

RC LACE Status 2011

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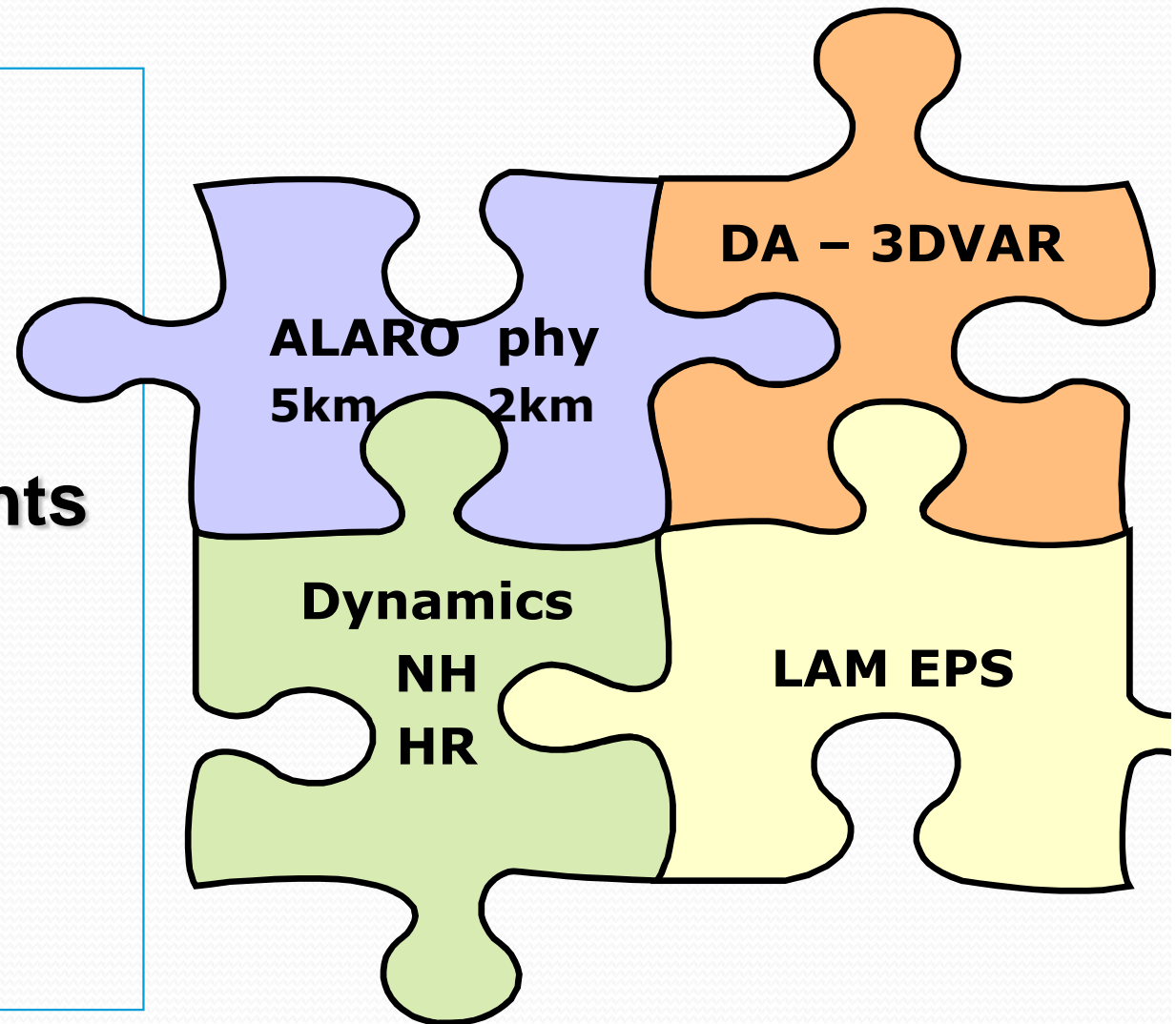
www.rclace.eu

