ANNEX

Answers to comments by Dr. Benestad of March 8^{th}.

1. INTRODUCTION

Meteorological aspects of the Ebro Valley have been widely analized in Spain since more than one century ago. In most of these studies (Gallart &Llorens, 2002; Batalla et al., 2004; Frutos et al., 2004; Balasch et al., 2007), the Ebro Valley is considered to be a hydrologic unit from the Cantabric to the Mediterranean, with common aspects regarding the water cycle and its transport. For this reason, when the present study started, we decided to define the domain in a heuristic way but inspired by this whole set of previous studies in the area. As mentioned in our paper, we use a grid with a distance of 1.125º between adjacent points. This means that for the original domain we are talking about a 7x5 =35 gridpoints (Figure 1).
The point raised by Dr Benestad in his review about the sensitivity of our downscaling work to the domain, posed a most challenging question with major implications for the methodology followed so far and the analysis of the water transport in the area. To address this question, we have repeated all the calculations using two additional domains.
i) a bigger domain with 10x9=90 gridpoints (Figure 2)
ii) a smaller domain with 3x3=9 gridpoints (Figure 3)

A second interesting issue pointed out by Dr. Benestad was the question on how could affect to the downscaling of the variables analyzed, the use of mixed EOF instead of independent EOF.

Finally, a third major point is his concern on normality and its implications on the selection of a classical multiple linear regression (MLR) model instead of a General Linear Model (GLM). We understand that the focus of this concern is the residuals of the regression, since GLM (or even General Additive Models GAM) must be considered for linear regression when (among other circumstances) the errors are not normally distributed (Crawlley, M., 2007).

These three major questions could only find a scientifically sound answer if a whole set of new intensive calculations were carried out. This was the reason for our request to the editor for an extended deadline. We would like to thank the Editor and the Editorial Board of HESS for their positive answer to our request.

In the following pages, the results of these new additional computations are shown.

i) In our original paper, the domain of Figure 1 and a set of 79 independent EOF were used for downscaling of surface moisture flux and precipitation at two locations in the Ebro Valley (Zaragoza and Tortosa). In the following pages, you will find the results obtained following the same methodology but using two additional domains and for each of the three domains, (original plus additional two) independent EOF and also mixed EOF. That makes now a total amount of 6 alternatives considered (original + 5 new) (see Table 1). In the following pages, the results corresponding to the 6 alternatives are shown.
ii) The results originally obtained were drawn from a test data set of 1826 cases. For each of the cases a multiple linear regression (MLR) model (among others, see original draft and below) was fitted on a number of approximately 300 analogues. These were identified in the training data subset and obtained from historical records in the area. Finding an appropiate answer to the question of normality of residuals and subsequent GLM vs MLR issue, implies carrying out a test of normality of residuals for each of the 1826 MLR equations fitted in the test data subset. In the following pages, we show the results of these tests of normality of residuals for the 1826 test cases, applied to the six variables downscaled, and for each of the 6 alternatives considered.

