

ORGANIGRAMME OF CONFIGURATION 923 IN THE CYCLE 45 OF ARPEGE/IFS.

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Abstract:

This documentation provides an organigramme of configuration 923, which allows to compute climatological files (containing monthly climatologies of surface fields). It is the complement of some other documentations which describe more technical aspects of this configuration. Note that configuration 923 is used only at METEO-FRANCE (and E923 also by ALADIN partners). This configuration is not used at ECMWF.

Résumé:

Cette documentation fournit un organigramme de la configuration 923 qui permet de fabriquer des fichiers de climatologies de surface. Elle complète d'autres documentations plus orientées sur les aspects techniques de cette configuration. La configuration 923 n'est utilisée qu'à METEO-FRANCE (et sa contrepartie domaine limité E923 par les partenaires ALADIN). Cette configuration n'est pas utilisée au CEP qui a son propre logiciel de production de climatologies.

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1 Organigramme.

1.1 Organigramme.

* Main part of organigramme under CNT0:

```
CNT0 -> INCLIO ->
* INTERO (ARPEGE) or EINTERO (LAM model)
* SUALCLIA
* INCLI1 (ARPEGE) or EINCLI1 (LAM model) -> see below
* INCLI2 (ARPEGE) or EINCLI2 (LAM model) -> see below
* INCLI3 (ARPEGE) or EINCLI3 (LAM model) -> see below
* INCLI4 (ARPEGE) or EINCLI4 (LAM model) -> see below
* INCLI5 (ARPEGE) or EINCLI5 (LAM model) -> see below
* INCLI6 (ARPEGE) or EINCLI6 (LAM model) -> see below
* INCLI7 (ARPEGE) or EINCLI7 (LAM model) -> see below
* INCLI8 (ARPEGE) or EINCLI8 (LAM model) -> see below
* INCLI9 (ARPEGE) or EINCLI9 (LAM model) -> see below
* INCLI10 (ARPEGE) or EINCLI10 (LAM model) -> see below
* DEALCLIA
```

Detail is given below for ARPEGE.

* Organigramme under INCLI1:

```
INCLI1 ->
* GEO923
* FA and LFI routines
* Interpolation routine INTER1 -> TRACARE
* LOCMAXI
* GTOPTX2, GTOPTY2 and GTOPTXY
* GANISO
* LISLAP
* RELNEW ->
  - LFI and FA routines.
  - CHIEN
  - SPREORD, SPEREE and REESPE (organigrammes not detailed)
* INIPZ
* INIRP
* RELSPE ->
  - SPREORD, SPEREE and REESPE (organigrammes not detailed)
  - SIMREL -> SPREORD, SPEREE and REESPE (organigrammes not detailed)
  - APLM1G ->
    * GRTESTR (organigramme not detailed)
    * M1QN3R (organigramme not detailed)
* SPREORD (organigramme not detailed)
```

* Organigramme under INCLI2:

```
INCLI2 ->
* GEO923
* CHIEN
* FA and LFI routines
* Interpolation routines INTER8 and INTER10 -> TRACARE
```

* Organigramme under INCLI3:

```
INCLI3 ->
* GEO923
* CHIEN
```

- * FA and LFI routines
- * Interpolation routines INTER6 and INTER8 -> TRACARE
- * INCLAG

*** Organigramme unter INCLI4:**

INCLI4 ->

- * GEO923
- * CHIEN
- * FA and LFI routines
- * Interpolation routines INTER8 and INTER10 -> TRACARE
- * CHK923 -> FA routines

*** Organigramme unter INCLI5:**

INCLI5 ->

- * CHIEN
- * FA and LFI routines
- * CHK923 -> FA routines

*** Organigramme unter INCLI6:**

INCLI6 ->

- * GEO923
- * CHIEN
- * COORD_DTS
- * FA and LFI routines
- * Interpolation routines INTER6, INTER8 and INTER10 -> TRACARE
- * PPV923
- * ACSOLW
- * CHK923 -> FA routines

*** Organigramme unter INCLI7:**

INCLI7 ->

- * CHIEN
- * FA and LFI routines
- * CHK923 -> FA routines

*** Organigramme unter INCLI8:**

INCLI8 ->

- * GEO923
- * CHIEN
- * FA and LFI routines
- * Interpolation routine INTER2 -> TRACARE

*** Organigramme unter INCLI9:**

INCLI9 ->

- * GEO923
- * CHIEN
- * FA and LFI routines
- * Interpolation routine INTER2 -> TRACARE

* Organigramme under INCLI10:

INCLI10 ->
* GEO923
* CHIEN
* FA and LFI routines
* Interpolation routine INTER2 -> TRACARE
* CHK923 -> FA routines

Organigramme of **REESPE** and **SPEREE** is not detailed (see documentation (IDTS) about spectral transforms).

