
  - Can it be used in another context than 4DVar ?
  - Code Fullpos-TL to transform FIELDS increments ?
- **Multi-post-processors support :**
  - Possible in Fortran framework (define & swap namelists file)
  - Low frequency vs High frequency post-processing
  - Multi-couplers post-processing server
  - Could be coupled with the I/O server

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# Thank you
# for your attention !

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