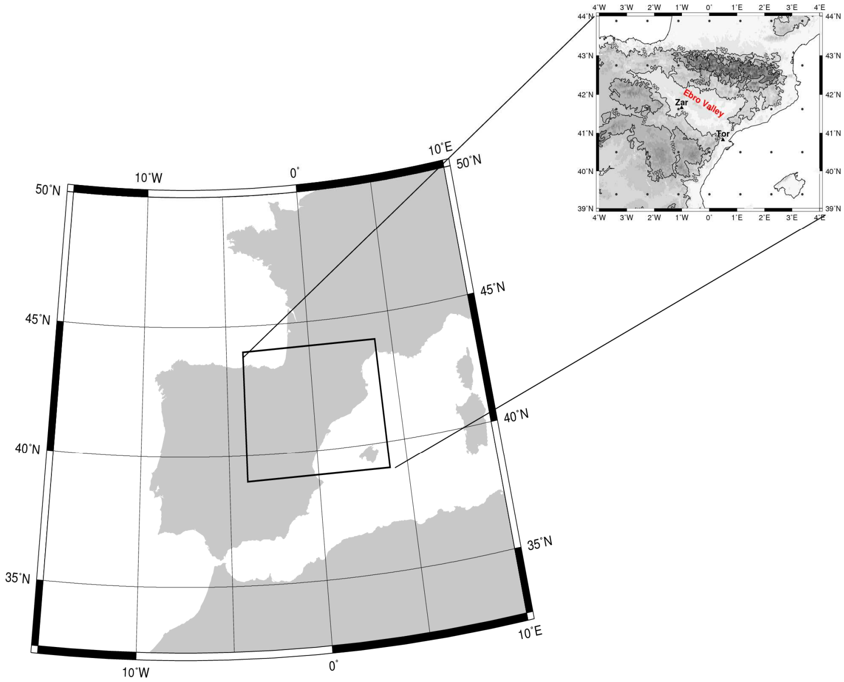

Figure 1. Original domain. 7x5 =35 gridpoints

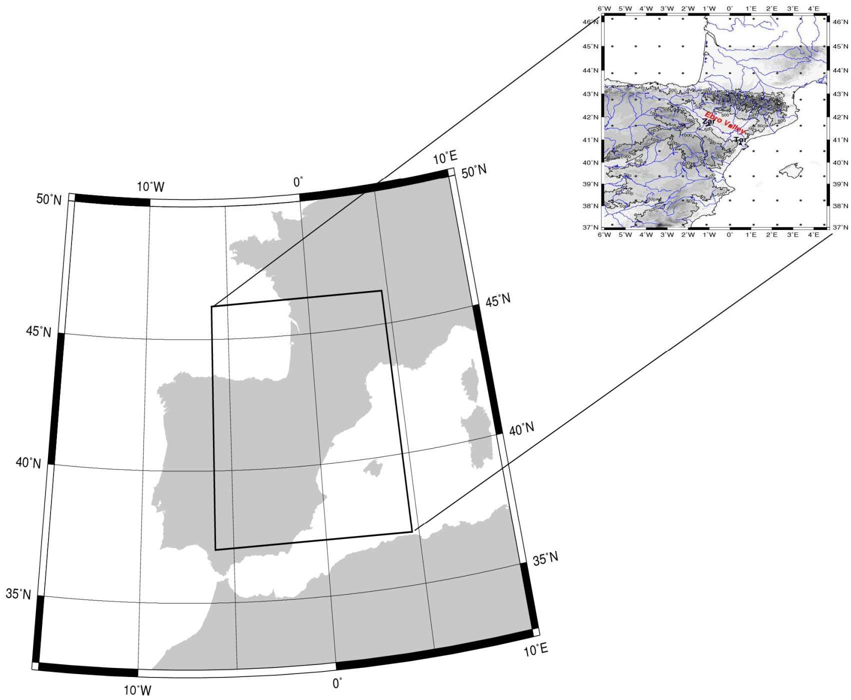

Figure 2. A domain of 10x9 =90 gridpoints (bigger than original)

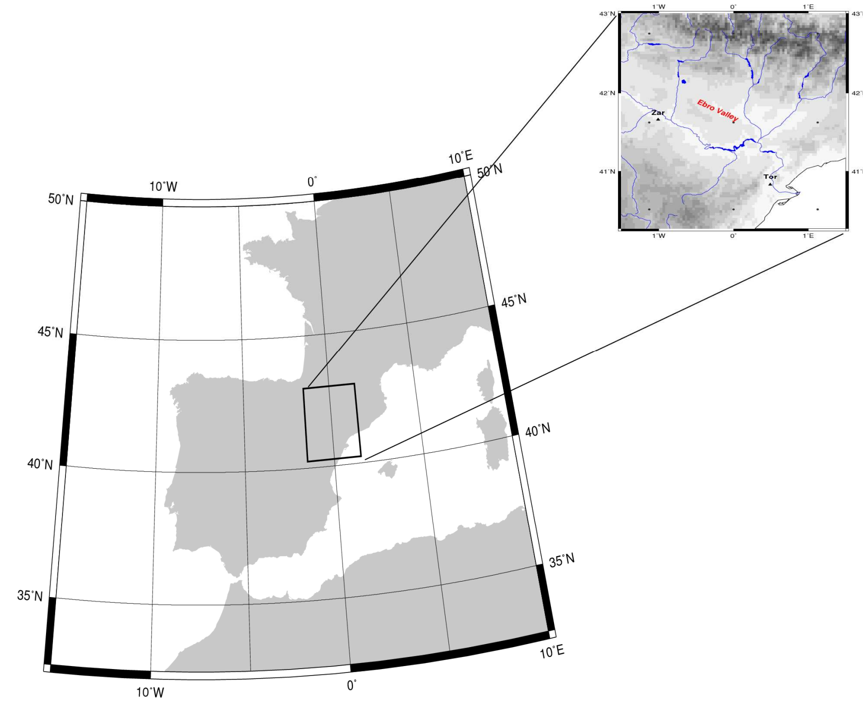

Figure 3. A domain of 3x3 =9 gridpoints (smaller than original)

