

Documentation

MesoNH Tutorial Class 1-4 December 2025

Informations pool

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- ▶ The scientific doc
- ▶ The user's guide
- ▶ The support team

The website

<http://mesonh.aero.obs-mip.fr/mesonh>

Mesonh-56 | Mesonh-55 | Mesonh-54 | Mesonh-53 | Mesonh-52 | Mesonh-51 | Mesonh-410 | Mesonh-49

Meso-NH
mesoscale non-hydrostatic model

5.6 (Current)

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Welcome


Meso-NH
mesoscale non-hydrostatic model

Download the latest version
[MNH_V5.6.0.tar.gz](#)

Meso-NH is the non-hydrostatic mesoscale atmospheric model of the French research community. It has been jointly developed by the [Laboratoire d'Aérodynamique](#) (UMR 5560 UPS/CNRS) and by [CNRM](#) (UMR 3589 CNRS/Météo-France). Meso-NH:

- Incorporates a non-hydrostatic system of equations, for dealing with scales ranging from large (synoptic) to small (large eddy) scales while calculating budgets;
- Has a complete set of physical parameterizations, which are particularly advanced for the representation of clouds and precipitation;
- Is coupled to the surface model SURFEX for the representation of surface atmosphere interactions by considering different surface types (vegetation, city, ocean, lake);
- Allows a multi-scale approach through a grid-nesting technique;
- Is a versatile code, vectorized, parallelized, operating in 1D, 2D or 3D designed to handle real situations as well as academic cases;
- Is coupled with a chemistry module (including gas-phase, aerosol, and aqua-phase components) and a lightning module;
- Has observation operators that compare model output directly with satellite observations, radar, lidar and GPS.

Since version 5.1, Meso-NH is freely available under CeCILL-C license agreement. See [LICENSE.txt](#), [CeCILL-C_V1-en.txt](#) (English) and [CeCILL-C_V1-fr.txt](#) (French) for more information.

News
11th User's Meeting: 2-3 Dec 2021.
The presentations are on-line.
[Next Tutorial: 13-16 March 2023](#)
Contact information: quentin.rodier@meteo.fr

Starting with Meso-NH
[Download the latest version](#),
[MASDEV5.6](#)

Mesonh-56: Welcome (dernière édition le 2022-10-04 07:57:21 par [JeanPierreChaboureau](#).)

The website : Research Activity

- ▶ Publications list (with URL)
- ▶ Meetings : every 2 years for the user's meeting (presentations are online)
- ▶ Some videos and illustrations in a gallery

The website : Documentation

- ▶ Specific Meso-NH references (by topic)
- ▶ Scientific docs (by topic + SURFEX)
- ▶ User's guide (Meso-NH + SURFEX)
- ▶ Misc. doc
(parallelization, Lagrangian analysis, Forefire, reproductibility)
- ▶ Docs on graphical tools (ncl, python, vislt, vapor)
- ▶ Guide for simulations with chemistry
- ▶ This tutorial : exercices (with solutions) and the presentations
- ▶ Guide for GIT and Meso-NH setup on several machines
- ▶ Guide for extracting IFS, ARPEGE, AROME and GFS files

The website : Code & Data

- ▶ Downloading the code and data (PACK + physiographic files)
- ▶ GIT sources
- ▶ Sample of simulations examples (KTEST)

The support team


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The scientific doc



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- Extract ECMWF
- AROME/ARPEGE
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Source code & data

- Download

BooksAndGuides

Scientific documentations

- Meso-NH Scientific documentation version MASDEV5-5 (version 21 July 2021)
[@ Part I: Dynamics, @ Part II: Model Setup, @ Part III: Physics, @ Part IV: Chemistry and Aerosols, @ Part V: Budget and Diagnostics](#)
- Surfex Scientific documentation (version August 3, 2012)
Click here for the [pdf version](#), more on <http://www.cnrm.meteo.fr/surfex/>

User's guides

- Meso-NH User's guide MASDEV5-5-0 (version July 21, 2021)
click here for the [pdf version](#)
- SURFEX User's guide version 8.1
look for the latest version on <http://www.umr-cnrm.fr/surfex//szip.php?rubrique10>

Model Updates from 5.4 to 5.5

- [@update_from_masdev54_to_550.pdf](#)

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Scientific Documentation

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- Surfex Scientific documentation (version August 3, 2012)
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- Meso-NH User's guide MASDEV5-5-0 (version July 21, 2021)
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look for the latest version on <http://www.umr-cnrm.fr/surfex/splp.php?rubrique10>

Model Updates from 5.4 to 5.5

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The user's guide : namelist sub-groups

9.2.33 Namelist NAM_DYNn (parameters for the dynamics of model n)

Fortran name	Fortran type	default value
XTSTEP	real	60.
CPRESOPT	4 characters	'CREST'
NITR	integer	4
LITRADJ	logical	TRUE
XRELAX	real	1.
LHORELAX_UVWTH	logical	FALSE
LHORELAX_RV	logical	FALSE
LHORELAX_RC	logical	FALSE
LHORELAX_RR	logical	FALSE
LHORELAX_RI	logical	FALSE
LHORELAX_RS	logical	FALSE
LHORELAX_RG	logical	FALSE
LHORELAX_RH	logical	FALSE
LHORELAX_TKE	logical	FALSE
LHORELAX_SV	array logical	FALSE
LHORELAX_SVC2R2	logical	FALSE
LHORELAX_SVC1R3	logical	FALSE
LHORELAX_SVLG	logical	FALSE
LHORELAX_SVCHEM	logical	FALSE
LHORELAX_SVDST	logical	FALSE
LHORELAX_SVPP	logical	FALSE
LHORELAX_SVAER	logical	FALSE
LVE_RELAX	logical	FALSE
LVE_RELAX_GRD	logical	FALSE
NRIMX	integer	1
NRIMY	integer	1
XRIMKMAX	real	1/(100 * 60.)
XT4DIFU	real	1800.
XT4DIFTH	real	1800.
XT4DIFSV	real	1800.