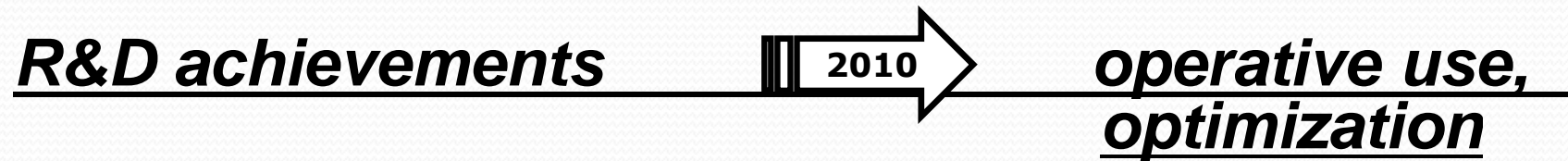
✓ **LACE Projects ()**

3y summary

✓ **2011 R&D highlights**
~ 2012 plans

✓ **LACE future**





4 Areas for R&D → 4 Projects

- Operational 3D Var system for LACE (HMS)
 - OPLACE-Common observation pre-processing (HMS)
 - Monthly reports of data monitoring
- Implementation of ALADIN NH dynamics (CHMI)
- Operational ALARO phy at 5km mesh size (CHMI)
e-suite products at LACE WEB page
- Common LAM EPS - ALADIN-LAEF (ZAMG)
processed at ECMWF,
products at LACE WEB page, raw data at MARS DB

	Operative 3DVar	NH Dynamics	ALARO 5km	ALADIN LAEF
Resp. Cent	HMS	CHMI	CHMI	ZAMG
<i>Duration</i>	3 years ->	2- 3years ->	3years ->	3years ->
<i>Contr. to IFS/AAA</i>	+	+	+	Own system
<i>Interaction to LACE Projects</i>		ALARO	NH Dynamics, LAEF	
<i>Operative sharing of resources</i>	OPLACE At HMS			LAEF ECMWF-ZAMG
<i>Applied at ALADIN- HIRLAM</i>	ALADIN, HIRLAM	ALADIN- HIRLAM ECMWF	ALADIN- HIRLAM	Start with ALADIN
<i>Maintenance</i>	Local and centralized	local	local	centralized
<i>Workshop and trainings</i>	DA Validation week 2010,2011	AROME trainings 2008, SRNWP WS	ALARO working week 2010	SRNWP WMO workshops
<i>Original contrib. to R&D</i>	+	+	+	+

Projects 2008-2010

The results of LACE Projects have been elaborated at original scientific papers :

- ❖ **One PhD theses** on Turbulence , implemented at ALARO physics
- ❖ **twenty two scientific papers** published in journals of AMS (American Meteorological Society) and RMetS (Royal Meteorological Society), for example, *Bull. Ame. Meteor. Soc.*, *Mon. Wea. Rev.*, *Tellus A*, and *Q. J. R. Meteorol. S.* , etc.
- ❖ The technical memos and the progress reports have been issued at LACE WEB page www.rclace.eu and ALADIN Newsletters.

The total means dedicated to the projects :

- ❖ **total of 267 person.months (p.m)** of coordinated work on Projects have been fulfilled.
- ❖ Part of work was executed as R&D missions for Project tasks development, hosted by LACE Members (**47 p.m as R&D missions**).
- ❖ LACE also financed app **70 p.m for networking & trainings, participation at workshops and working days** for of LACE scientists and LACE Management Group.

Variational methods:

B matrix -from NMC to VARBC implemented

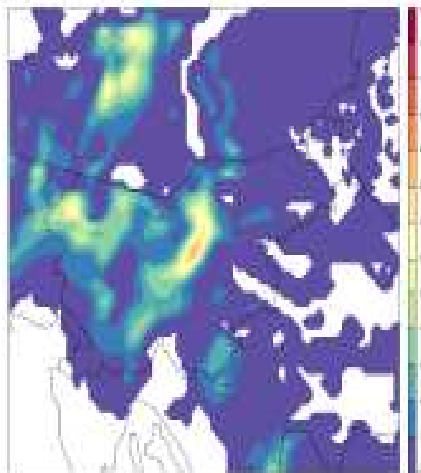
- New B matrix =downscaling of the ARPEGE ensemble assimilation system (EnVar)
- implementation of RUC

