

Local flow under weak trade wind regime



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On 8-10 April 2007, several episodes of intense sea-breeze fronts were registered at the islands of Fuerteventura and Lanzarote (Canary Islands). The sea-breeze circulation was primary driven by daytime heating contrasts between land and the Atlantic Ocean during a period of *weak trade winds*. Numerical simulations of these events were carried out using the 3.1.1 version of the Weather Research and Forecasting (WRF-ARW) Model. Three different domains with 6.6-km, 2.2-km and 0.7-km horizontal grid spacing and two sets with 51 and 70 vertical sigma levels were defined. The simulation was performed using two-way interactive nesting between the first and the second domain, using different land surface model parameterizations (Thermal diffusion, Noah LSM and RUC) for comparison. Initial conditions were provided by the NCAR Dataset analysis from April 2007, which were improved using surface and upper-air observations. The poster is focused on the 10 April episode.

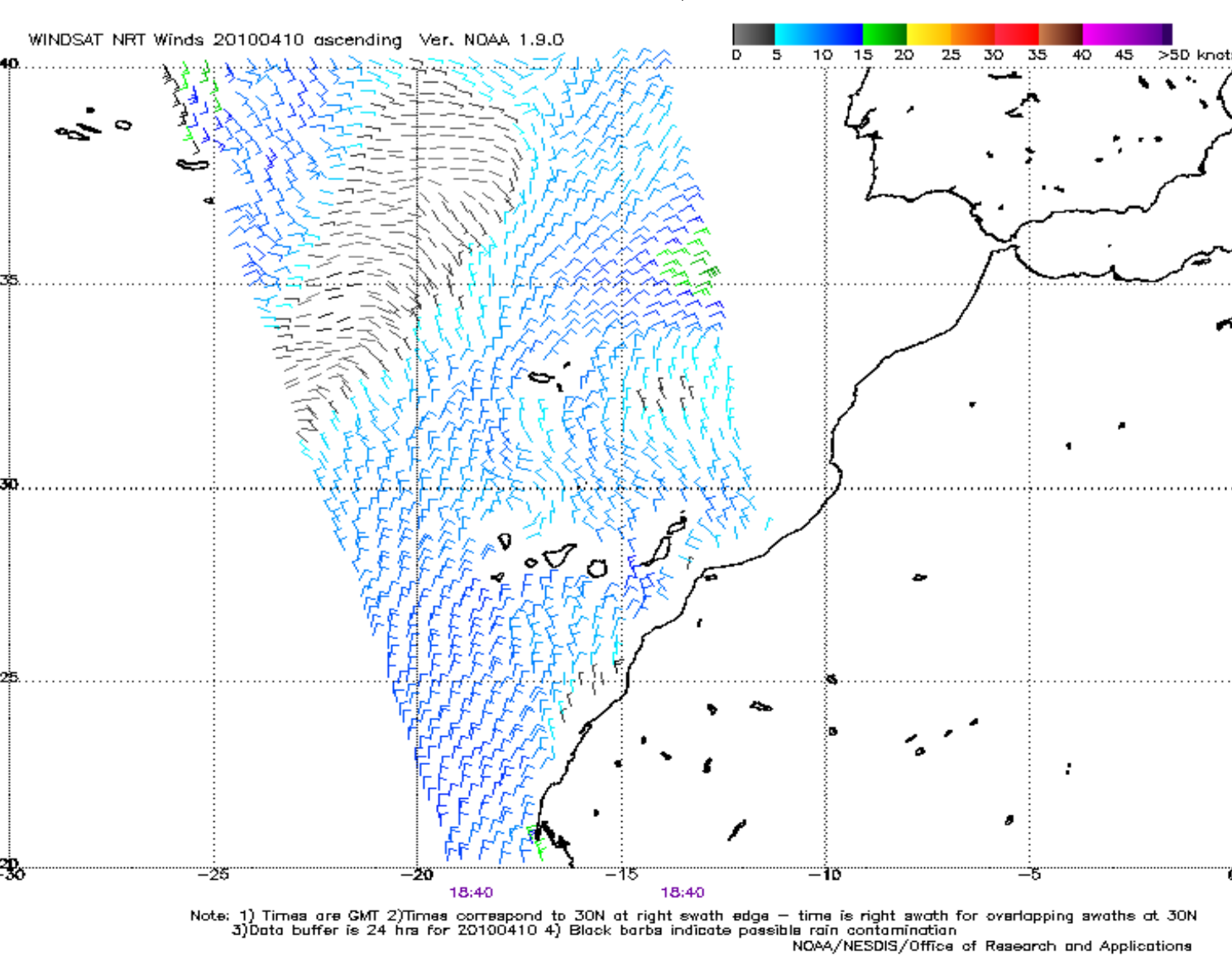
Sea-breeze episode on 10/04/2007



Convection triggered by the sea breeze, 12:30 GMT

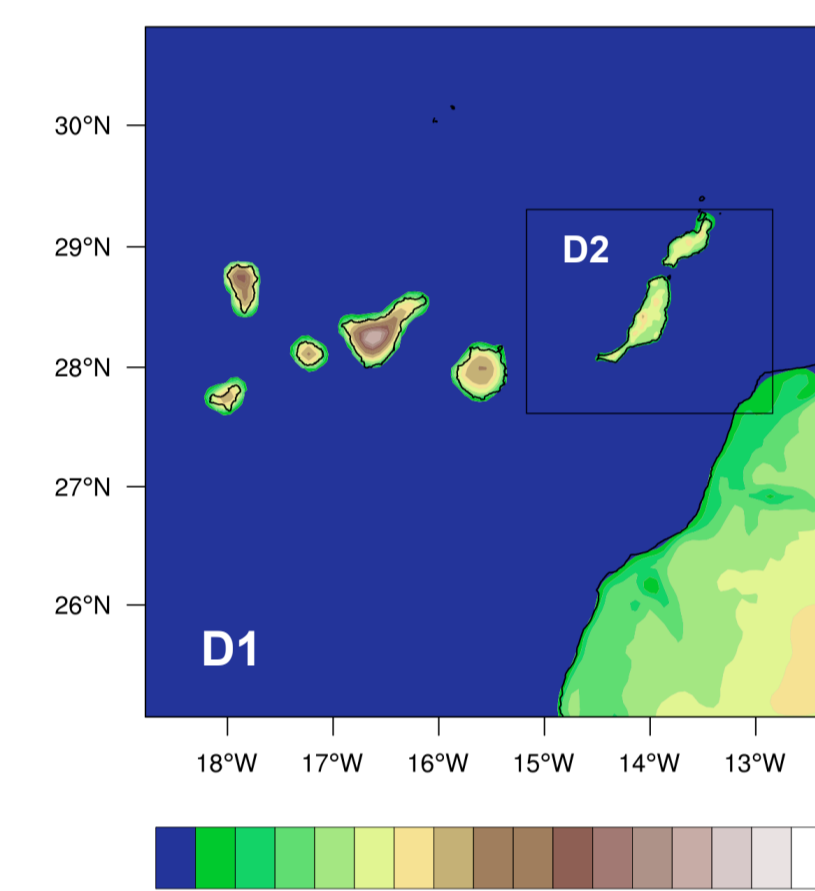


Visible image of Fuerteventura
on 10/04/2007, 14:00 GMT



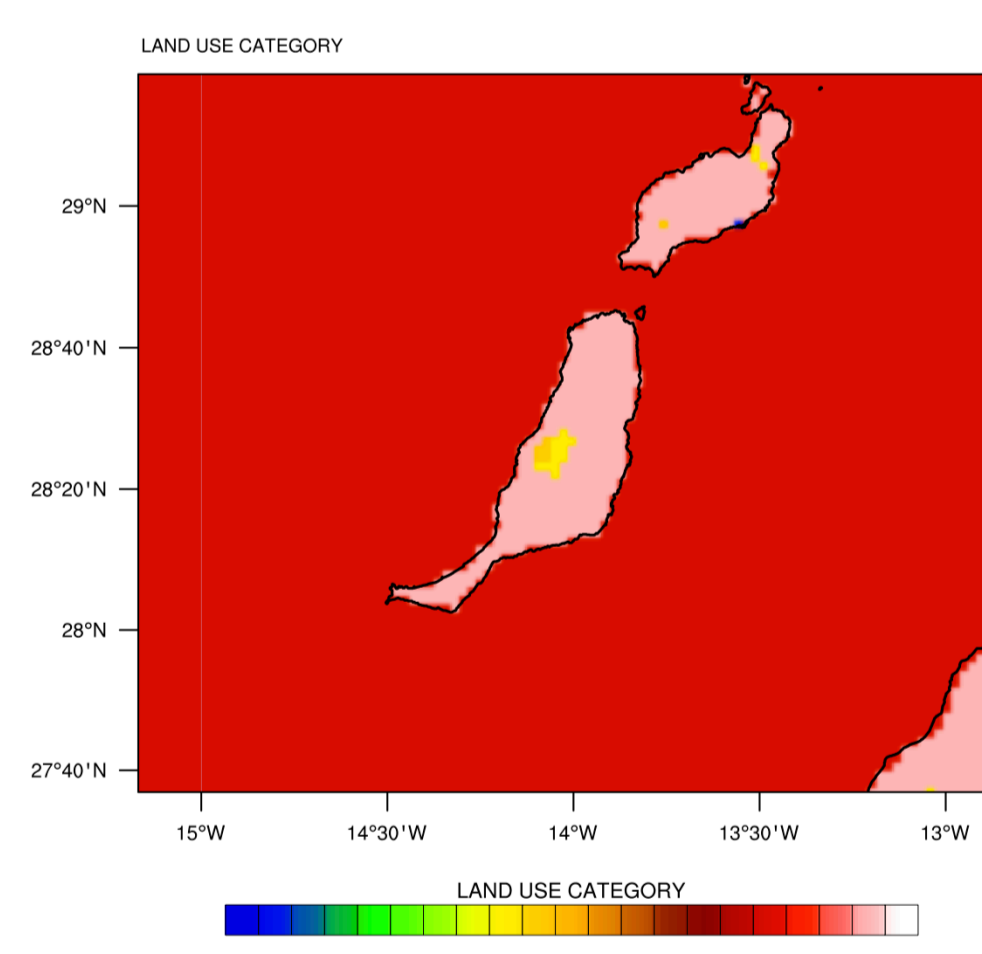
Windsat winds on 10/4/2007

WRFV3.1.1 Configuration (ARW)



