Status o SURFEX in ALADIN

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Outline

- Latest developments
- Status of validations
- Perspectives

Latest developments (1)

- Work of Mohamed Jidane (October 2008, Toulouse)

  http://www.cnrm.meteo.fr/aladin/spip.php?action=autoriser&arg=614

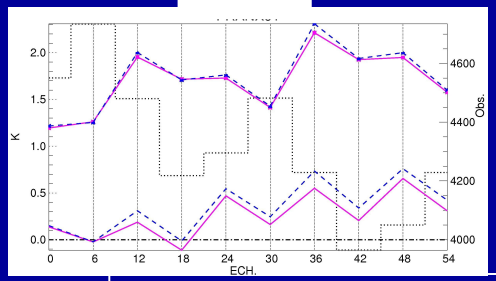
  - Bug correction in initialization of total frozen soil moisture,

  - Bug correction on Z0 & Z0h in inquiry mode that where containing only the ISBA contribution

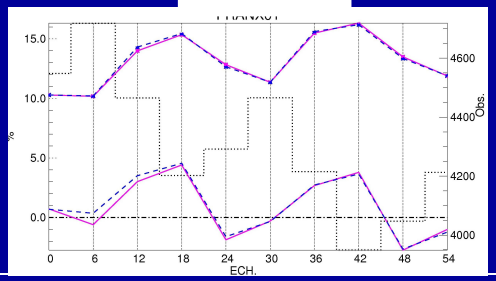
  - Study of the best solution for interpolating CLS fields in Fullpos (NFPCLI, IANO)

  - Comparison of ALADIN operational forecasts with and without SURFEX (remaining differences more pronounced over mountains, objective scores versus SYNOP or TEMP very similar over two 3-week periods (01-20/01/2008 and 01-20/07/2008)

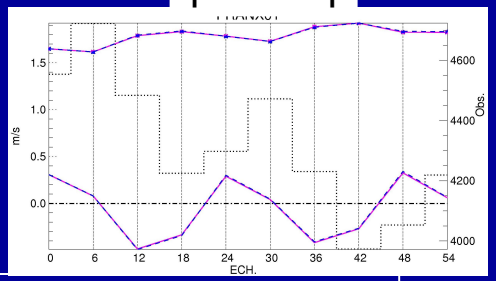
T2m



RH2m



|V10m|



SYNOP scores for T2m, H2m, |V10m| over France for the period 01-20/07/2008
ALADIN oper (blue), ALADIN with SURFEX (magenta)

Latest developments (2)

- Work of R. Hamdi and L. Kullmann (2008, Budapest)

  - Computation of Z0h over sea for ALARO physics in SURFEX

  - Computation of Z0h in case of snow for operational ISBA in SURFEX

  - Coding of moist gustiness in SURFEX

  - Changes related with moist Cp=Cp(q) and L=L(T) for surface energy balance in SURFEX

  - Use also the atmospheric « orography » over sea (PUT_ZS_SEA)

  - Computation of T2m by interpolation of s instead of T

Latest developments (3)

- Recent work done in Toulouse

  - Allow SURFEX diagnostics at time-step zero

  - Correction of SST initialization in PREP_SURFEX (increments from climatological SST are used)

  - Correction of thermal radiative fluxes after SURFEX

  - Bug correction in one implicit coefficient (Bq : density factor missing)

  - **Bug correction in equation of Ts+ (Vn- instead of Vn+)**

  - Bug correction in frozen soil parameterization (LAI=999 for bare ground)

  - Bug correction in snow fraction over vegetation (EBA snow scheme)

  - Forecast+DFI is currently split in 2 different configurations

  - Vertical interpolation of frozen soil water and deep temperature should be desactivated for reproducibility experiment in SURFEX

Validation (1)

