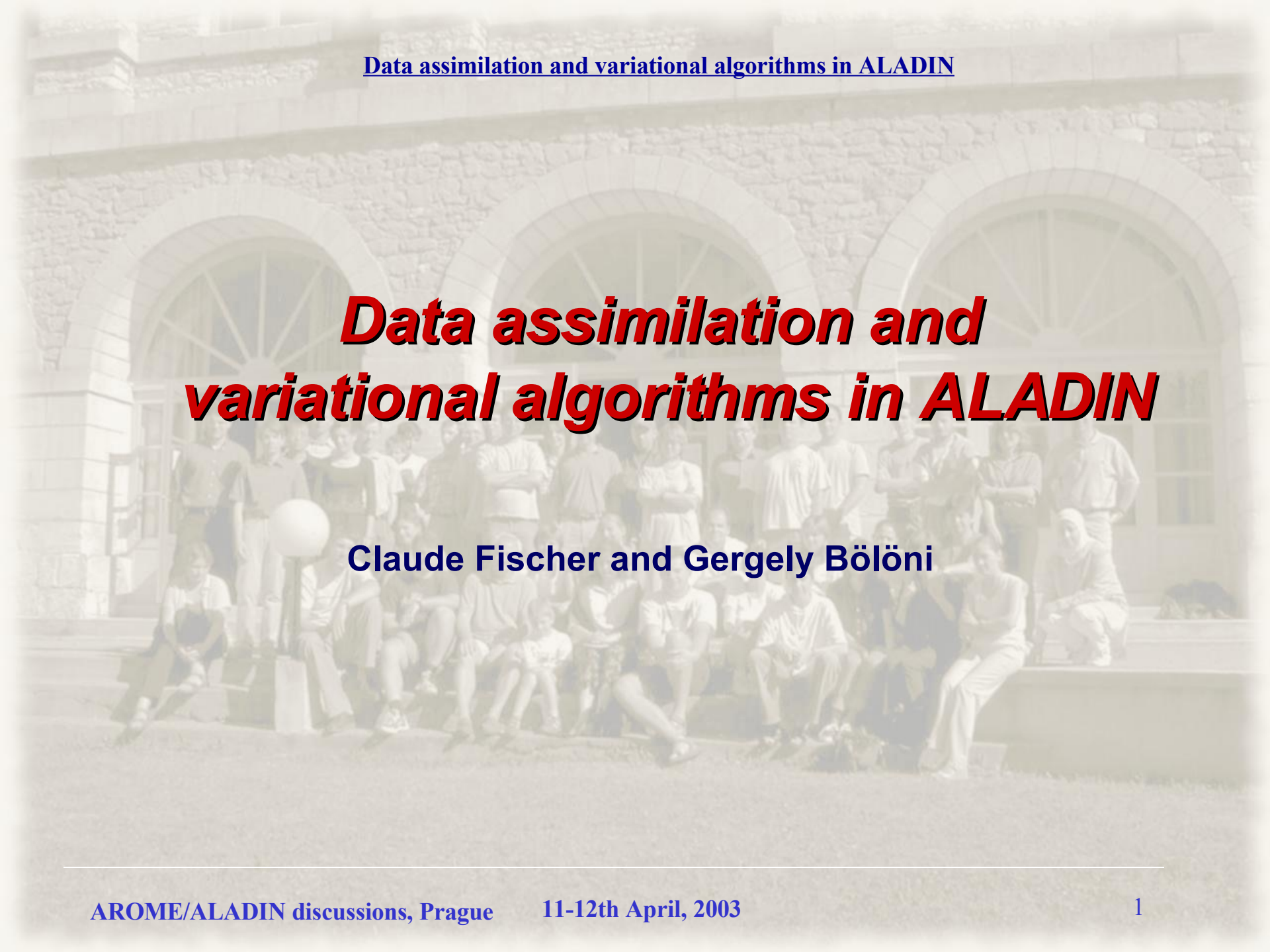