		EOF approach	
		Independent EOF	**Mixed EOF**
DOMAIN	7x5 =35 gridpoints domain (Figure 1)	***ALTERNATIVE 1 (used in the first version of our paper)***	ALTERNATIVE 2
	10x9 =90 gridpoints domain (Figure 2)	ALTERNATIVE 3	ALTERNATIVE 4
	3x3 = 9 gridpoints domain (Figure 3)	ALTERNATIVE 5	ALTERNATIVE 6

Table 2. Combinations of domains and EOF approaches that identifiy the 6 alternatives considered.

2. DATA and METHODOLOGY

2.1. Data

At each gridpoint a number of 120 daily variables were available from the ERA40/ERAInt. reanalysis (Table 2). Depending on the number of gridpoints for each domain, a different number of daily variables were available (Table 3). In order to be able to combine variables of different nature, at the beginning and for all the subsequent steps taken, all original variables were standardized to have mean=0 and variance=1. The dimensionality for the different alternatives was reduced using EOF in two different ways.

1. After standarization, EOF were calculated separately for each variable (Z, T,……D2). For each variable, a number of EOF holding percentages of the overall variability above 80-90% were retained (Matulla et al., 2008). This is the ***"independentEOF"*** approach.

2. Equally, after standarization, all variables were considered at the same time and EOF were extracted, while retaining similar percentages of the variability. This is the ***"mixedEOF"*** approach.

Acronym	Variable-units	Levels	N#variables
Z	Geopotential height [m]	30000-50000-70000-85000-100000 Pa	**5**
T	Temperature [K]	30000-50000-70000-85000-100000 Pa	**5**
U	Zonal wind speed [m s**-1]	30000-50000-70000-85000-100000 Pa	**5**
V	Meridional wind speed [m s**-1]	30000-50000-70000-85000-100000 Pa	**5**
H	Relative humidity [%]	30000-50000-70000-85000-100000 Pa	**5**
MSL	Mean sea level pressure [Pa]	Sea level	**1**
U10	Zonal wind speed 10m [m s**-1]	Surface	**1**
V10	Meridional wind speed 10m [m s**-1]	Surface	**1**
T2	Temperature, 2m [K]	Surface	**1**
D2	Dew-point temperature, 2m [K]	Surface	**1**
Amount of variables available from ERA40/ERAint reanalyses at each gridpoint			***30***
For each period of 24 hours (day) 4 realizations of these variables are available at 0h-6h-12h-18h			
Overall amount of variables considered at ***each gridpoint*** at a ***daily*** time scale: 30 x 4 =***120***			

Table 2. Number of variables at each gridpoint**.**

For the 6 alternatives, the total number of independent EOF and mixed EOF retained were as shown in Table 3. These EOF are the inputs for the downscaling model. The outputs, as mentioned in our original paper, are the following 6 variables (at a daily time scale) directly obtained or derived from the ECA database http://eca.knmi.nl/ :

1. Zonal moisture flux in Zaragoza
2. Meridional moisture flux in Zaragoza
3. Precipitation in Zaragoza
4. Zonal moisture flux in Tortosa
5. Meridional moisture flux in Tortosa
6. Precipitation in Tortosa

Available daily data has been divided into two: a training period used to find a group of analogues to build the downscaling model (years 1961-1996, 13149 daily cases) and a test period (years 1997-2001, 1826 daily cases), where models' performance has been assessed using independent data.

2.2. Methodology.
The following methodology originally applied only to **ALTERNATIVE 1** has now been applied to all the 6 alternatives.

1. For each of the 1826 days belonging to the test dataset, the nearest cases among the 13149 days corresponding to the training database are selected. The nearest cases (analogues) are those with the smallest euclidean distance to the current case as defined in the independent/mixed EOF hyperspace (Table 3). For the different alternatives, the number of analogues was estimated under the rule of thumb that a reasonable number of cases (4-10) should be made available at the linear regression stage, if overfitting was to be avoided. Depending on the number of independent/mixed EOF used in each alternative, 300 was the number chosen for all alternatives, except in the case of **ALTERNATIVE 3** with 140 EOF (Table 3) where 600 was the number of chose analogues used to fit the models.