Operational implementation of 3DVAR+CANARI systems

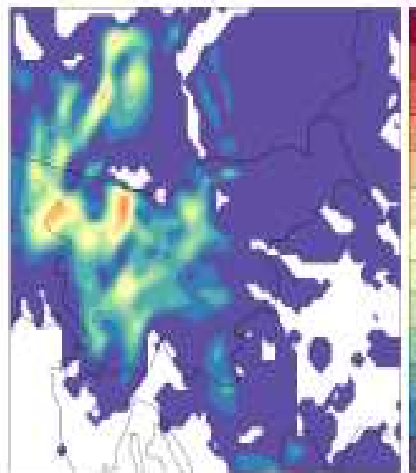
- 2nd LACE DA Working week – June 2011
- CANARI system , 3D VAR, BlendVar-VarBlend
- Complex treatment of T2m, surface assimilation, Soil wetness index
- Tuning of DFI for DA
- **ALARO 4km DA at SI -Operational since March 30th 2011**
- **AROME 3D Var at Hu**

DFI tuning - *ALARO 3D VAR/Si*, 4km

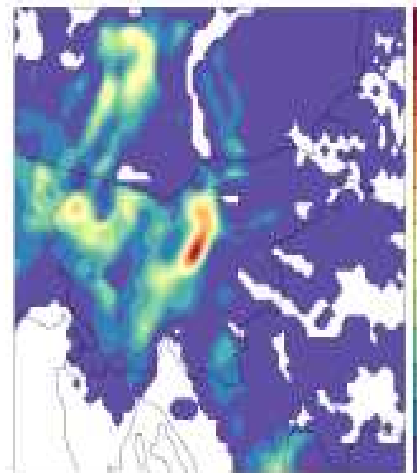
- ⌚ Modifications of DFI cut-off period (TAUS)
- ⌚ Tests of incremental vs. non-incremental filter
- ⌚ Tests also with no initialization



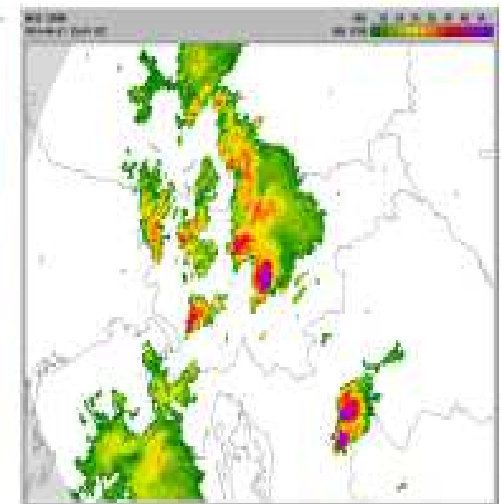
DFI ($\tau_\delta=3$ h)



IDFI ($\tau_\delta=1.5$ h)



DFI ($\tau_\delta=1$ h)