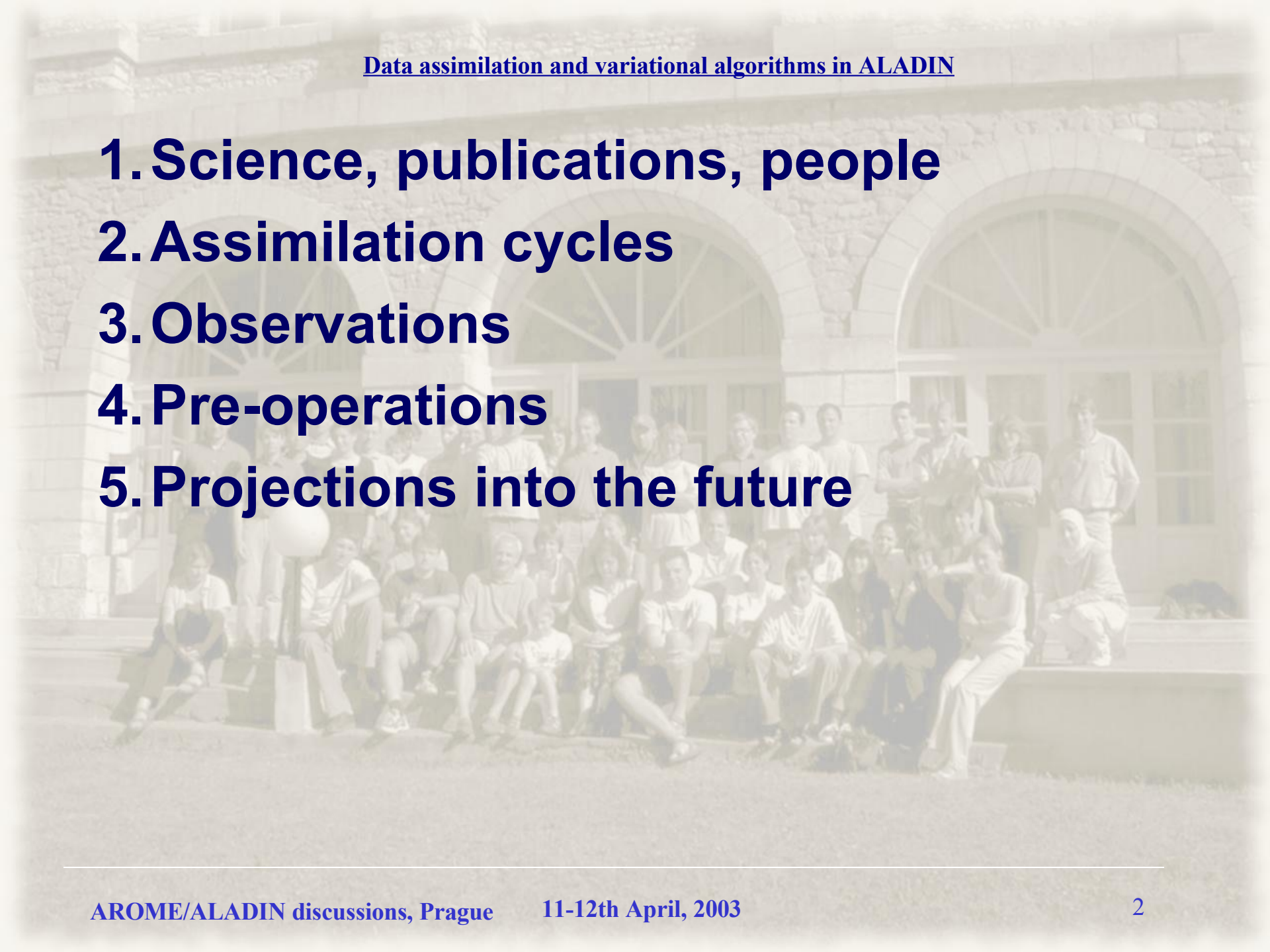