- 3 nested domains (6.6, 2.2, 0.7 km), two-way nested feedback
- Input data: FNL dataset ds083.2 with 1° x 1°
- Improved using surface and upper-air observations (ds353.4 and ds464.0)
- 2 sets of runs with 51-level and 70-level

- Microphysics scheme : Lin et al. (opt. n° 2)
- Cumulus scheme : Kain-Frisch (new Eta scheme)
- Planetary boundary layer (PBL): Monin-Obukhov
- Atmospheric Radiation scheme: RRTM (LW) & Dudhia (SW)



- Land use parameterization for Fuerteventura and Lanzarote (USGS 24-categories).

- The land use of Fuerteventura and Lanzarote islands is reduced to a few categories:

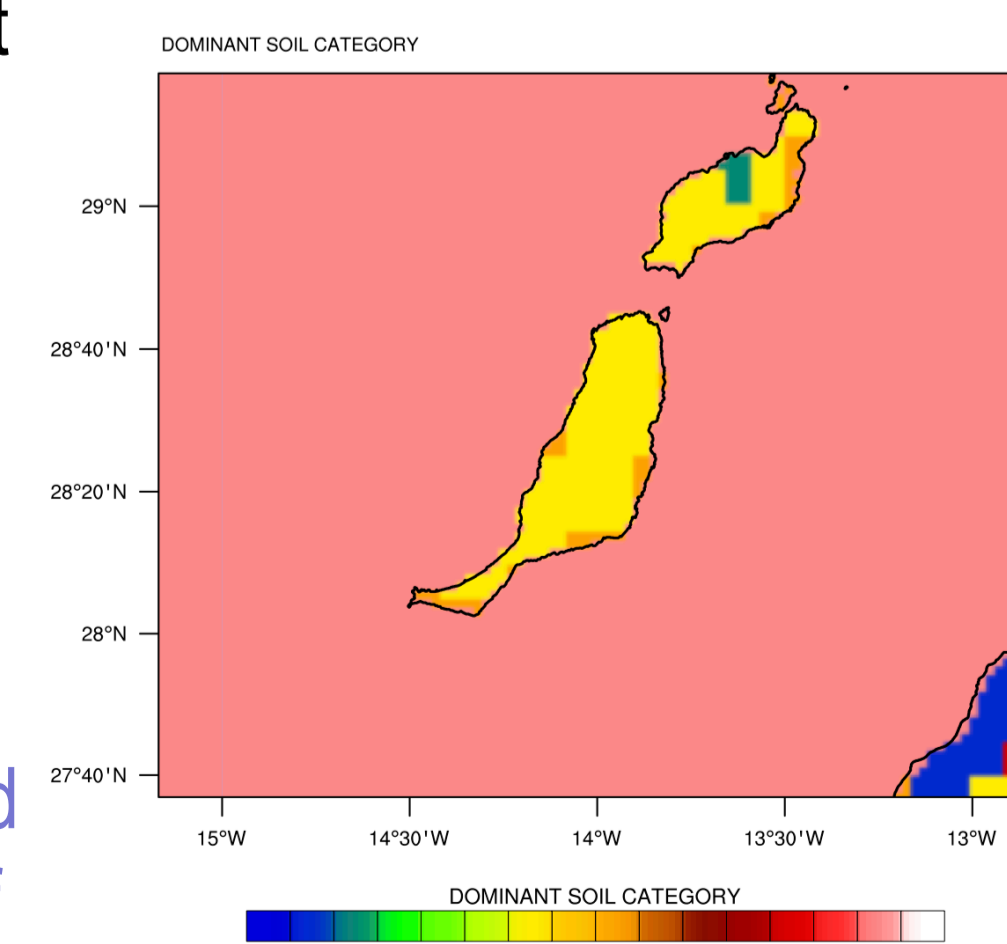
- Barren or sparsely vegetated (19), water bodies (16), savanna (13) and urban and built-up lands (2)

