ALATNET PhD and Post-Doc studies

1. Steluta ALEXANDRU : "Scientific strategy for the implementation of a 3D-VAR data assimilation scheme for a double nested limited area model"

3d-var experiments were performed for a 7-day period (25.02.2002-03.02.2002) using :

- observations : SYNOP and TEMP
- statistics : classical (standard) NMC
- evaluation tools :
  - objective scores (rmse, bias) : vertical profiles for a chosen moment (00h, 06h, 24h), and time-evolution for 24h at standard levels;
  - *"echkevo"* diagnostics
  - *"ectoplasm"* plots

The following combinations were made :

1. Time / Space consistency

Experimental framework :

	cycling	production
first guess	6h ALADIN/HU forecast	-
coupling	ALADIN/LACE (assimilation cycle)	ALADIN/LACE (operational)
initialisation	no	DFI
remark	-	24h forecast

Main conclusions :

- At time 00h, the 3d-var analysis is better than dynamical adaptation, getting closer to observations for all fields. An important improvement is for the relative humidity field. Also for the wind there is an improvement especially for the upper levels. At the surface the scores are close to those of the operational forecast.
- After 6h forecast, the improvement from the initial time is lost. For some levels the forecast with 3d-var is better, but for others, not. So, starting from a better analysis, the results are worse than for dynamical adaptation.
- After 24h forecast, the scores are similar to those for dynamical adaptation.
- The *"echkevo"* plots show that the fields are in balance.
- The time-consistency coupling strategy shows better results than the space-consistency one's.

2. Time / Space consistency with incremental initialization

Experimental framework :

	cycling	production
first guess	6h ALADIN/HU forecast	-
coupling	ALADIN/LACE (assimilation cycle)	ALADIN/LACE (operational)
initialisation	incremental DFI (IDFI)	DFI
remark	-	24h forecast

Main conclusions :

- Comparing the scores of the forecasts when the same coupling technique was applied, with and without IDFI, at the moment 00h, the shapes are very close for temperature and geopotential. Also for the relative humidity and wind the differences are small, maybe with a little improvement when no IDFI is used. But this difference appears because of the IDFI, which is putting the analysis a little far away from the observations.
- After 6h, the scores are similar.
- There is no need to apply IDFI in cycling, because the fields are already in balance.

3. LACE / ARPEGE with space-consistency

Experimental framework :

	cycling	production
first guess	6h ALADIN/HU forecast	-
coupling	LACE/ARPEGE (assimilation cycle) (LBC0 / INIT file= 3d-var analysis) (LBC1 file= LACE/ARPEGE analysis)	LACE/ARPEGE (assimilation cycle)
initialisation	no	DFI
remark	"Moroccan" solution	6h forecast

Main conclusions :

- The forecasts obtained from these experiments are compared to the 3d-var results using the operational coupling files in production (from the experiments 1), with the same coupling strategy (space consistency).
- At the moment 00h, the scores for temperature are similar. For geopotential, the 3d-var with ARPEGE files is a little bit better. The relative humidity is improved with the LACE files, for upper levels, and for the wind the ARPEGE combination shows better scores.
- After 6h integration, the shapes for the temperature are very close. The ARPEGE combination is better for geopotential. In the case of relative humidity the 3d-var with the operational coupling files in production is better for the upper levels. For the wind, one can say that the ARPEGE combination has a small improvement against the others.
- The choice of the second coupling file in cycling (when the space consistency strategy is used) is important.