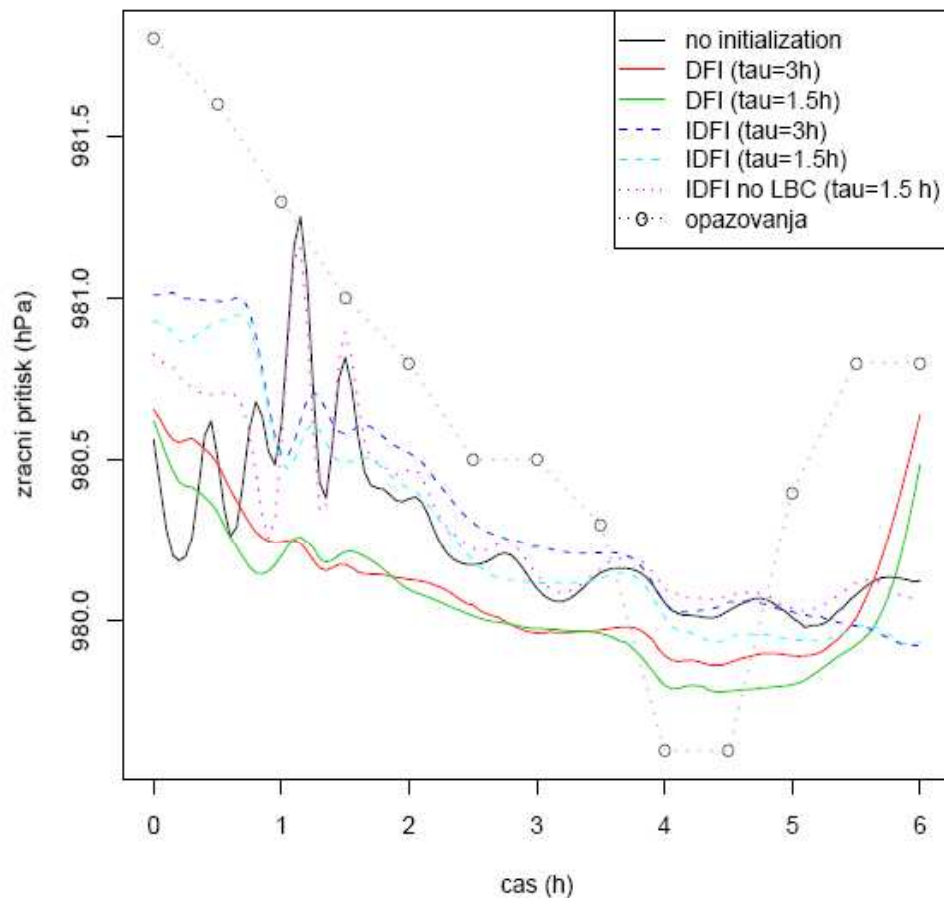


radar zmax

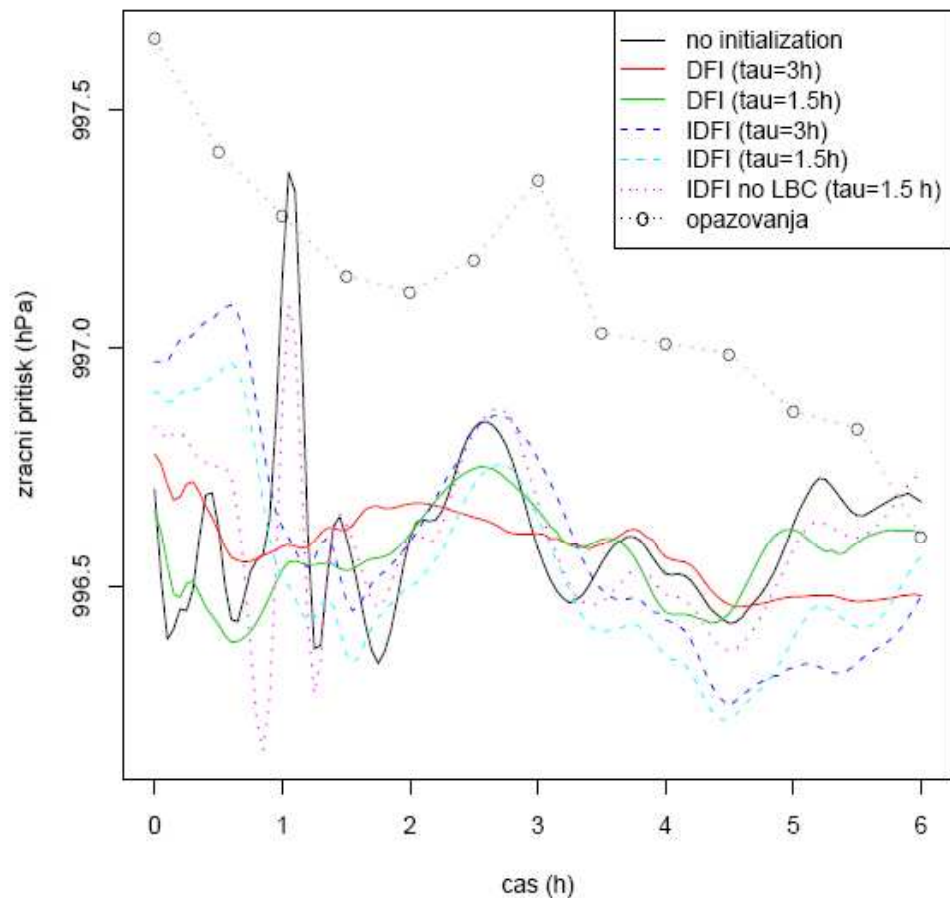
6-minute rainfall accumulation

DFI diagnostics - *ALARO 3D VAR/Si* 4km

Razvoj pritiska pri tleh - LJU



Razvoj pritiska pri tleh - POR



Observation preprocessing and monitoring- [OPLACE system](#)