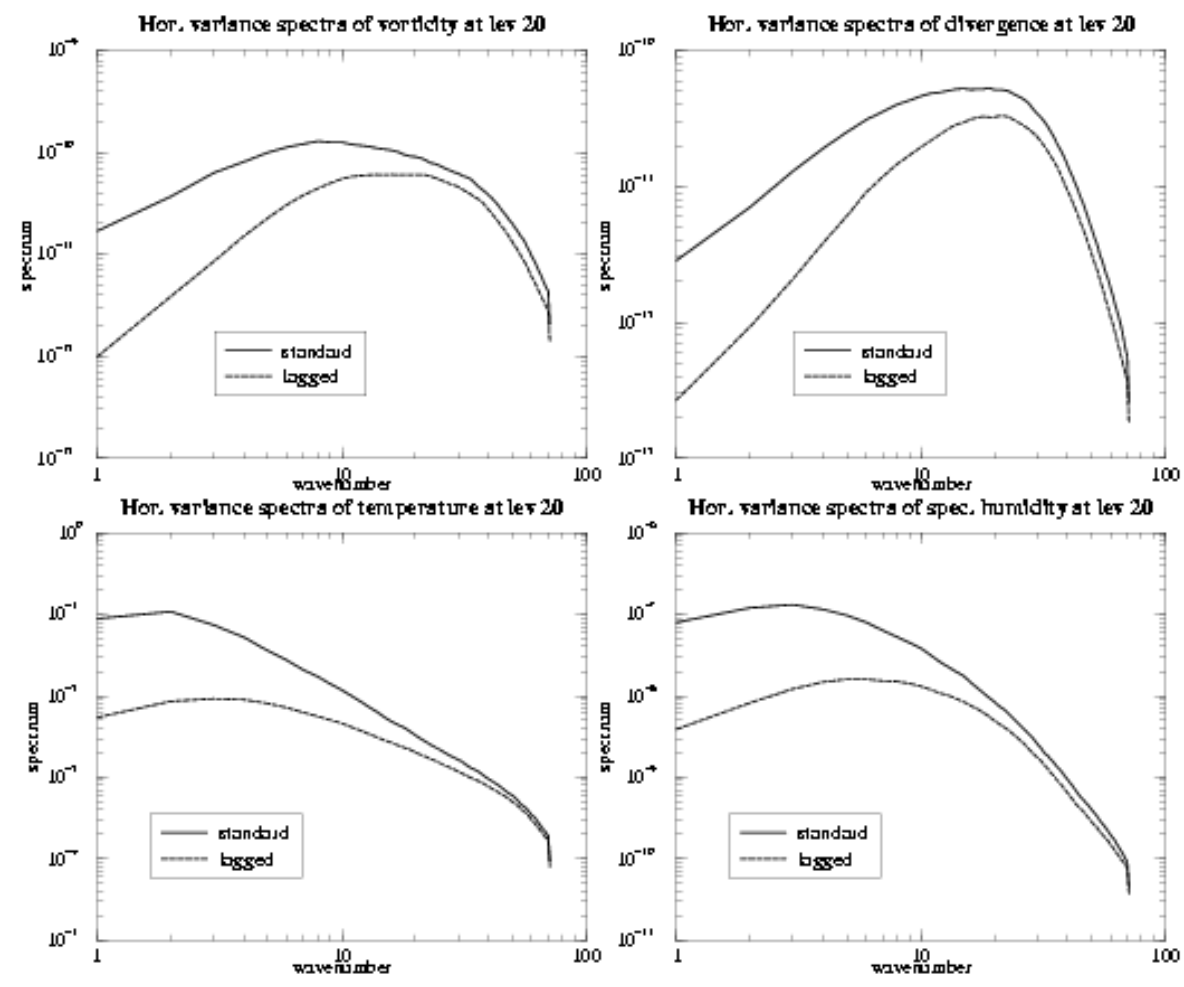
Data assimilation and variational algorithms in ALADIN