- Dominant soil categories for Fuerteventura and Lanzarote islands (16-categories)

- As the land use, the dominant soil categories are reduced to very few:

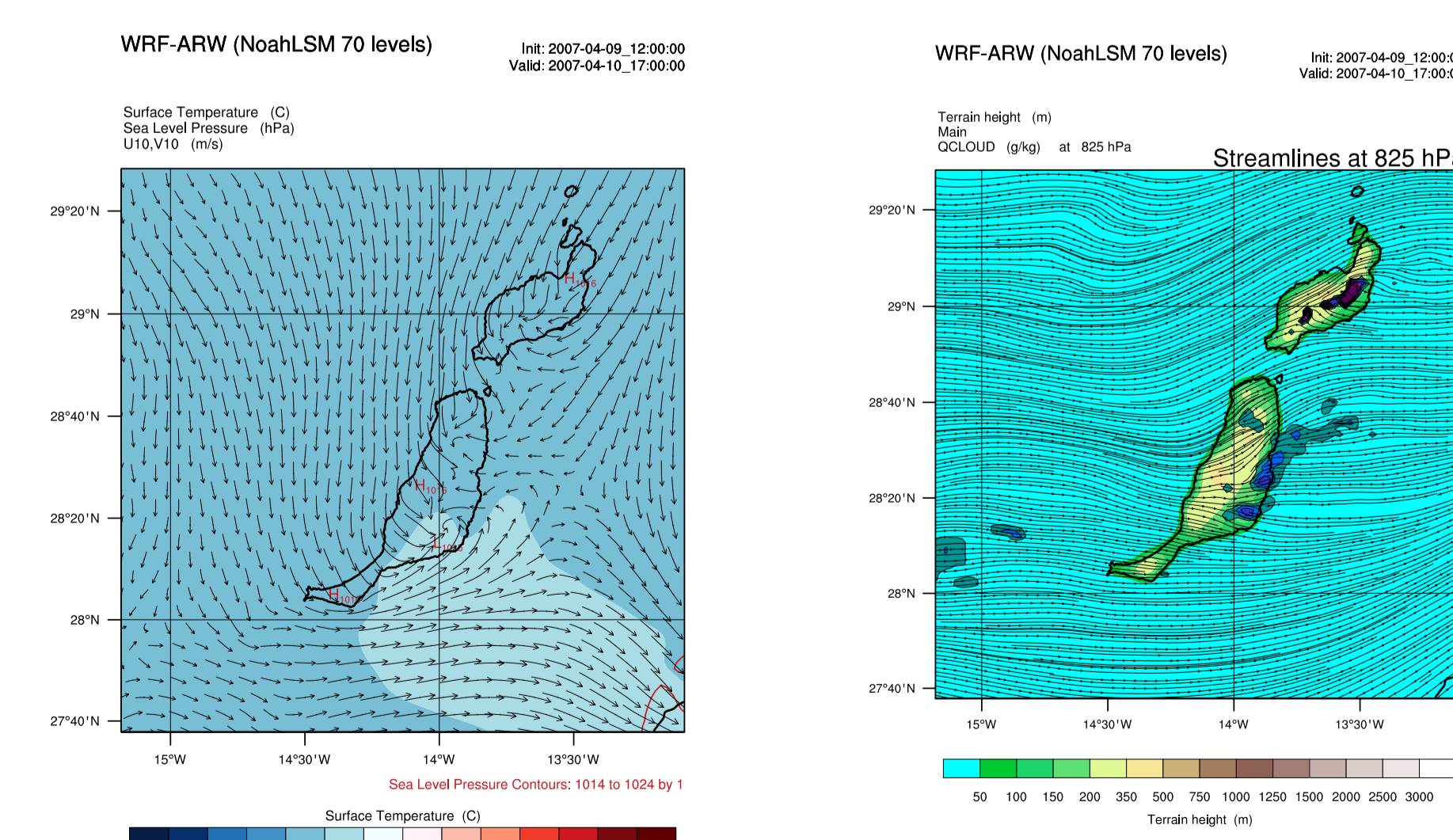
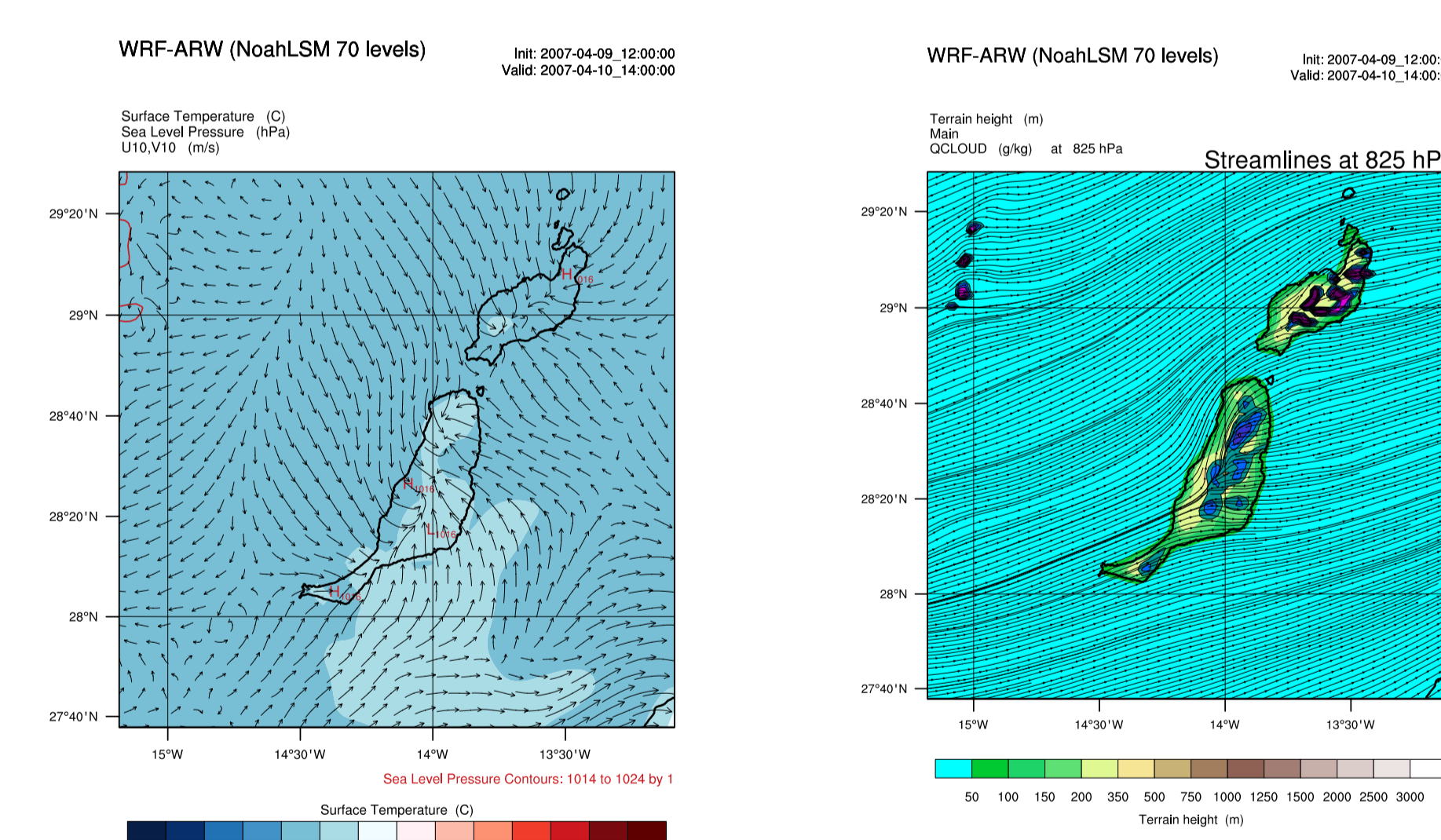