It contains the specific dynamic parameters for the modesimulation.text n. They are included in the module MODD_DYNn.

- XTSTEP : [Time step](#) in seconds. If the model is not the DAD model, XTSTEP is not taken into account but NDTRATIO in NAM_NESTING.
- CPRESOPT : Pressure solver option. 3 choices are implemented in MESONH for the moment (see the Scientific documentation for more details) :

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The user's guide : variables names

Name	Dim	Meaning	Unit
ACPRC	[D]	Accumulated Cloud Precipitation Rain Rate	mm
ACPRG	[D]	Accumulated Precipitation Graupel Rate	mm
ACPRH	[D]	Accumulated Precipitation Hail Rate	mm
ACPRR	[D]	Accumulated Precipitation Rain Rate	mm
ACPRS	[D]	Accumulated Precipitation Snow Rate	mm
ACPRT	[D]	Total Accumulated Precipitation Rate	mm
AZIM	[2D]	azimuth	rad
CG_RATE	[2D]	CloudGround lightning Rate	/s
CG_TOTAL_NB	[2D]	CloudGround lightning Number	-
CLDFR	[2D]	Cloud fraction	
CLEARCOL_TM1	[2D]	Trace of cloud	-
DIR_ALB	[2D]	Direct albedo	-
DIRFLASWD	[2D]	Direct Downward Long Waves on flat surface	W/m ²
DIRSRFSWD	[2D]	Direct Downward Long Waves	W/m ²
DSVCONVxxx	[3D]	Convective tendency for scalar variable	/s
DSVCONV_LINOX	[3D]	Convective tendency for linox	/s
DRCONV	[2D]	Convective R_c tendency	/s
DRCONV	[2D]	Convective R_i tendency	/s
DRVCONV	[2D]	Convective R_v tendency	/s
DTHCONV	[2D]	Convective heating/cooling rate	K/s
DTHRAD	[2D]	Radiative heating/cooling rate	K/s

The user's guide : variables names

Name	Dim	Meaning	Unit
PRSCONV	[2D]	Convective instantaneous Precipitation Rate for Snow	mm/h
RCT	[3D]	Cloud mixing Ratio at t time	kg/kg
RGT	[3D]	Graupel mixing Ratio at t time	kg/kg
RHODREF	[3D]	Dry density for reference state with orography	kg/m ³
RHOREFZ	[1D]	rhodz for reference state without orography	kg/m ³
RHT	[3D]	Hail mixing Ratio at t time	kg/kg
RIT	[3D]	Ice mixing Ratio at t time	kg/kg
RRT	[3D]	Rain mixing Ratio at t time	kg/kg
RST	[3D]	Snow mixing Ratio at t time	kg/kg
RVFRC	[1D]	$(\partial r_v / \partial t)_{frc}$ forcing vapor mixing ratio	kg/kg
RVT	[3D]	Vapor mixing Ratio at t time	kg/kg
SCA_ALB	[2D]	Scattered albedo	-
SCAFLASWD	[2D]	Scattered Downward Long Waves on flat surface	W/m ²
SVTnnn	[3D]	User or passive scalar variables at t time	kg/kg
TENDRVFRC	[1D]	$(\partial r_v / \partial t)_{frc}$	/s
TENDTHFRC	[1D]	$(\partial \theta / \partial t)_{frc}$	K/s
THFRC	[1D]	θ_{frc} forcing potential temperature	K
THT	[3D]	potential temperature at t time	K
THVREF	[3D]	Thetav for reference state with orography	K
THVREFZ	[1D]	thetavz for reference state without orography	K
TKET	[3D]	Turbulent Kinetic Energy at t time	m ² /s ²
TSRAD	[2D]	Radiative Surface Temperature	K
UFRC	[1D]	zonal component of horizontal forcing wind	m/s
UT	[3D]	horizontal component U of wind at t time	m/s
VFRC	[1D]	meridian component of horizontal forcing wind	m/s
VT	[3D]	horizontal component V of wind at t time	m/s
WFRC	[D]	vertical forcing wind	m/s
WT	[3D]	vertical wind at t time	m/s
ZENITH	[2D]	zenith	rad
ZS	[2D]	orography	m
ZSMT	[2D]	smoothed orography for SLEVE vertical coordinate	m

The SURFEX doc

<http://www.umr-cnrm.fr/surfex/>

SURFEX tutorial : twice a year (november and march)

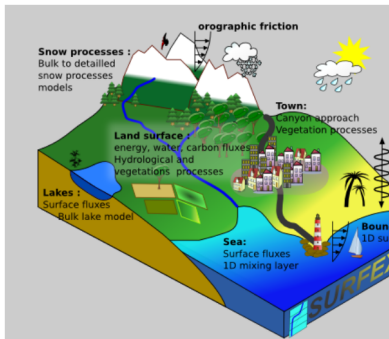


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Welcome to the SURFEX Home Page



SURFEX (Surface Externalisée, in French) is a surface modelling platform developed by Météo-France in cooperation with the scientific community.

SURFEX is composed of various physical models for natural land surface, urbanized areas, lakes and oceans. It also simulates chemistry and aerosols surface processes and can be used for assimilation of surface and near surface variables.