1.2 Action of each routine.

* Main routines:

- **CNT0**: controls integration job at level 0.
- **INCLI0**: main routine for configuration 923.
- **INTER0**: determination of the size of interpolation boxes.
- **SUALCLIA**: allocates arrays used in the computation of spectral orography.
- **DEALCLIA**: deallocates arrays used in the computation of spectral orography.
- **INCLI1**: main routine for the treatment of orography.
- **INCLI2**: main routine for the treatment of fixed climatological fields.
- **INCLI3**: main routine for the treatment of soil moisture and soil temperature (one for each month).
- **INCLI4**: main routine for the treatment of some surface fields like albedo, roughness length, data linked with vegetation (one for each month).
- **INCLI5**: main routine for the treatment of land surface fields (one for each month).
- **INCLI6**: main routine for the treatment of soil moisture and soil temperature (one for each month).
- **INCLI7**: main routine for the modification of some fields over aquatic surfaces.
- **INCLI8**: main routine for the treatment of the 3 coefficients of the profile of ozone.
- **INCLI9**: main routine for the treatment of aerosol fields.
- **INCLI10**: main routine for the treatment of climatological fields for an aqua-planet.

* Lower routines used for most fields:

- **ACSOLW**: computes soil water contents.
- **CHIEN**: It controls consistency between defined geometry and ARPEGE file. In the case of inconsistency it calls **ABOR1**.
- **CHK923**: checks climatological fields.
- **COORD_DTS**: sets the latitudes and longitudes of the dataset grid.
- **GEO923**: computes the constants and fields related to the geometry which are used by configuration 923.
- **INCLAG**: calculates the deep soil evolution of a surface variable by lagging and attenuation of its annual cycle.
- **INTER1**, **INTER2**, **INTER6**, **INTER8**, **INTER10**: horizontal interpolation routines (do something close to the **FPINT..** routines used in **FULLPOS**).
- **PPV923**: searches for suitable data when there is a conflict between initial and final masks.
- **TRACARE**: computes geographical coordinates (lon-lat) knowing apparent ones (on the computational sphere).
- **TRARECA**: inverse operation of **TRACARE**.

* Specific routines for orography:

- **APLM1G**: interface to the minimisation routine **M1QN3R**.
- **GTOPTX2**, **GTOPTY2** and **GTOPTXY**: computes the components of the topographic gradient correlation tensor.
- **GANISO**: computes the anisotropy coefficient and direction of the principal axis of topography in GAUSS grid square, which are used in parametrisation of the gravity wave drag.
- **GRTESTR**: test of the cost-function and its gradient.
- **INIRP**: computes in case of modified envelope, the spectral orography without any envelope, and the corresponding weights in the cost function.
- **LISLAP**: spatial smoothing of a field by adding the laplacian times a constant factor.
- **LOCMAXI**: computes the occurrence of a local maximum in a field.
- **M1QN3R**: minimizer (provided by INRIA) using a quasi-Newton algorithm.
- **RELNEW**: reads a new orography, checks the frame, and makes a spectral truncation. May also read a new land-sea mask.
- **RELSPE**: computes a spectral orography from an orography on a gaussian grid, by a minimization: the new orography minimizes a (generally non-quadratic) cost function which is not uniform over the globe.
- **SIMREL**: simulator which computes the function and its gradient for minimization (of orography).
- **SPEREE** (resp. **REESPE**): spectral transformation from spectral space to grid-point space (resp. from grid-point space to spectral space). For more details see documentation (IDTS) about spectral transforms.
- **SPREORD**: reorders spectral data structure from file ordering to model ordering or vice-versa.

1.3 LAM model specificities.

* **Organigramme**. The structure of the EINCLI... routines is generally the same as the INCLI... ones: (**EGEO923**, **EGANISO**, **ELISLAP**, **ECHK923**, **CCHIEN**) are called instead of (**GEO923**, **GANISO**, **LISLAP**, **CHK923**, **CHIEN**); (**EINTER1**, **EINTER2**, **EINTER6**, **EINTER8**, **EINTER10**) are called instead of (**INTER1**, **INTER2**, **INTER6**, **INTER8**, **INTER10**). Some EINCLI... routines call specific LAM model routines which have no ARPEGE counterpart: **EBICLI** and **ELECI**.

- **EBICLI**: bi-periodicizes and corrects climate fields and writes them to FA files (organigramme not described in detail).
- **ELECI**: reads grid-point fields in C+I+E and extracts C+I data.

2 References and internal notes.

- (TDECDYN) 2016: IFS technical documentation (CY41R2). Part III: dynamics and numerical procedures. Available at "<https://software.ecmwf.int/wiki/display/IFS/Official+IFS+Documentation>".
- (TDECTEC) 2016: IFS technical documentation (CY41R2). Part VI: technical and computational procedures. Available at "<https://software.ecmwf.int/wiki/display/IFS/Official+IFS+Documentation>".
- (IDARPC6) 2017: ARPEGE-CLIMAT V6.2. Algorithmic documentation (CY37T1). Internal note (351pp), available on "<http://www.umr-cnrm.fr/gmapdoc/>".
- (ID923E) Pristov, N., 2002: Configuration E923 user's guide (AL12). Internal note, 11pp, available on the intranet server "<http://www.umr-cnrm.fr/gmapdoc/>".
- (IDBAS) Yessad, K., 2017: Basics about ARPEGE/IFS, ALADIN and AROME in the cycle 45 of ARPEGE/IFS (internal note).