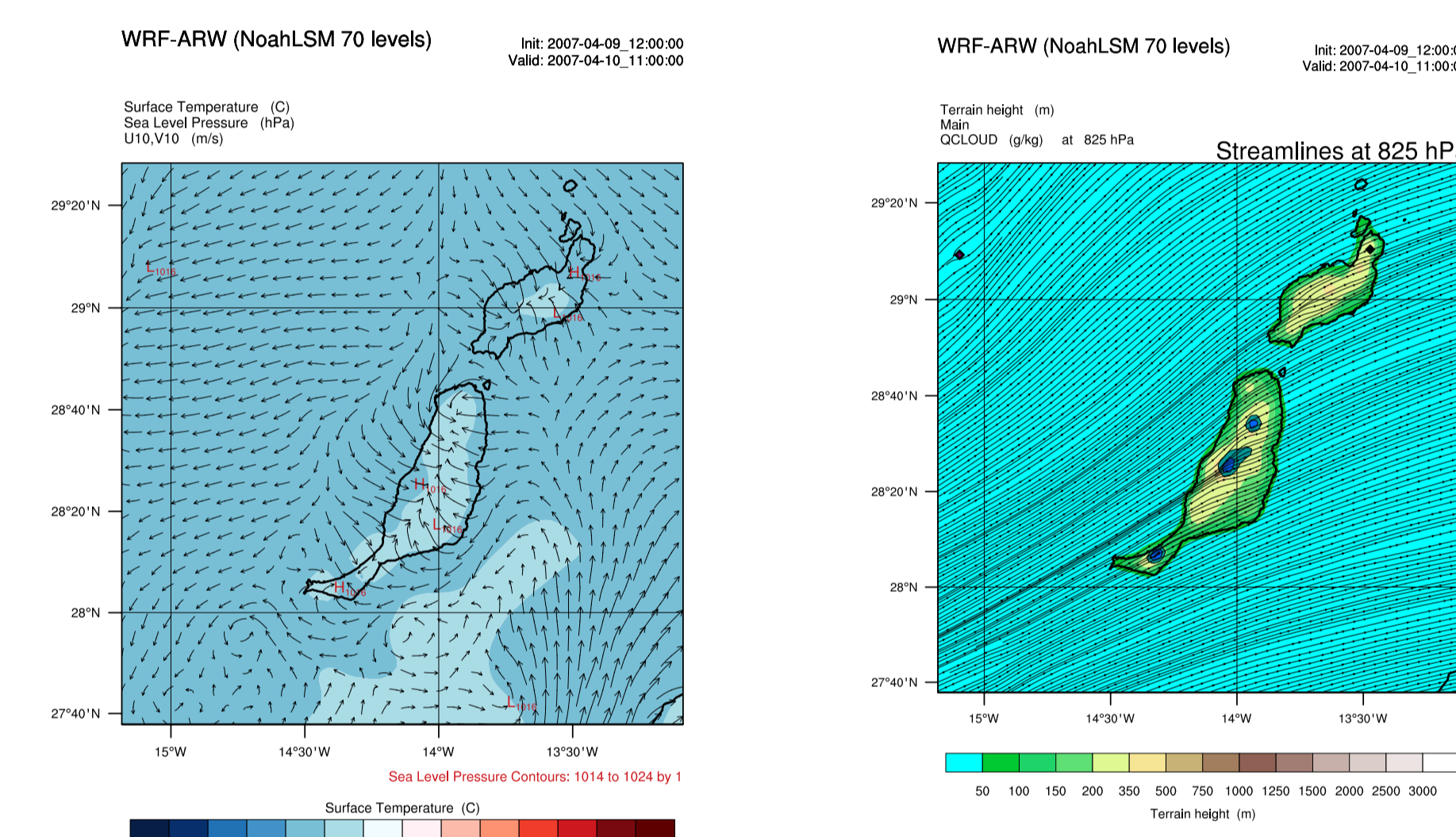
- Sand (1), sandy loam (3), Sandy clay loam (7), clay loam (9) and clay (12)