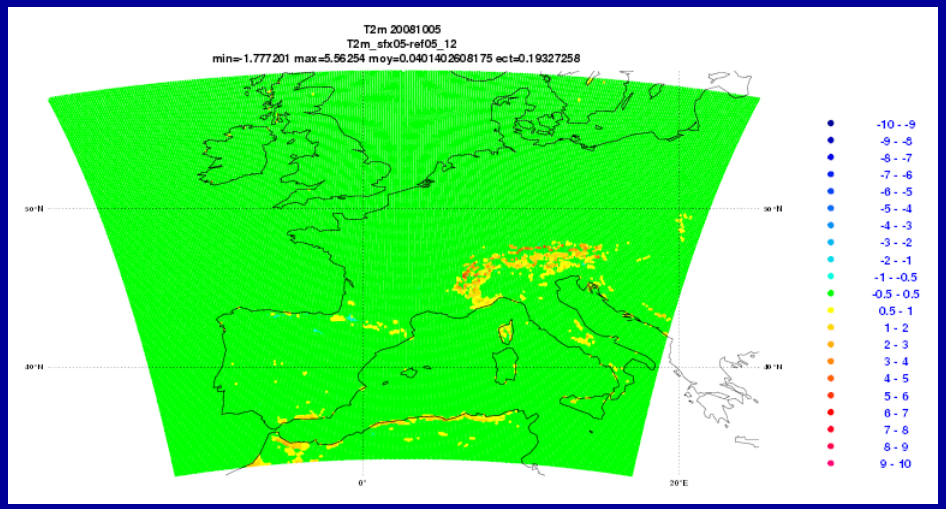
Reproductibility of ALADIN with and without SURFEX was a good strategy to find bugs, and discrepancies in interfacing and parameterizations

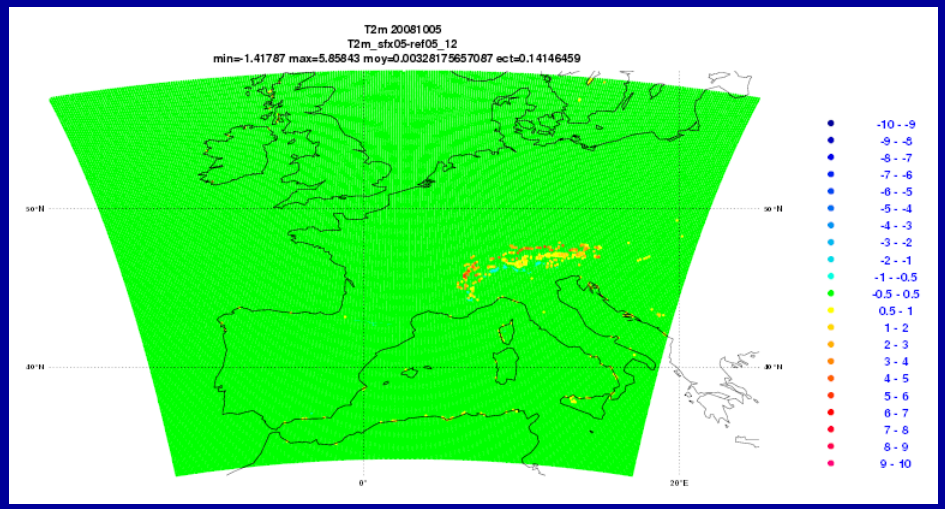
Currently there are still several sources of discrepancies :

- PREP_SURFEX initializes differently some prognostic variables (canopy interception reservoir, snow albedo, roughness over sea, …)
- Location of surface processes is not the same in the physics : for instance the precipitation fluxes computed in the time-step are not available when calling SURFEX and should be pseudo-historical variables
- The operational frozen soil parameterization is not coded in SURFEX (but availability of another scheme developed by Boone et al. (2000))

Validation (2)

Impact of bug correction bug correction in equation of Ts+ (Vn- instead of Vn+)





ALDSFX-ALD 20081005r0 P12h	T2m	H2m	U10m	V10m
Bias (old)	0.040	-0.0013	-0.0039	-0.0023
STD (old)	0.19	0.018	0.088	0.092
Bias (new)	0.0032	0.00057	-0.0036	0.0011
STD (new)	0.14	0.0087	0.066	0.062

