# Introduction: DA vocabulary

Definition

The object of atmospheric data assimilation is to produce a regular, physically consistent four dimensional representation of the state of the atmosphere from a heterogeneous array of in situ and remote instruments which sample imperfectly and irregularly in space and time (Daley, 1991).
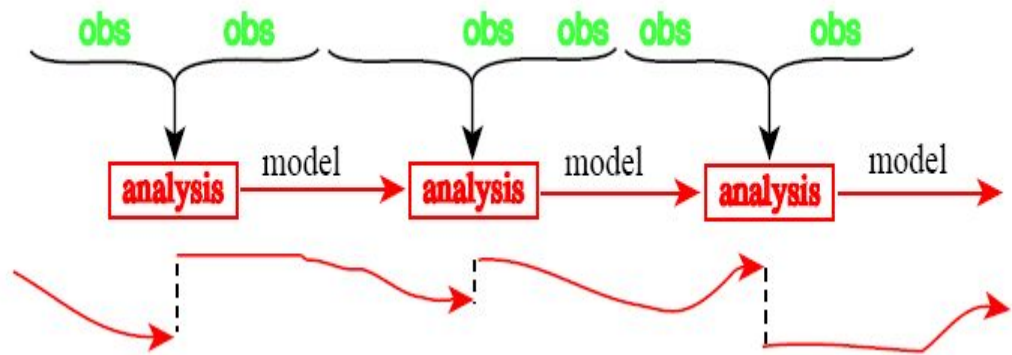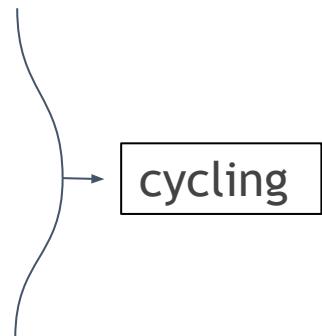
Data assimilation

- Observations collection and quality control

- Objective analysis

- Initialization

- Short model integration => guess

cycling

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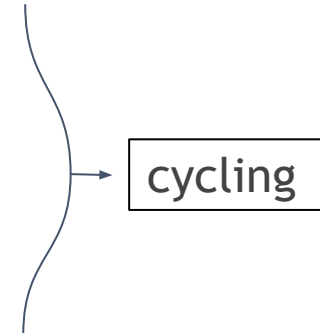
Observations

- **Collection of observations**

OPLACE talk (Alena)

- **Observation processing, monitoring & quality control**
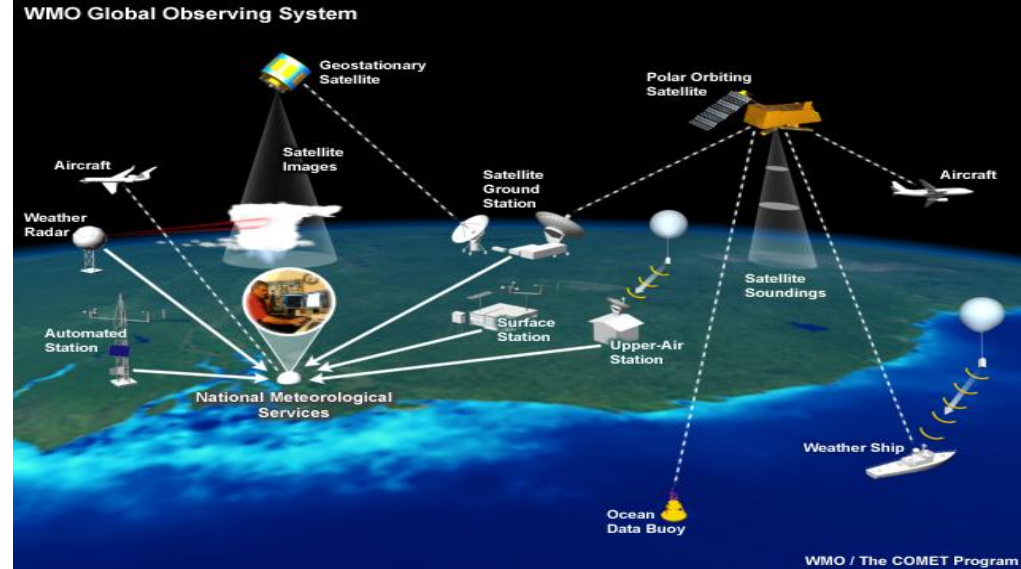
BATOR => ODB