- Neither the land use nor the dominant soil are accurate, and should be updated because of the much increased urban and built-up lands across the coast of both islands



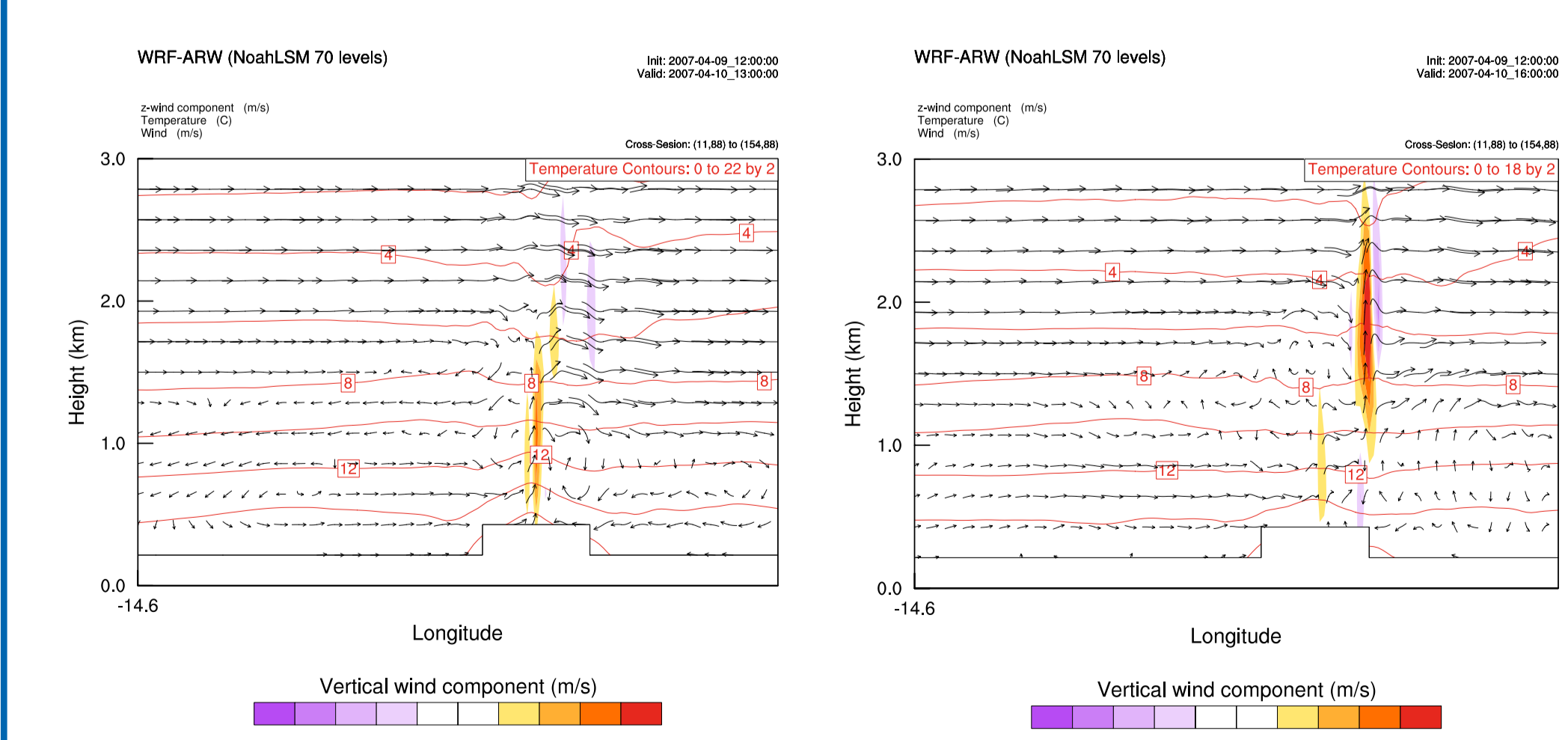
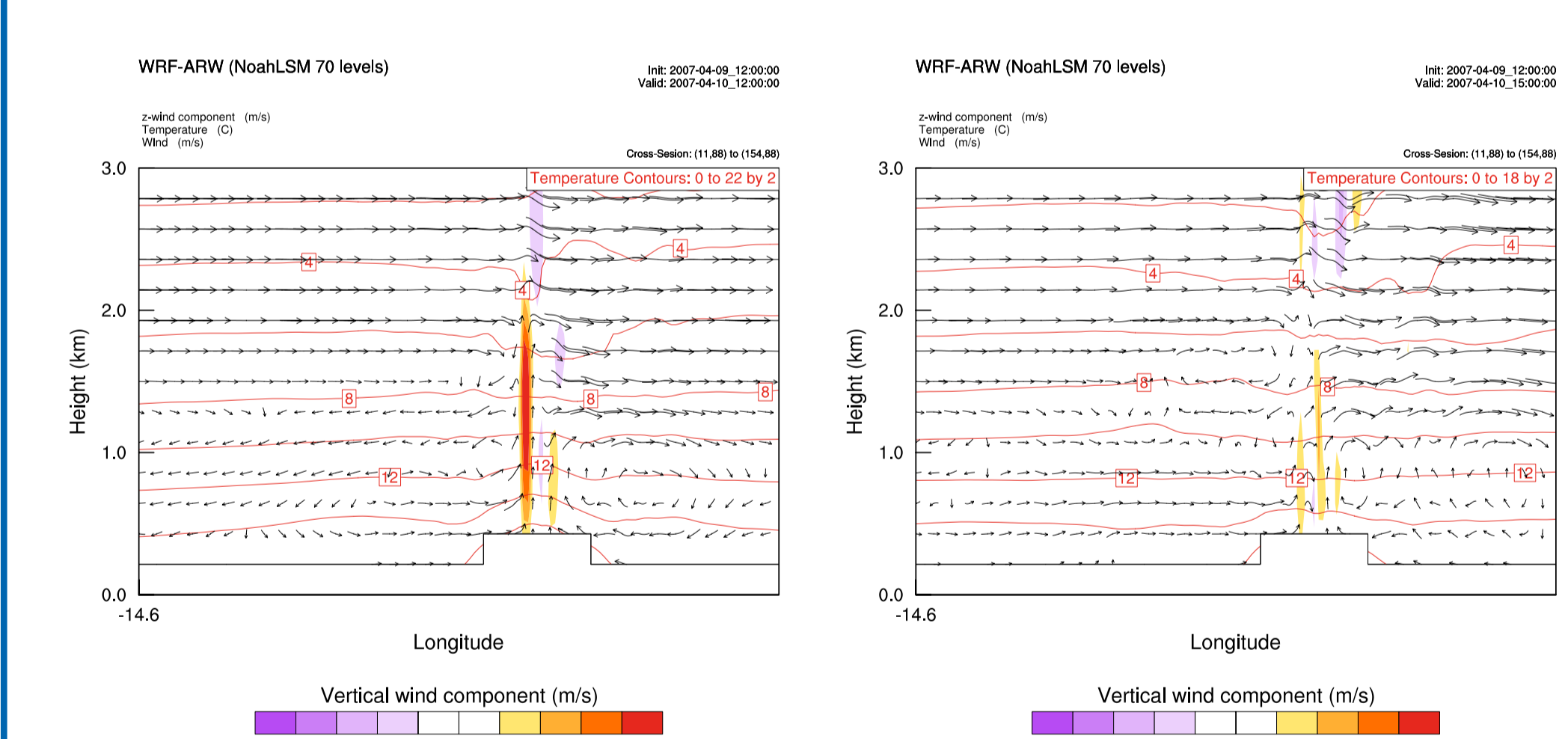
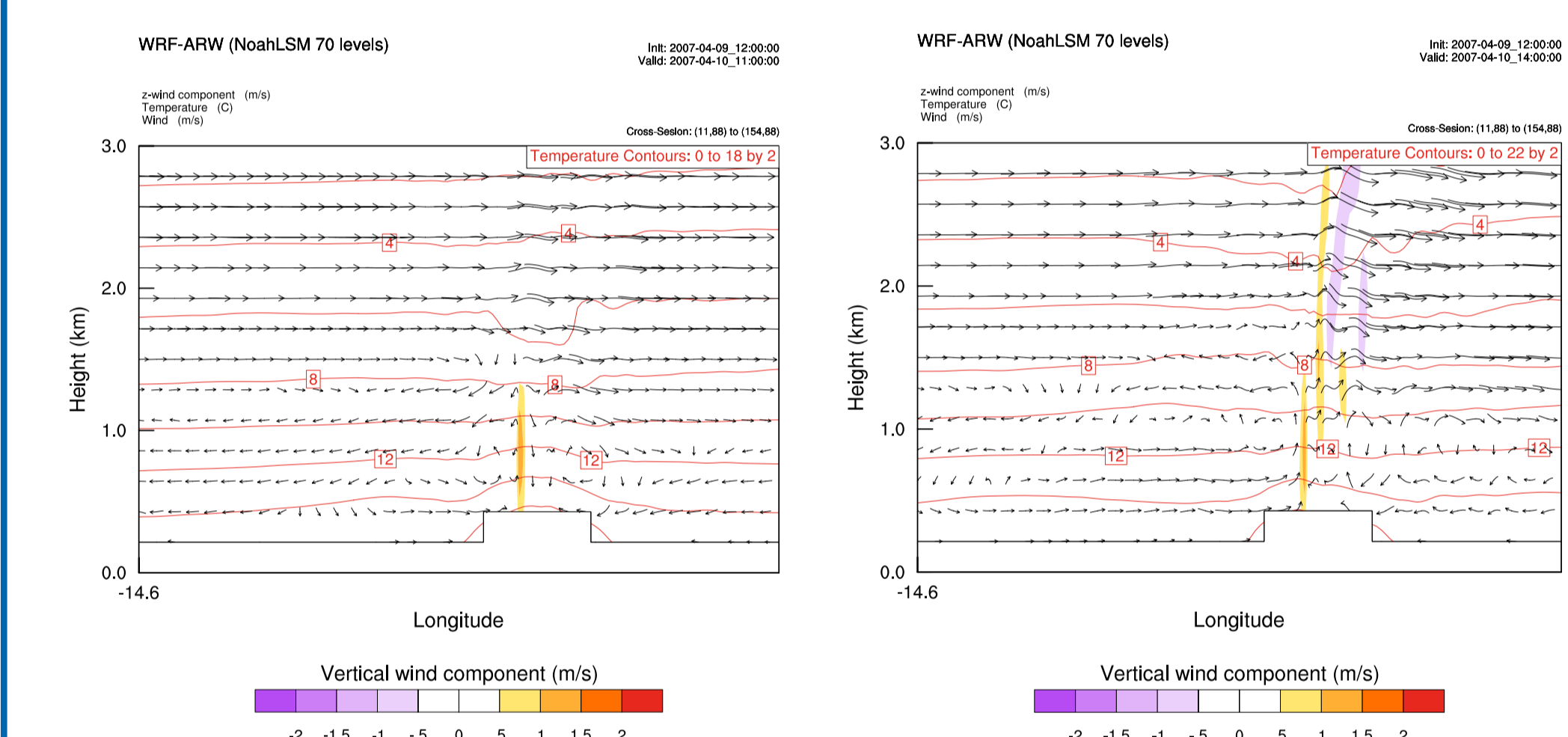
Schemes of the different inputs used in all the simulations

Maps: SLP, T, V10 and streamlines+QCloud



Best results: combining NoahLSM with 70 levels, but also RUC with 70 levels shows good results

Cross section: w, T and wind



The accuracy should be improved with updated data for both land use and soil categories