Validation (3)

ALADIN 3D-Var with SURFEX is working (work of L. Auger):

Same solutions as in AROME are used :

- CLS fieds computed in SURFEX are directly interpolated to compute O-G (achmt not used)

- O-G is located at the lowest model level (achmttl and achmtad not used)

Surface analysis :

- T2m, RH2m : CLS background fields in CANARI are provided by SURFEX

- Soil variables : Externalised in SURFEX (modifications to read ALADIN FA files) – ready to be tested with ALADIN 3D-Var

Validation (4)

Evaluation of SURFEX in forecast experiments with new options in ALADIN (same as the ones used in AROME except TEB and CANOPY for the time being):

- ECOCLIMAP

- ISBA-3L

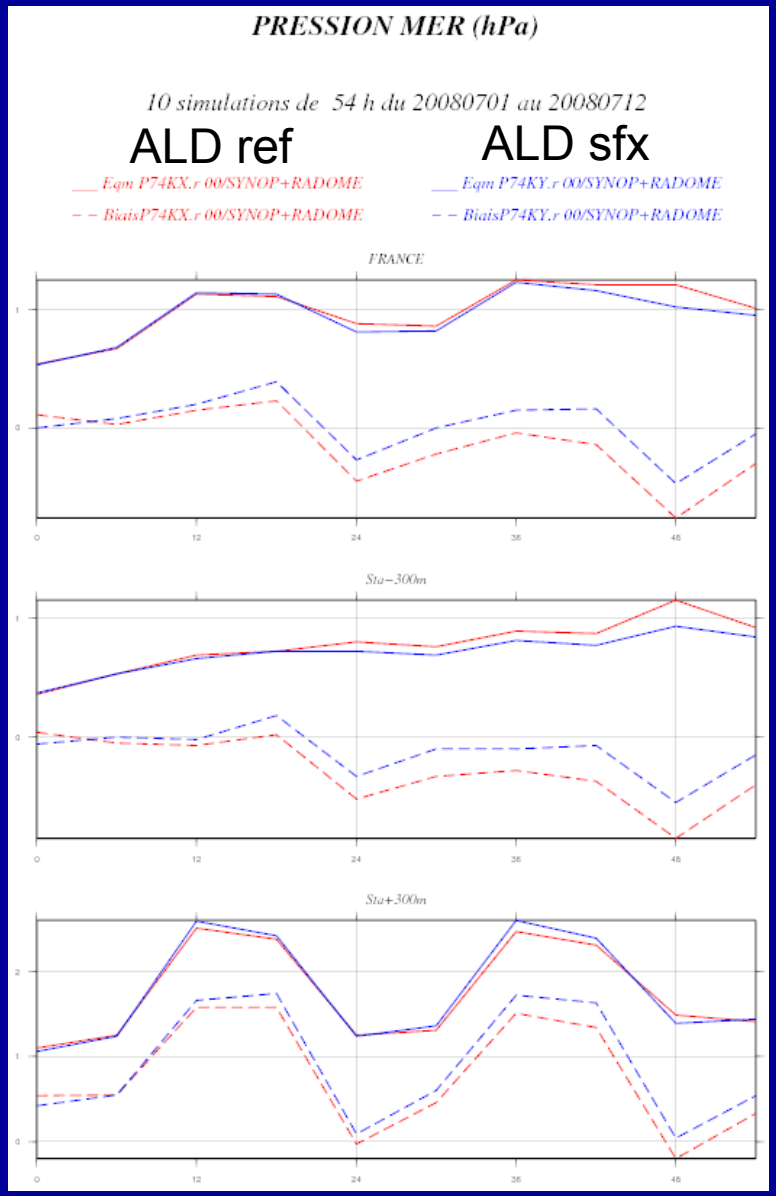
- Snow scheme (Douville, 1995)