(CANARI QC), screening, Variational QC

MF talk (Claude)

- **COPE project**

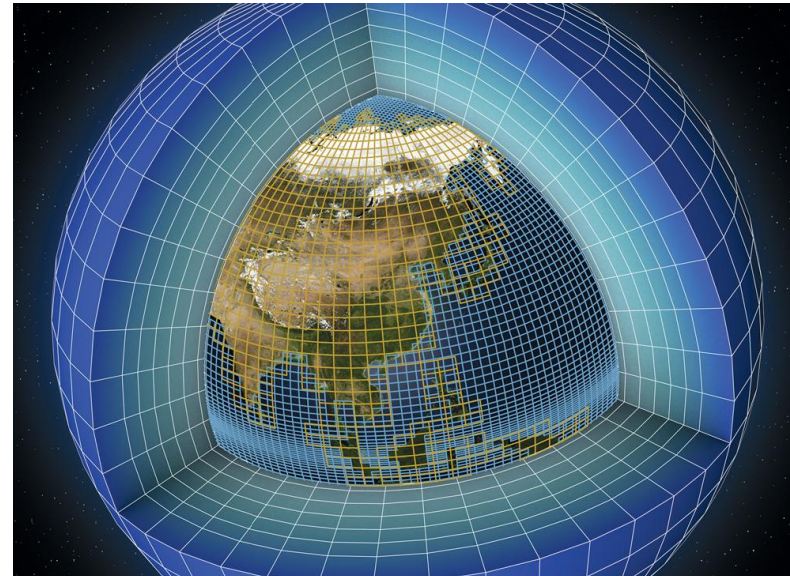Continuous Observation Processing Environment

ECMWF/HIRLAM talk (Eoin)

Objective analysis

To obtain the present state of the atmosphere & the surface
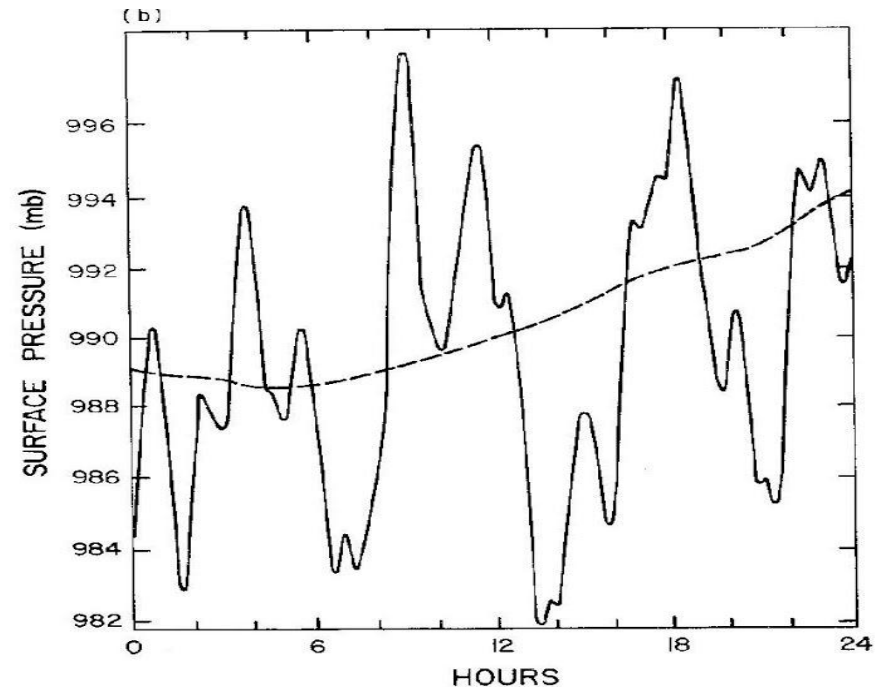
- Upper air
  - 3DVAR
  - Blending by DFI (pseudo assimilation)
- Surface
  - CANARI optimal interpolation
  - OI_MAIN
  - EKF

