Flexible dataflow for diagnostics (DDH): application to DDH in Arome
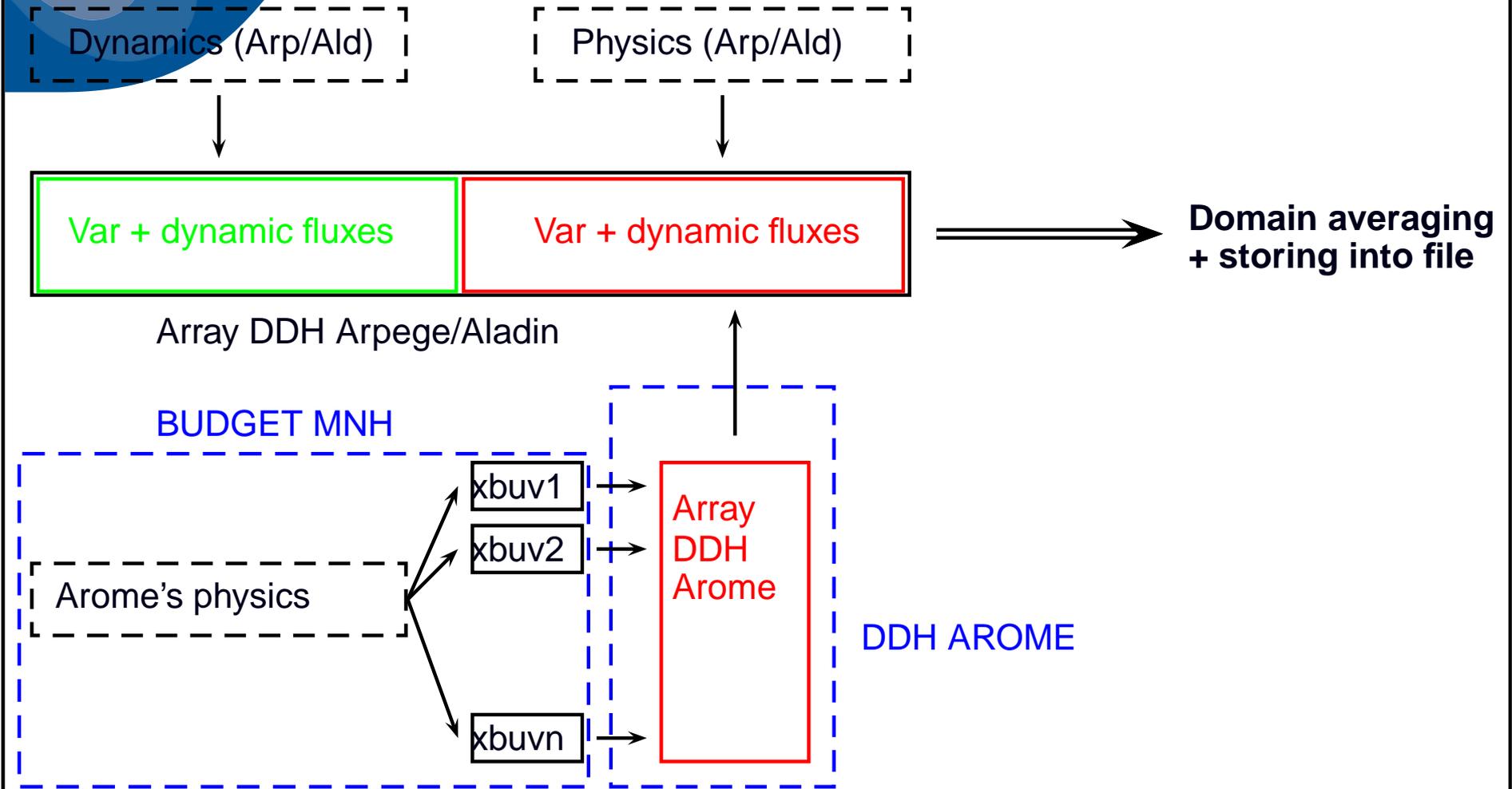
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Previous state of art of data flow for DDH in various models

Dynamics (Arp/Ald)

Physics (Arp/Ald)

Var + dynamic fluxes

Var + dynamic fluxes

Domain averaging + storing into file

Array DDH Arpege/Aladin

BUDGET MNH

Arome's physics

xbuv1

xbuv2

xbuvn

Array DDH Arome

DDH AROME

Different data flow according to used model

Use of arrays with predefined shape

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Motivations for a flexible dataflow

- Interoperability: the same data flow should be common to Arpege/Aladin/Alaro/Arome (and possibly externalized)

- Multiplication of terms to be extracted from various physical parametrizations due to increasing number of represented processes
  $\Rightarrow$ complication of setups for arrays initialization and difficult maintenance of the code

- Users may be able to add easily requested fields to the diagnostics

- Reduction of necessary maintenance for the part of code specific to DDH

- A proposition has been submitted in March 08 to all Aladin partners with the following objectives:
  - Transparency for existing DDH users
  - Disparition of setup of DDH arrays (200 fields in Arome !!!)
  - Compability with all existing different types of physics
  - Possible use of this structures for other diagnostics than DDH
  - Keeping the structure open for future needs

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Description of new dataflow

- Utilisation of a self allocatable array of type structures:

```
TYPE DDH_MNH
      CHARACTER(LEN=11)::CNAME !name of field
      CHARACTER(LEN=1)::CFLUX ! flux/tend/var
      !.... other possible attributes......
      LOGICAL:: LKDDH ! .TRUE. for output in DDH
      REAL(KIND=JPRB),DIMENSION(:,:):: PFIELD
END TYPE DDH_MNH
TYPE(DDH_MNH),ALLOCATABLE,DIMENSION(:):: DDH_DESCR
```

- Self documented structure allocated "on the fly" during 1st call $\Rightarrow$ no setups

- Fields retrieved through call to a specific subroutine:

```
CALL ADD_FIELD(array,name,attributes...)
```

which performs:

- allocation of DDH arrays at 1st time step

- storage of field's values

- operation on the input fields according to values of attributes
  (this operation may be model dependent)

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Application to Arome's DDH

- The actual code (difficult to maintain and debug) was replaced by the above described flexible structures (with an interface developped for compability with Meso-NH subroutines)
  $\Rightarrow$ one single data flow for all models

- New version is working and beeing validated in order to enter cy35t1 (early October)

- Important decrease of lines of codes and number of subroutines specific to DDH => the code will be easier to maintain

- Increased efficiency of the code

Conclusion

- New flexible dataflow coded (still sharing for the moment common subroutines with old dataflow which is still mantained in the code) and beeing validated

- Fields can be added "on demand" into DDH files.

- If satisfying results: possible use of this dataflow in Arpege/Aladin/Alaro

- Other possible uses of this dataflow (output into ICMSH files...) ?