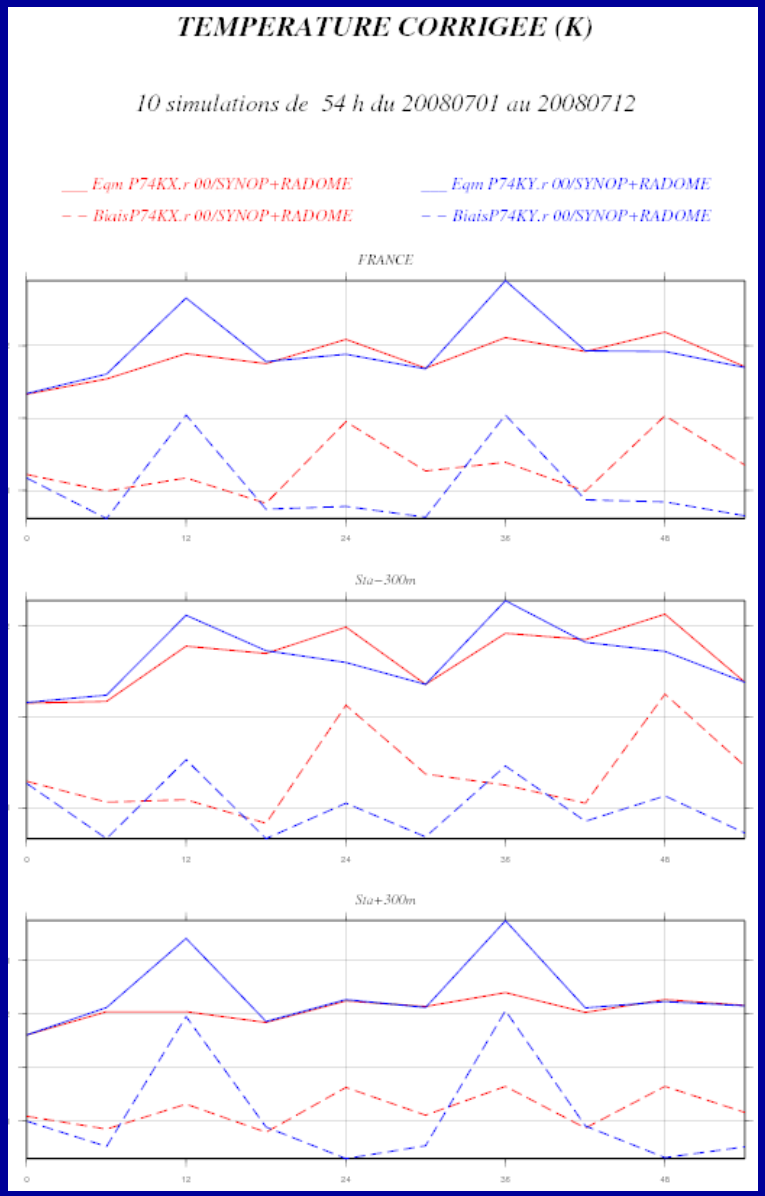
- Frozen soil scheme (Boone et al, 2000)

Encouraging results, but two problems :