Initialization

To remove the imbalances/fast waves introduced when manipulating the model state - to be seen on MSLP, div (oscillations), precipitation field (spin-up)
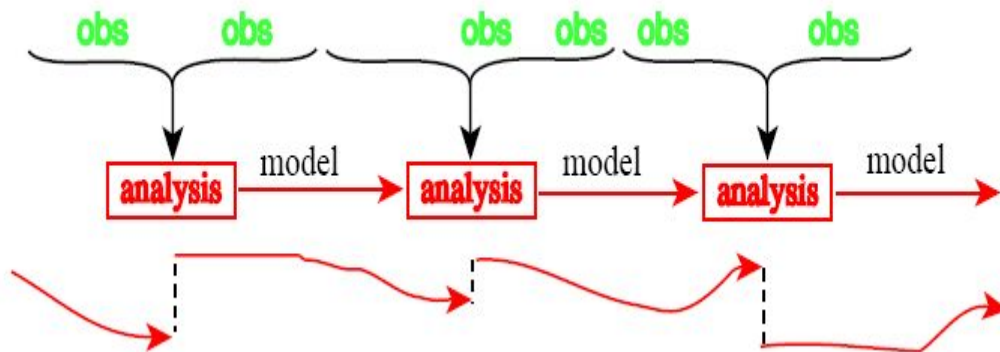
- (Incremental) Digital Filter Initialisation

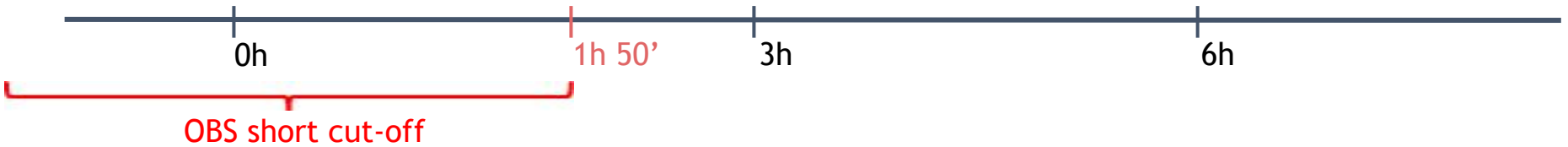- Jk - extra term in the cost function

Prognostic component

Short model integration to obtain the first guess field

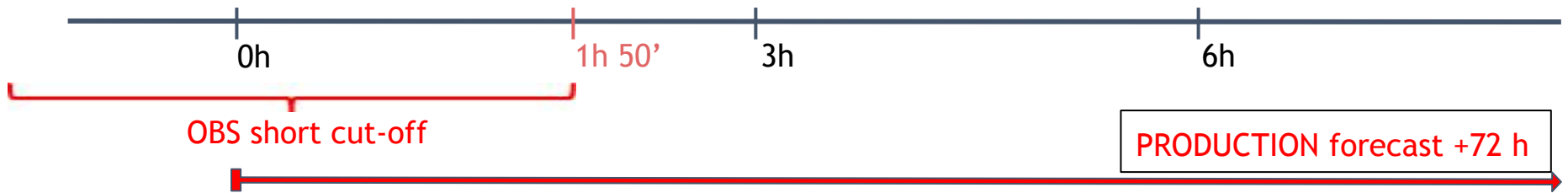Note: model/background errors to be known a-priori => B matrix computation

Cycling aspect

Arpege: assimilation vs. production

```
              0h              1h 50'      3h                    6h
    ├─────────────────────────┤
         OBS short cut-off
```

