

New Telemac-3D features for v6p2 links from [New version features](#)

v6p2 Telemac-3D

The main new features of this version 6.2 are:

- Thompson boundary conditions, like in 2D
- Choice of element: prisms or prisms cut into tetrahedrons
- New restart procedure with all digits ensured
- Normal restarts may be done from a given record number in the previous computation file
- Values of tracers in rain taken into account
- Vertical cross-sections with Postel-3D now in Selafin format
- 3 databases of harmonic constants to force open boundary conditions
- Exchange with atmosphere module

New or modified key-words :

“OPTION FOR LIQUID BOUNDARIES” (OPTION POUR LES FRONTIERES LIQUIDES)

Integer, default: 1

This will trigger the treatment with Thompson boundary conditions (exactly like in 2D). One value must be given per liquid boundary. 1 is the default and previous normal treatment. 2 denotes a treatment with Thompson conditions.

“VALUES OF TRACERS IN THE RAIN” (VALEURS DES TRACEURS DANS LA PLUIE)

Real array (as many as tracers), default: 0.D0

This keyword has been introduced to take into account the temperature of the rain (which was assumed to be 0 so far). It will be used when there are tracers and when there is rain (keyword RAIN OR EVAPORATION). Only real rain will be taken into account, i.e. with positive values of the keyword RAIN OR EVAPORATION IN MM PER DAY.

“THRESHOLD FOR VISCOSITY CORRECTION ON TIDAL FLATS” (SEUIL POUR CORRECTION DE VISCOSITE SUR BANCS DECOUVRANTS)

Double precision, default: 0.2D0 (in Fortran: HLIM)

This was a hidden parameter in subroutine VISCLIP. On tidal flats, the turbulent viscosity must be set to 0 to avoid an influence of dry points on wet points and vice versa. The default value is meant for real cases and can be changed. For example 0.D0 works in the Malpasset test case, but the Wesel test case needs a value greater than 5 cm. This threshold must be changed for physical models that have smaller depths.

“VERTICAL VELOCITY DERIVATIVES” (DERIVEES VERTICALES DES VITESSES)

Default : 1

1: vertical derivatives of velocity are linear (like versions prior to 6.1)

2: logarithmic vertical derivatives of velocities, from bottom to 0.2 depth

Option 2 is a modified version of what was done in version 6.1. It corresponds more to the velocity profile near the bottom and should then be more accurate.

This option is used in subroutine VISCLM for the mixing length turbulence model. In this subroutine another option has been hardcoded: choice of a pure finite element method for computing derivatives, or taking advantage of the verticals.

“VARIABLES FOR 2D GRAPHIC PRINTOUTS” (VARIABLES POUR LES SORTIES GRAPHIQUES 2D)

The high water mark is now possible like in 2D, under mnemo : « MAXZ », and the time of high water mark under mnemo « TMXZ »

“RESULTS FILE FORMAT” (FORMAT DU FICHIER DE RESULTATS)

This key word has been (logically) split into two:

“2D RESULT FILE FORMAT” (FORMAT DU FICHIER DES RESULTATS 2D)

“3D RESULT FILE FORMAT” (FORMAT DU FICHIER DES RESULTATS 3D)

New restart procedure:

Up to now a computation continued could give slightly different results, the reason why being that advection of velocities was not done at the first time-step. As a matter of fact advection of velocities is done at the previous time-step, so extra data are required when restarting a computation. Saving results in single precision is also a reason explaining slight differences. Now advection of velocity is done at the first time-step, and a new procedure is available when a clean continuation is required, e.g. for debugging. It is obtained by two new keywords:

« RESTART MODE » (MODE SUITE)

Logical, default: NO

« RESTART FILE » (FICHER POUR SUITE)

A new file, default: ' '. It is associated to a " RESTART FILE FORMAT " which is by default 'SERAFIND', so in double precision.

The new procedure requires RESTART MODE = YES and a RESTART FILE name. This restart file may be then used as "PREVIOUS COMPUTATION FILE" (FICHER DU CALCUL PRECEDENT), provided that the "PREVIOUS COMPUTATION FILE FORMAT" (FORMAT FICHER DU CALCUL PRECEDENT) be set to 'SERAFIND'. When doing the computation continued the restart mode is no longer necessary, unless another continuation has to be done.