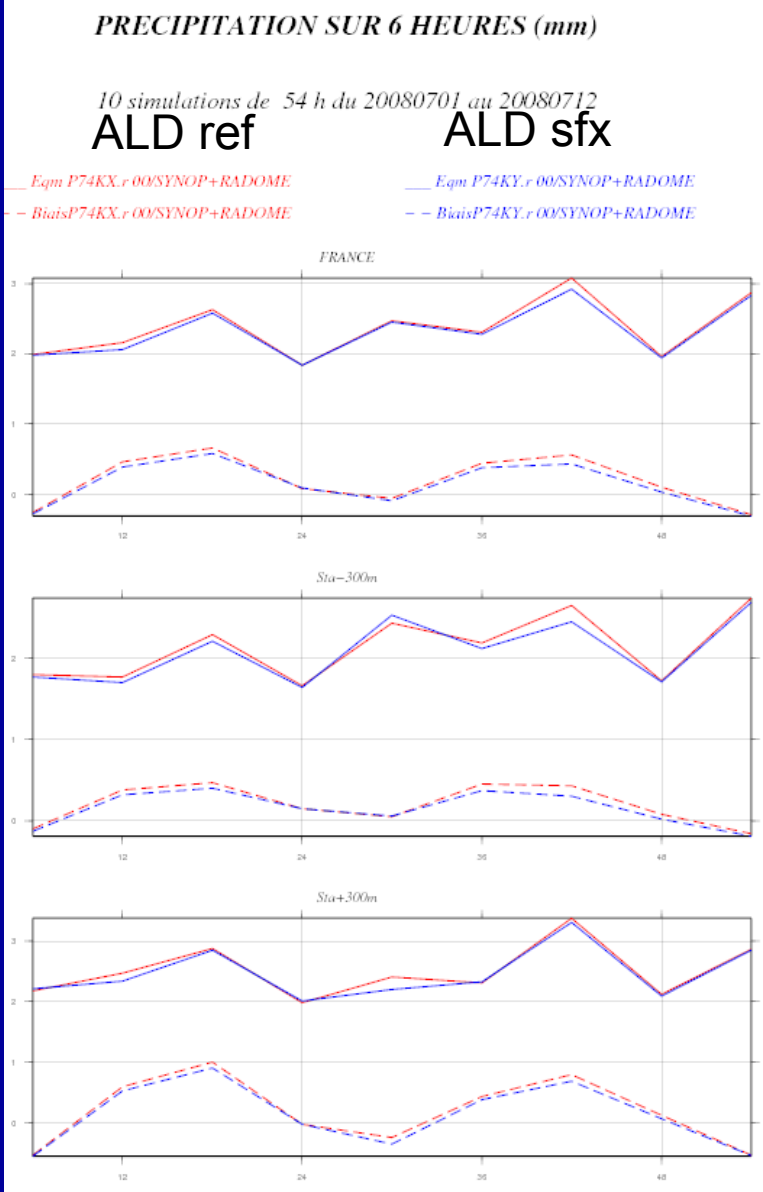
- T2m overestimation at 12 UTC points the need of a surface analysis

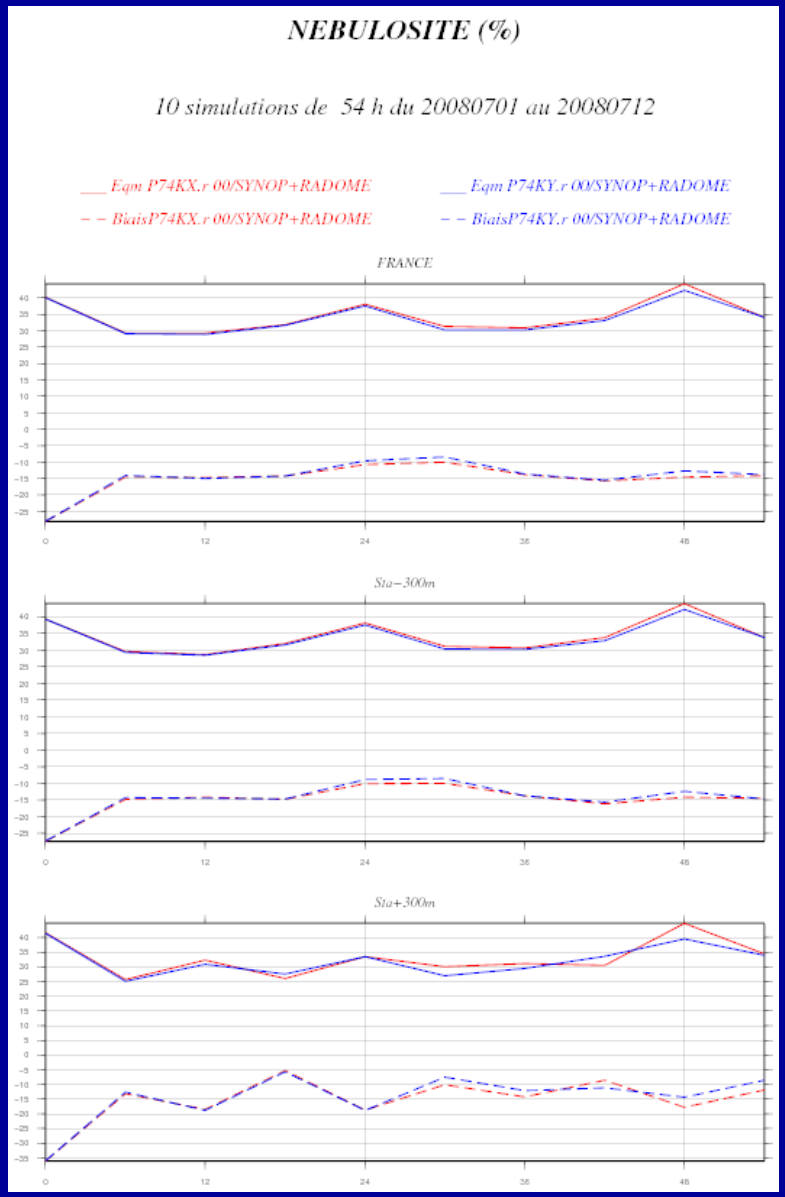
- problem with frozen soil parameterization in winter (perhaps also a problem of initialization or the need of tunings in Boone et al. parameterization)