Cycling aspect

Arpege: assimilation vs. production

0h 1h 50' 3h 6h

OBS short cut-off

PRODUCTION forecast +72 h

Cycling aspect

Arpege: assimilation vs. production

OBS long cut-off

0h   1h 50'   3h   6h

OBS short cut-off

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Cycling aspect

Arpege: assimilation vs. production

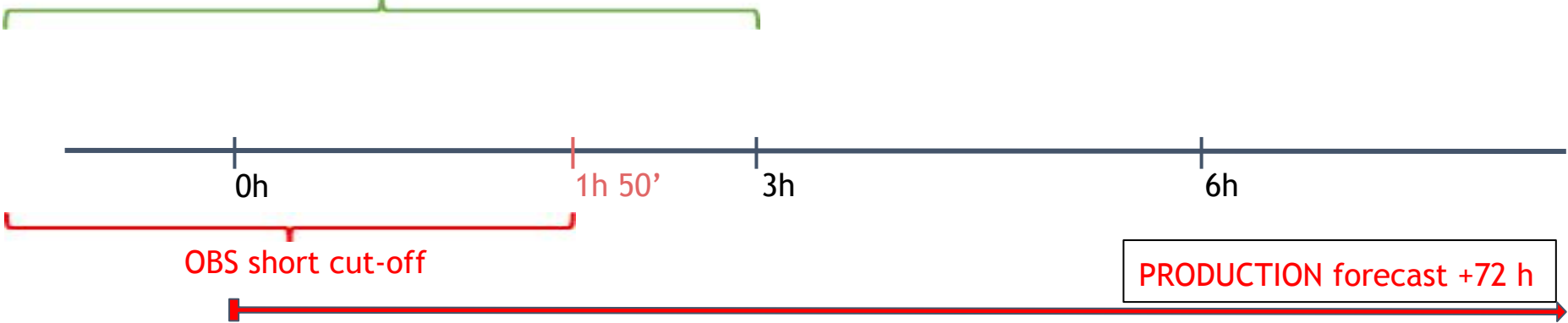OBS long cut-off

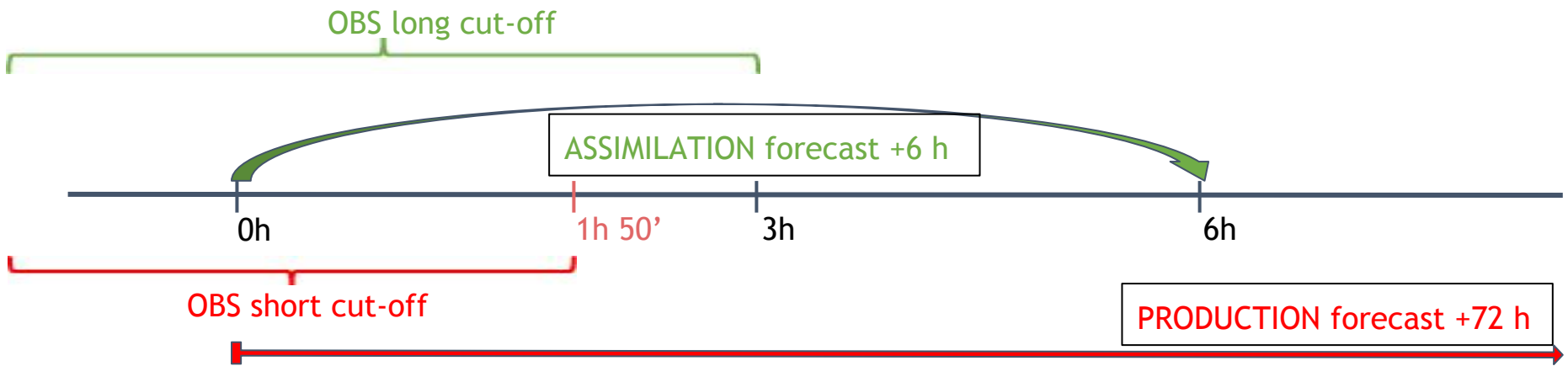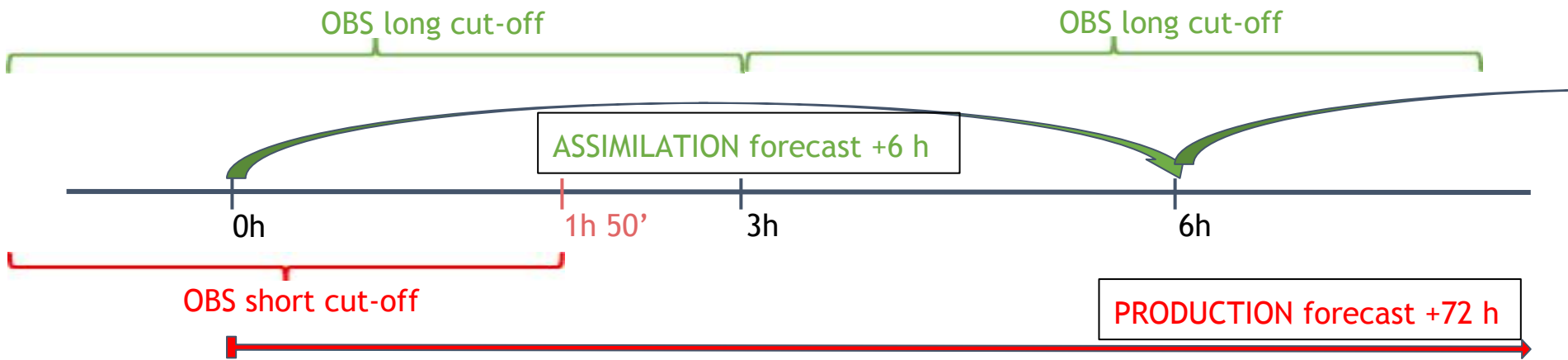ASSIMILATION forecast +6 h
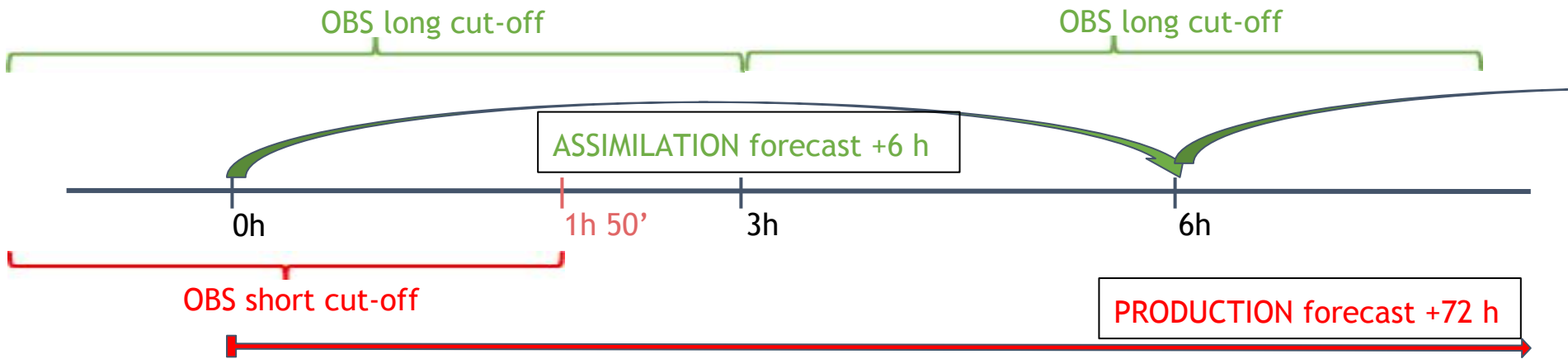
0h   1h 50'   3h   6h

OBS short cut-off

PRODUCTION forecast +72 h

Cycling aspect

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OBS long cut-off

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ASSIMILATION forecast +6 h

0h   1h 50'   3h   6h

OBS short cut-off

PRODUCTION forecast +72 h

ECMWF: 4D-VAR 12h window with long cut-off time => no assimilation/production notion, but lagged coupling => LAM assimilation crucial

Concluding remarks/issues to consider

- Observations

    - collection, processing, format, monitoring

    - high resolution local obs

- Technical issues

    - Reference system, its maintenance & validation

    - Scripting system, namelists

- Data assimilation is very demanding

    - time

    - CPU

    - manpower ... at least 1 **FTE**

- Big mental step (cycling should be continuous)