When the restart procedure is used, the results will be equal to the results obtained in a single run without continuation, with all double precision digits.

The same result can be obtained with a double precision 3D RESULT FILE, but with a number of variables in the keyword: "VARIABLES FOR 3D GRAPHIC PRINTOUTS" (VARIABLES POUR LES SORTIES GRAPHIQUES 3D), namely:

'Z,U,V,W,DP,UCONV,VCONV,WCONV,VOLUN,DM1,DHHN,UCONVC,VCONVC,UD,VD,WD'

As it is only necessary to have these variables at the last time step, it is better to use the restart file which will contain only this last time step. The "mnemos" of the new variables:

UCONV,VCONV,WCONV,VOLUN,DM1,DHHN,UCONVC,VCONVC,UD,VD,WD

Are exactly their name in Fortran, except DHHN which is a combination of DH and HN, two 2D arrays

stored in a 3D array. Some of these variables, like UD, VD and WD are only here to be used as initial guess for linear solvers.

“RECORD NUMBER FOR RESTART” (ENREGISTREMENT POUR SUITE DE CALCUL)

Integer, default: 0

It is now possible to do a restart not only from the last record of the PREVIOUS COMPUTATION FILE, but from any record, by using this new keyword. The default value is 0, which means that the last record will be taken, as before. Notes:

- 1)The record number is an integer, not the corresponding time.
- 2)In the new restart mode, only the last time step is saved, due to the high number of variables to be exited.

POSTEL 3D:

The vertical cross-sections given by Postel-3D are now in Selafin format, which means that they can be read by Fudaa and Blue-Kenue, or Tecplot with the Telemac addons.

Modifications in user subroutines or new subroutines:

BORD3D.F: the subroutine debimp3d has been changed and is now called debimp_3d, if you have a specific bord3d.f, just copy in it the new call from the standard subroutine.

T3D_CORFON: to avoid a duplication of names, subroutine CORFON in library telemac-3D has been renamed T3D_CORFON. Specific subroutines CORFON must thus be also renamed T3D_CORFON.

SOURCES_SINKS: note that in case of rain, a new array PARAPLUIE (equivalent to PLUIE but assembled in parallel) is initialised. See the new version and update yours. Neglecting this advice will cause a crash in Berre lake applications with rain...

CONDIM: variable COTINT has been suppressed and will be detected as undefined by compilers. It is advised to take the new subroutine CONDIM and implement in it your modifications.

Functions SL3, VIT3 and TR3: argument N is now the global point number of the original mesh, so these functions can be implemented with hardcoded point numbers and it will work in parallel.

Databases of harmonic constants to force open boundary conditions

Three databases of harmonic constants are available in order to calculate the open boundary conditions (same as for 2D):

- the JMJ database,
- the TPXO global tidal solution and other regional and local tidal solutions from Oregon State University (OSU),
- the regional NEA (North East Atlantic) atlas.

New keywords have been introduced:

OPTION FOR TIDAL BOUNDARY CONDITIONS (OPTION POUR LES CONDITIONS AUX LIMITES DE MAREE)

Integer, default: 0 (no tide)

Kind of tides to simulate. For real tides, option 1 is recommended when using JMJ database (mandatory in other cases). Possible calibration with the keywords COEFFICIENT TO ADJUST TIDAL RANGE, COEFFICIENT TO CALIBRATE TIDAL VELOCITIES and COEFFICIENT TO ADJUST SEA LEVEL:

0: No tide (default value),

1: Real tide (recommended methodology),

2: Astronomical tide (for JMJ database only),

3: Mean spring tide (for JMJ database only),

4: Mean tide (for JMJ database only),

5: Mean neap tide (for JMJ database only),

6: Astronomical neap tide (for JMJ database only),

7: Real tide - methodology before 2010 - (for JMJ database only).