Extension to more observation types:

- METOP/IASI data

Plan:

- National SYNOP data (including snow)
- LandSAF albedo
- GPS EGVAP
- ASCAT (soil moisture, ocean wind)
- radar (long term plan)

To collect HR National observations (GPS, SYNOP, Radar full volume scans)

parallel test ALARO at 9 km/L43:

- most of the benefit comes from the vertical discretization
- ICI (P/C) offers improvement of scores
- no profit from NH with respect to hydrostatic (simplicity vs. accuracy)

parallel test ALARO at 4.7 km/L87:

- not much to gain from NH (strong rain in mountain, wind 10m), scores are perfectly neutral
- ICI scheme detrimental for scores (for both NH and hyd.) (problem of phys/dyn interface or SI?)

Recommendations: to invest CPU to other scheme bringing more benefit for similar cost (VFE $\approx +15\%$, TOUCANS $\approx +6-8\%$,...

Second order accurate coupling of physics to dynamics

Goal: Approaching the higher resolutions, physics should be increasingly re defined as a 3D process

- present coupling o very stable and robust solution.
- extensible to a second order accuracy coupling without a need to change timestep organization.
- detected problems associated to microphysics (graupels)

Dynamics towatd HR

Goal: to ensure, that dynamics delivers realistic performance also at the scales of around 1-2 km of horizontal mesh

- to revisited schemes responsible for pacifying gravity waves (especially near the model top) - plan

Alaro operational:

- At, initialization with o (cy35t1, 4.8 km)
- Hr, initialization with o (cy36t1, 2 km)
- Cz, assimilation cycle (cy36t1, 4.7 km)
- Ro, initialization with o (cy35t1, 6.5 km)
- Si, data assimilation (cy35t1, 4.4 km)
- Sk, assimilation cycle (cy36t1, 9 km)
- parallel runs:
 - Hu, data assimilation (cy36t1, 8 km)
 - Sk, assimilation cycle (cy36t1, 5 km)

Alaro recent development

TOUCANS turbulence

Radiation scheme

Convection

Wind gusts diagnostics (2 old + 3 new type of
diagnostics for forecasters)

Alaro at LACE LAEF perturbed physics,

diff tunings of

- Microphysics,
- Deep conv, Shallow conv
- Turbulence, Radiation
- Wind gust diagnostics, Screening level diagnostics

ALARO toward 2km horizontal mesh

ALARO diagnostics with pseudo-radar reflectivities

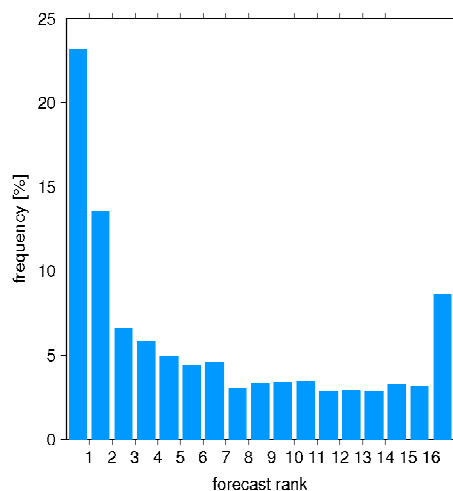
LAEF –recent development

- **New LAEF with higher resolution & domain is implemented at ECMWF HPC**
- **Ensemble CANARI is implmented**
- **Stochastic physics for ISBA is implemented, and case study**
- **New multi-physcs has been designed**
- **Post-processing 10 Wind**
- **LAEF application in hydrology (CHMI)**

LAEF application: Ensemble prediction of water outflow from river catchments covering Czech territory

Rank histogram for 6 hour precipitation
(ALADIN/LAEF ensemble)