Slight improvement on Ps and on T2m during night
Overestimation of T2m at 12h UTC (probably the consequence of a too dry soil moisture in summer :-> test with surface analysis)





Small improvement on precipitation (significant ?), neutral on total cloudiness

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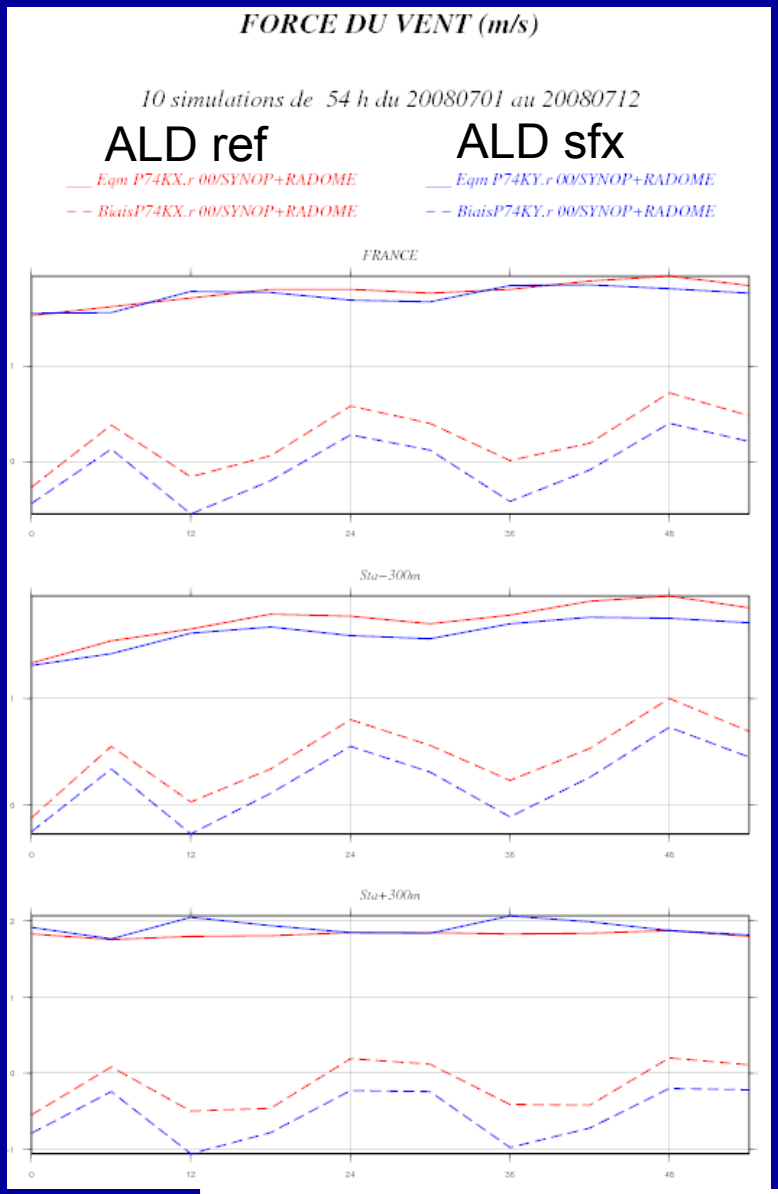
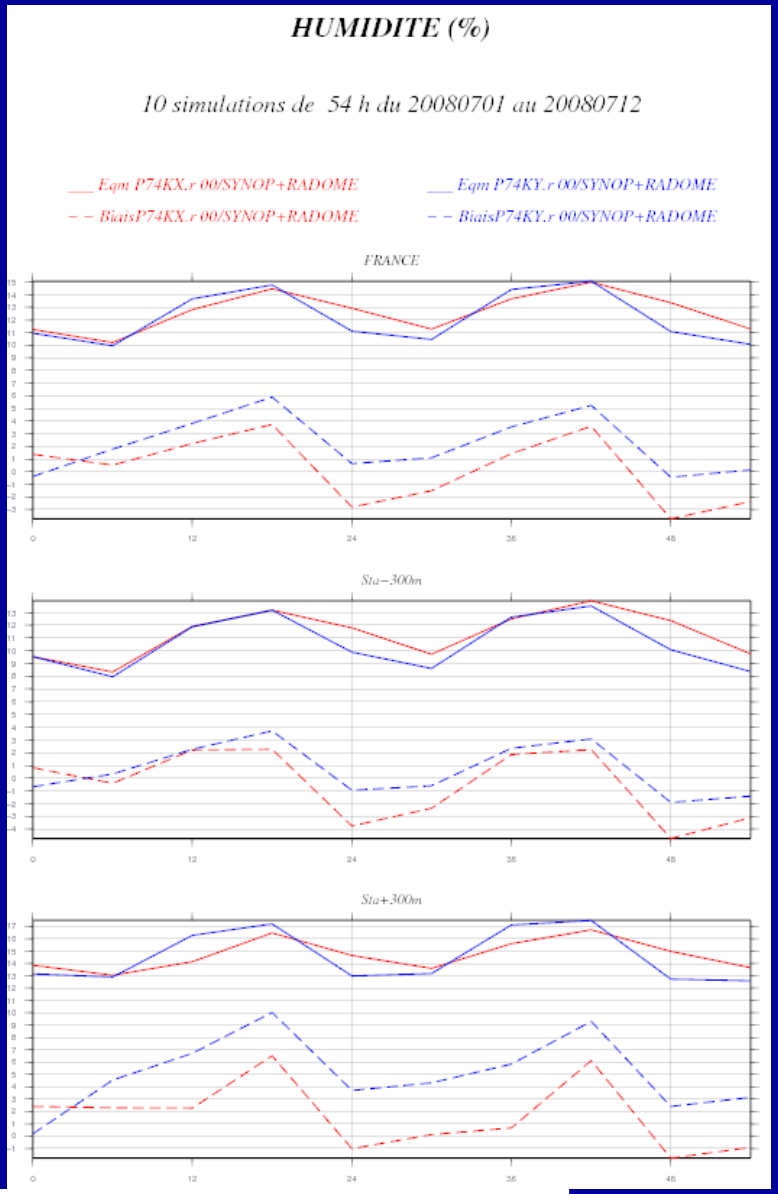
Toujours un temps d'avance





Improvement of wind in plains, degradation over orography
Degradation of biais for RH2m and improvement of RMS ???