HARMONIC CONSTANTS FILE (FICHIER DES CONSTANTES HARMONIQUES): Name of the file which contains the harmonic constants extracted from one database of harmonic constants, for every node of the open boundaries.

TIDAL DATA BASE (BASE DE DONNEES DE MAREE)

Integer, no default

Choice of the harmonic constants database to use to calculate boundary conditions:

- 1: JMJ,
- 2: TPXO (or other solutions from OSU),
- 3: LEGOS-NEA.

For JMJ database, please indicate the location of the files `bdd_jmj` and `geofin` with keywords ASCII DATABASE FOR TIDE and TIDAL MODEL FILE. For TPXO, other solutions from OSU and LEGOS-NEA, the users have to download the files of harmonic constituents on the internet:

<http://volkov.oce.orst.edu/tides> for tidal solutions from OSU or
<http://sirocco.omp.obs-mip.fr/outils/Tugo/Produits/TugoProduits.htm> for NEA.

COEFFICIENT TO CALIBRATE TIDAL RANGE (COEFFICIENT DE CALAGE DU MARNAGE)

Real, default: 1.

Coefficient to calibrate the tidal range at open boundary conditions.

COEFFICIENT TO CALIBRATE TIDAL VELOCITIES (COEFFICIENT DE CALAGE DES VITESSES DE COURANT)

Real, default: 999999.

Coefficient to calibrate the tidal velocities at open boundary conditions. Default value 999999. means that the square root of COEFFICIENT TO CALIBRATE TIDAL RANGE is taken.

COEFFICIENT TO CALIBRATE SEA LEVEL (COEFFICIENT DE CALAGE DU NIVEAU DE MER)

Real, default: 0.

Coefficient to calibrate the sea level.

GEOGRAPHIC SYSTEM (SYSTEME GEOGRAPHIQUE)

Real, no default

Geographic coordinates system in which the numerical model is built. Please indicate the corresponding zone with the keyword ZONE NUMBER IN GEOGRAPHIC SYSTEM:

0: defined by the user,

1: WGS84 longitude/latitude in real degrees,

2: WGS84 Northern UTM,

3: WGS84 Southern UTM,

4: Lambert,

5: Mercator for TELEMAC.

ZONE NUMBER IN GEOGRAPHIC SYSTEM (NUMERO DE FUSEAU OU PROJECTION DANS LE SYSTEME GEOGRAPHIQUE)

Real, no default

Number of zone when using a plane projection. Please indicate the geographic system in which the numerical model is built with the keyword GEOGRAPHIC SYSTEM:

1: Lambert 1 North,

2: Lambert 2 Center,

3: Lambert 3 South,

4: Lambert 4 Corsica,

22: Lambert 2 Extended,

30: UTM zone, e. g.

TIDAL MODEL FILE (FICHER DU MODELE DE MAREE): Name of the geometry file of the model from which harmonic constants are extracted for JMj database.

ASCII DATABASE FOR TIDE (BASE ASCII DE DONNEES DE MAREE): Name of the database of harmonic constants extracted from the tidal model file for JMj database. The old name in version 6.1 was TIDE DATA BASE (BASE DE DONNEES DE MAREE).

BINARY DATABASE 1 FOR TIDE (BASE BINAIRE 1 DE DONNEES DE MAREE) and BINARY DATABASE 2 FOR TIDE (BASE BINAIRE 2 DE DONNEES DE MAREE): Names of the binary databases which contain harmonic constants. In the case of the OSU satellite altimetry model, this file should be for free surface level, for instance h_tpxo7.2 (for binary database 1) or tidal velocities, for instance u_tpxo7.2 (for binary database 2).

MINOR CONSTITUENTS INFERENCE (INTERPOLATION DE COMPOSANTES MINEURES)

Logical, default: NO

For tidal databases from OSU only, logical to indicate if inference of minor constituents is done from the ones read in input files linked to keywords BINARY DATABASE 1 FOR TIDE and BINARY DATABASE 2 FOR TIDE.

Exchange with atmosphere module

One module that includes some subroutines to deal with exchange with atmosphere has been introduced. This module needs more validations and improvements. Nevertheless, the subroutines can be used at users' own risk.

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