Claude Fischer and Gergely Bölöni

1. Science, publications, people
2. Assimilation cycles
3. Observations
4. Pre-operations
5. Projections into the future



Science and publications



- Berre, Monthly Weather Review, 2000
- Sadiki *et al.*, Monthly Weather Review, 2000
- Široka *et al.*, Meteorology and Atmospheric Physics, 2003
- Soci *et al.*, Idöjàràs, 2003
- Deckmyn, submitted to Applied and Computational Harmonic Analysis
- Other projected papers: Soci, Sadiki, Guidard, Bölöni, Stefanescu

People (manpower)

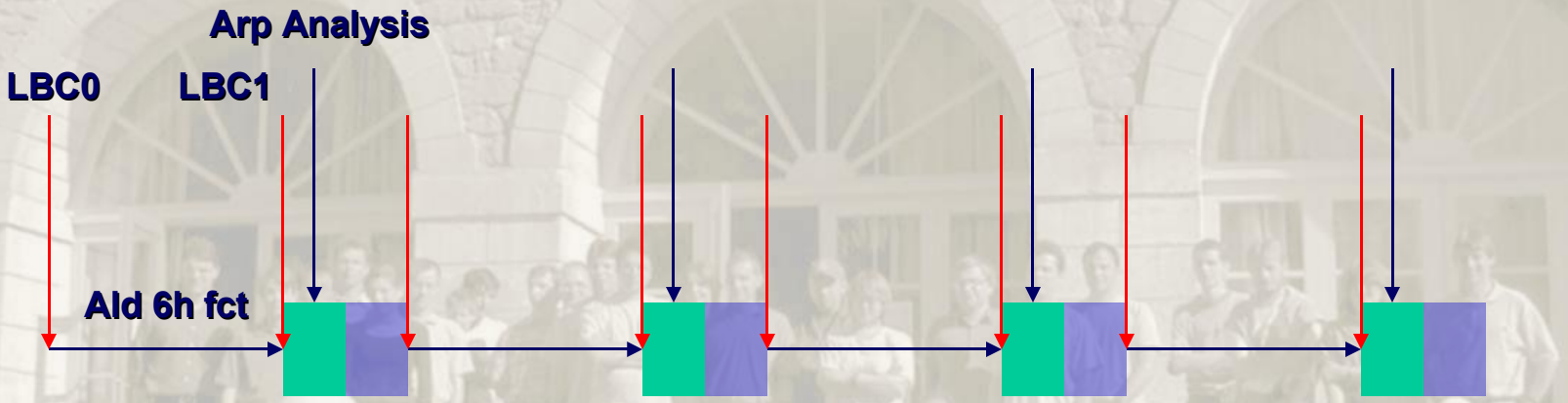
- Algorithms (TL/AD models, minimisation): 11 / *1.5*
- Error statistics (« B » matrix): 9 / *1.5*
- Observations, « Jo »: 8 / *3*
- Surface analysis: 10 / *2*
- Total: 30 / 7

(French not counted) – Users / *Experts*

Important addendum: these figures are in no comparison with the full requirements for building a data assimilating and forecasting system from scratch (eg: ARPEGE/IFS estimated 150 men.year for the French side only …)

Consequence: just as ALADIN, the AROME development will remain bound to the algorithmic compatibility with the ARPEGE/IFS backbone => regular phasing and mutual benefits

BlendVar: a mixed "empirical/statistical" assimilation cycle



Blending: digital filter blend for 3D fields + linear combination of Surface fields, in order to combine Arpège analyzed large scales with Aladin forecast small scales

Aladin 3D-VAR analysis:

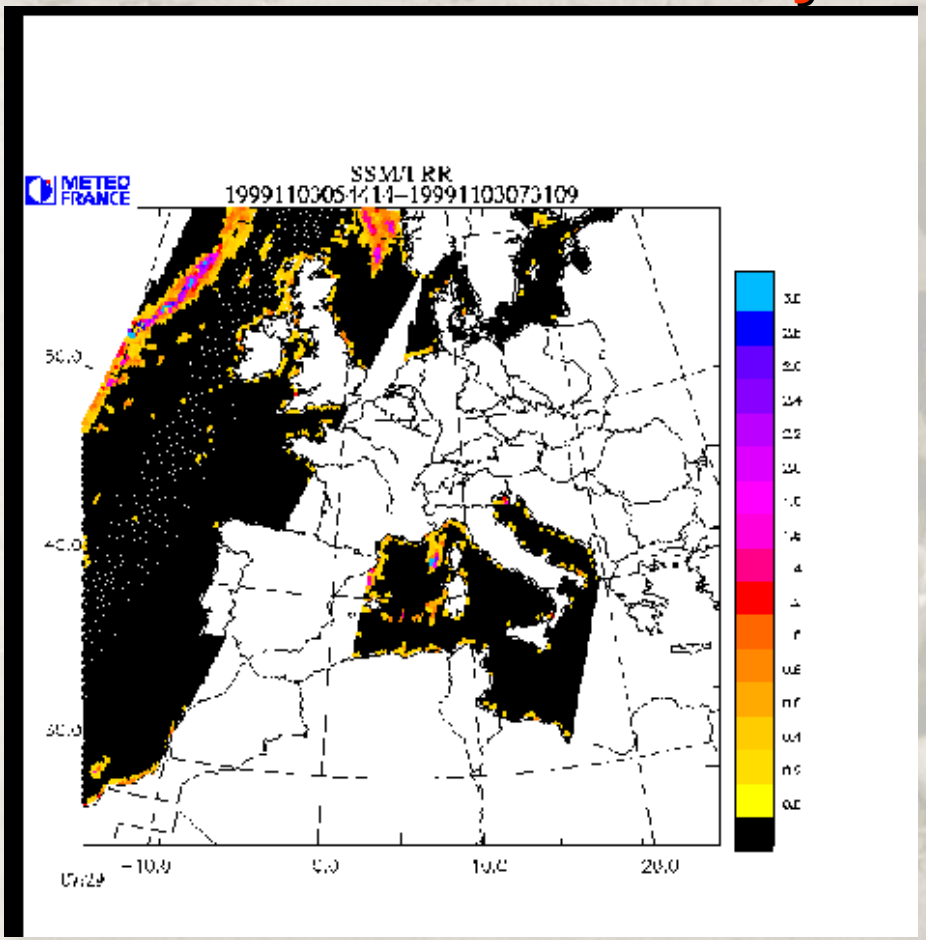
J = Jb + Jo

Several Jb formulations exist:

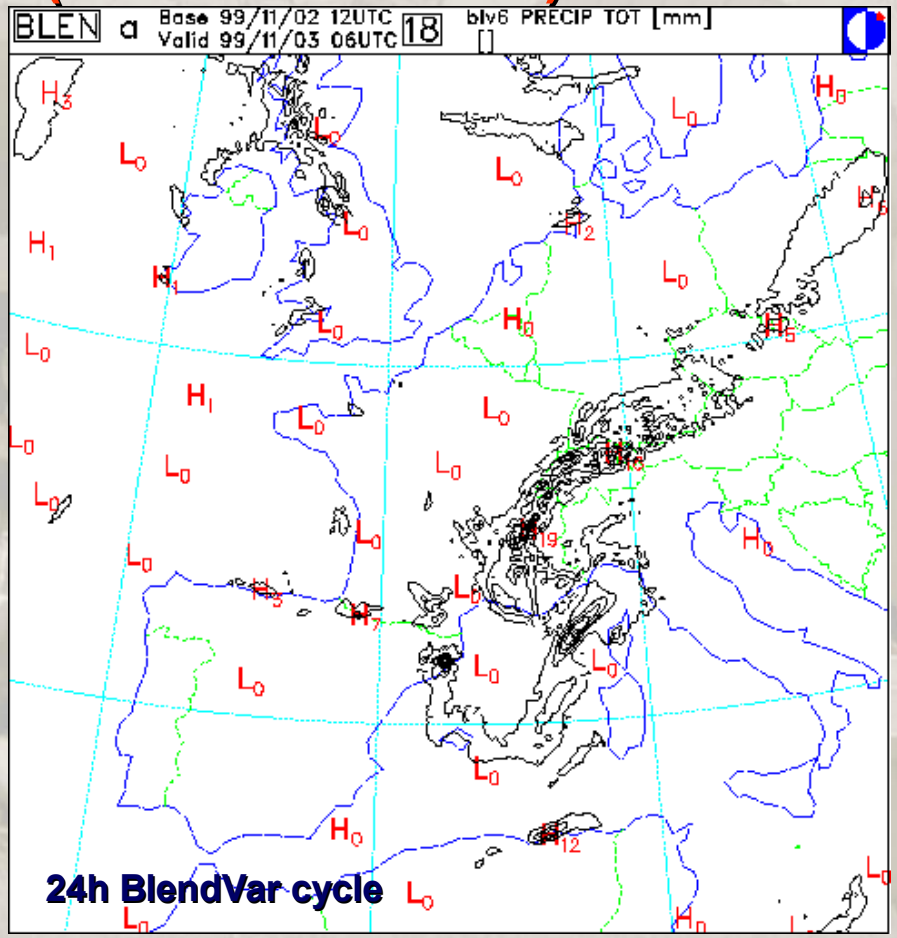
Standard Jb (large scale)

Lagged Jb (mesoscale)

MAP/IOP14 case study using BlendVar assimilation cycles (Vincent Guidard)