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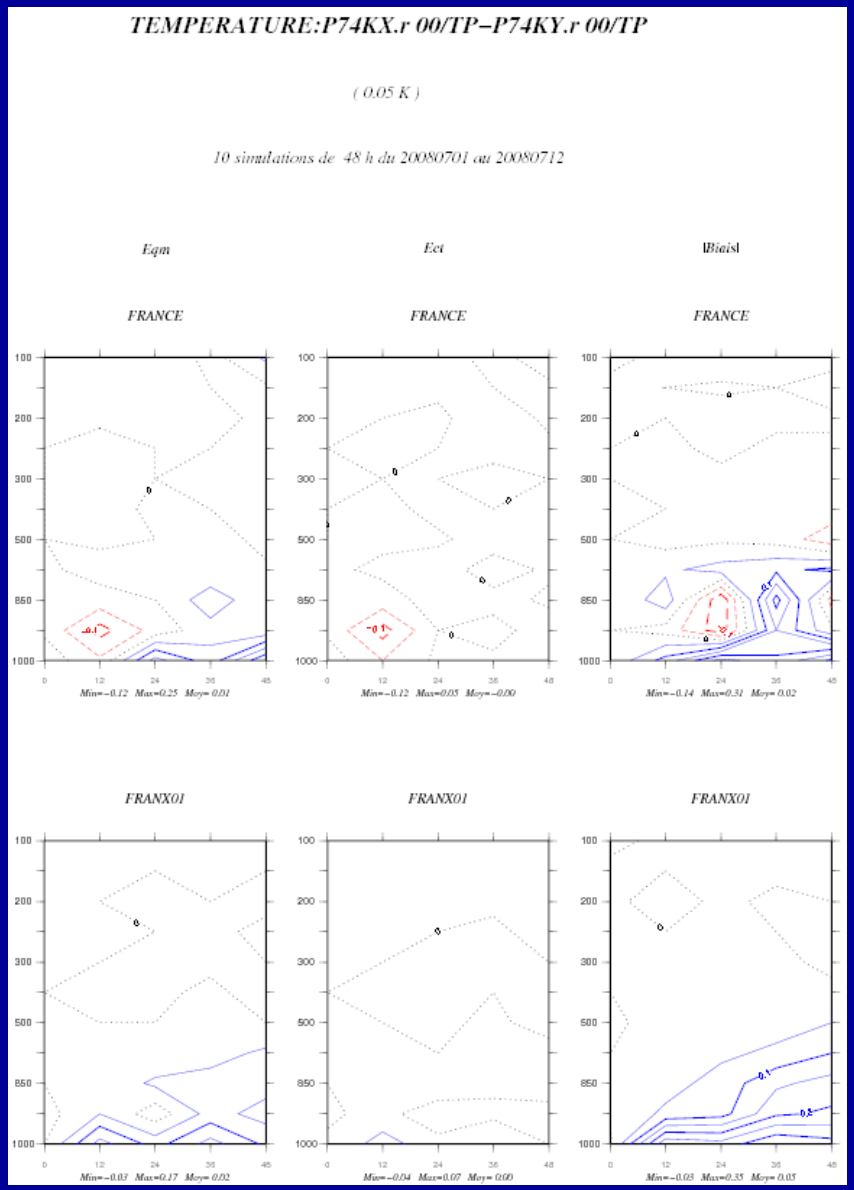

Improvement of low level temperature versus RS

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Remaining issues

Necessity of coding SURFEX frozen soil parameterization in SURFEX ?

Extend the validation for several atmospheric options (need of Cd, Ch before calling SURFEX)

Validation of soil SURFEX OI analysis

Optimisation issues : Open-MP, efficiency of PGD, PREP evolutions to replace PREP_SURFEX, …

Operational perspectives

Parallel suite with SURFEX in ALADIN-France for end of 2009 (including 3D-Var and surface analysis)

The possibility to use SURFEX with ECOCLIMAP in the future ALADIN « Outre-Mer » in dynamical adaptation will be evaluated

SURFEX is technically working in ARPEGE climate model, the evaluation is on-going