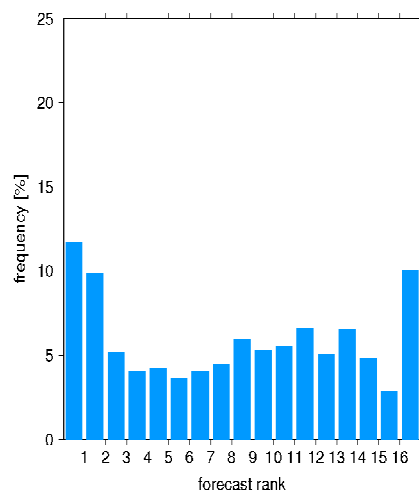
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final date: 20101231
start of integration: 00 UTC
forecast range: 12h
region: h
 $r_{raw} = 1.81$



12h forecast, raw vs. calibrated

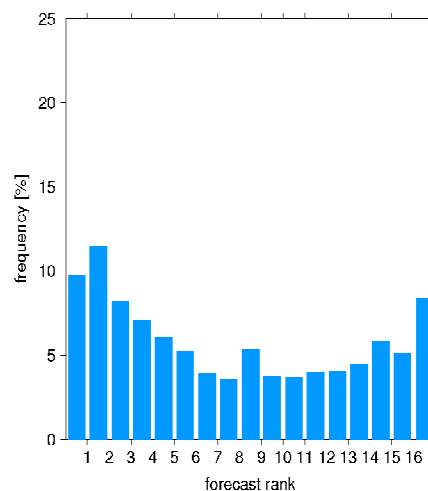
Rank histogram for 6 hour precipitation
(ALADIN/LAEF ensemble)

initial date: 20100101
final date: 20101231
start of integration: 00 UTC
forecast range: 12h
region: h
 $\alpha = 0.29$, $\beta = 1.99$, $r_{raw} = 1.81$, $r_{cal} = 0.99$



Rank histogram for 6 hour precipitation
(ALADIN/LAEF ensemble)

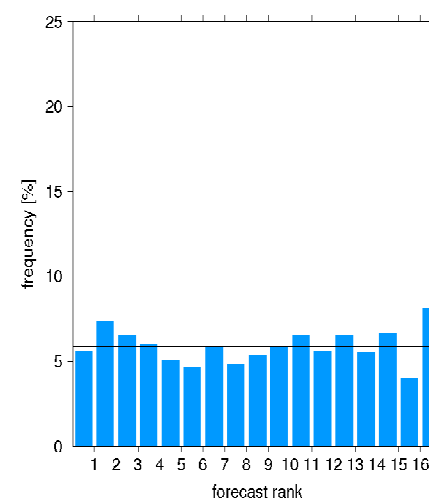
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final date: 20101231
start of integration: 00 UTC
forecast range: 30h
region: h
 $r_{raw} = 1.24$



30h forecast, raw vs. calibrated

Rank histogram for 6 hour precipitation
(ALADIN/LAEF ensemble)

initial date: 20100101
final date: 20101231
start of integration: 00 UTC
forecast range: 30h
region: h
 $\alpha = 0.49$, $\beta = 1.99$, $r_{raw} = 1.24$, $r_{cal} = 0.99$



LAM EPS plans

- **The new LAEF with:**
- **higher resolution and new domain,**
- **optimised multi-physics,**
- **introduction of ensemble CANARI and stochastic ISBA,**
- **optimised LAEF member size,**
- **optimised production strategy**

Combination LAEF + HUNEPS

- **LAEF & GLAMEPS co-operation**

Announcement for LAEF-GLAMEPS working days – Feb 2012

- **On common products, verification tools**
- **Convection permitting EPS , cooperation on methods**

- Refreshment of MG structure
(call for new Area Leaders : DA, Dynamics&C)
- New LACE SC Chair (Josef Vivoda-Sk)
- **LACE 10 Y strategy** (self –review)
 - the new R&D challenges – HR, interactions and integrations
 - strength the partnerships : sharing of products, facilities, operations?
 - links between RC LACE partners, is link between CE Services
(not just NWP actions , observations, end applications)
- **Next RC LACE MoU (*after 2012)**
 - ambitions on top of ALADIN-HIRLAM cooperation
 - balance local preferences and common benefits