SSMI Microwave sounder



RR between 12h and 18h forecast range

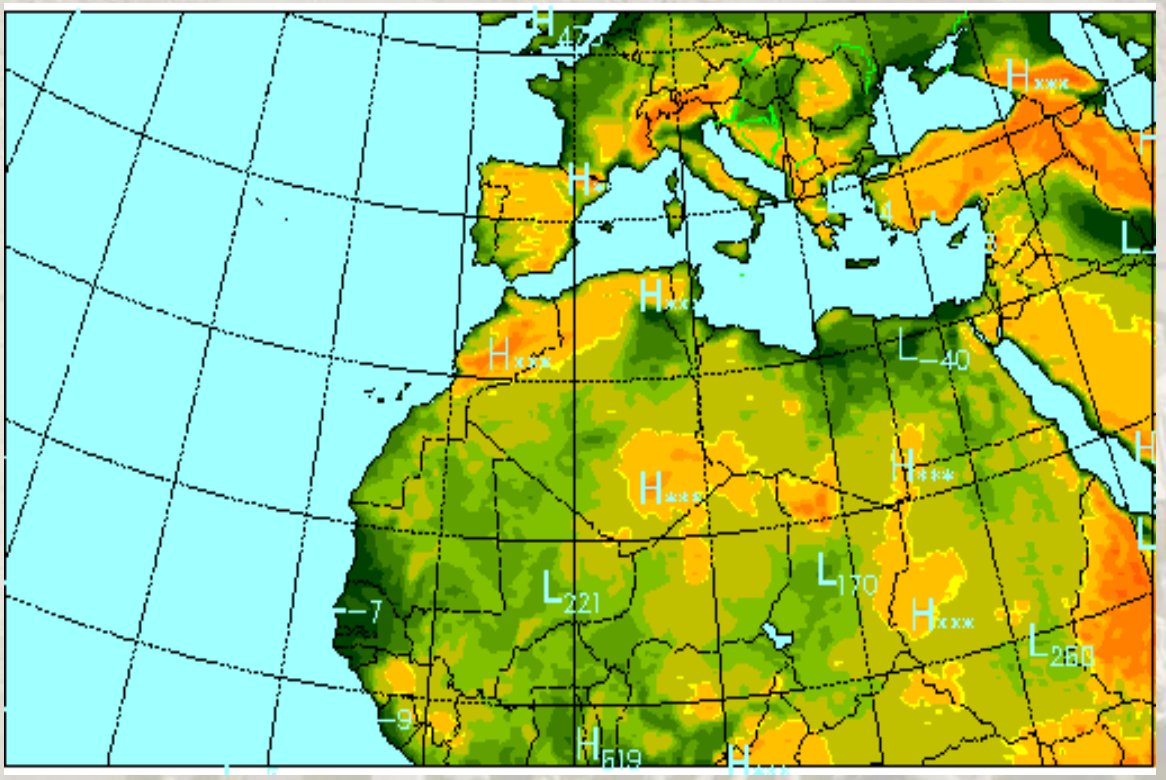
Use of new sources of observations

- denser use of aircraft data
- analysis of screen-level relative humidity
- 10 m wind
- use of pseudo-profiles of relative humidity (MeteoSat imagery)
- raw radiances
- radar data

ALADIN 3d-Var in Hungary

- Implementation (2000)
- Experiments (2000-): single or double nested assimilation cycles and impact of coupling (Alatnet), error statistics
- Quasi-operational application (Dec 2002):
  - 6 hour assimilation cycle (4 analyses/day)
  - background: 6 hour forecast (LBC: ARPEGE analysis)
  - observations: TEMP and SYNOP
  - production at 0 and 12 UTC
- Future plans:
  - Use of new observations (satellite, aircraft data)
  - Blending
  - 3d-Fgat
  - Operational application

ALADIN 3d-var in Morocco



BlendVar assimilation cycle plus raw radiances

Research versions

- Toulouse: up-to-date reference version for 3d-var, already used by an increasing local community (PhD, AROME prototype)
- Prague: local experimentations (impact of surface observations, first successful implementation of « lagged Jb »), operational Blending cycle (« assimilation without data »)

Projections into the future

- Further encourage work on data at high resolution or high frequency
- The three pillars of variational assimilation: scientific goals, local 3D-VAR consolidation, maintenance of the TL/AD/Obs code
- Any new home installation requires: ODB, local feeding and monitoring of an obs data base, installation of screening and minimization, Jb computation, scripts and first experimentations -> *much more demanding than the installation of the forecast model alone*
- 3D-FGAT, 4D-VAR in a nutshell, more sophisticated « Jb »
- interactions with the AROME project