ALTERNATIVE 1		
Number of variables=120x35 gridpoints=4200		
Variable	Number of ***independentEOF***	Retained Variance (%)
Z	5	97.6
T	5	93.9
U	7	80.6
V	7	83.4
H	28	80
MSL	5	98.8
U10	7	80.5
V10	5	80
T2	5	97.6
D2	5	94.6
TOTAL	**79 EOF**	

ALTERNATIVE 2		
Number of variables=120x35 gridpoints=4200		
	Number of ***mixedEOF***	Retained Variance (%)
TOTAL	**45 EOF**	90.10

ALTERNATIVE 3		
Number of variables=120x90 gridpoints=10800		
Variable	Number of ***independentEOF***	Retained Variance (%)
Z	7	97.8
T	7	93.4
U	10	81.7
V	10	82.3
H	65	81.9
MSL	7	98.5
U10	10	82.7
V10	10	82.1
T2	7	97.2
D2	7	94
TOTAL	**140 EOF**	

ALTERNATIVE 4		
Number of variables=120x90 gridpoints=10800		
	Number of ***mixedEOF***	Retained Variance (%)
TOTAL	**50 EOF**	87.95

ALTERNATIVE 5		
Number of variables=120x9 gridpoints=1080		
Variable	Number of ***independentEOF***	Retained Variance (%)
Z	3	97.5
T	3	93.6
U	6	82.9
V	6	86.6
H	15	83.4
MSL	3	98.7
U10	6	88.2
V10	5	89.1
T2	3	97.9
D2	3	95.8
TOTAL	**53EOF**	

ALTERNATIVE 6		
Number of variables=120x9 gridpoints=1080		
	Number of ***mixedEOF***	Retained Variance (%)
TOTAL	**27 EOF**	90.32

Table 3. Number of EOF used in each of the 6 alternatives

2. Once the analogues were identified, two regression models for each variable (predictand) were fitted on the analogues. In all cases, the candidate predictors were the independent/mixed EOF from ERA-40 reanalysis and the predictand, the surface variable. One of the models was fitted using a MLR and the other, using random forests (RF).
3. Due to the gaps in the ECA database, some historical records of the predictands corresponding to the most similar days identified in the atmospheric circulation analogues (reanalysis), were not present. For this reason, regression was carried out using a set of cases in which predictors and predictand are present. The final average number of cases available and average euclidean distance for each alternative can be seen in Table 4. For each of the 1826 days belonging to the test dataset, two models (RF and MLR) were fitted in this way for each of the 6 alternatives considered. In the case of MLR, for each of the linear equations fitted the Lilliefors (an adaptation of the more classical Kolmogorov-Smirnov) test was computed to test the null hypothesis of normality of residuals. A total amount of [6 alternatives x 1826 test cases x 6 variables downscaled =] 65736 tests of normality were conducted. The percentage of cases in which the test was passed with p>=0.05 and p>=0.01 can be seen in Table 5.
4. Using the independent/mixed EOF corresponding to every day of the test dataset as inputs, the two models previously fitted (RF and MLR) on the most similar historic records (analogues) were used to calculate an estimated value of the chosen variable for the same day in Zaragoza or Tortosa. To test the sensitivity of both techniques (RF and MLR) to the use of ERA-40 or ERA-Interim analyses, once the two models were fitted on ERA-40 data, both models were run with two different sets of inputs (predictors): i) the independent/mixed EOF from ERA-40 (models denoted as **RF ERA-40** and **MLR ERA-40**) and ii) the the independent/mixed EOF obtained with ERA-Interim (**RF ERA-Interim** and **MLR ERA-Interim**). Additionally, a plain average obtained from ECA values corresponding to the most similar daily cases identified, is used to build an additional analogue-type downscaling model (denoted as **Analogues** model).
5. Finally, the most evident estimations of surface moisture flux and precipitation were also considered. In the case of zonal and meridional components of surface moisture flux, the values directly calculated using ERA-40 and ERA-Interim reanalyses raw data at the geographically nearest points to Zaragoza and Tortosa. In the case of precipitation, the idea is the same but two other references were used. The first one was the GPCP satellite and rain gauge merged precipitation data set. The second one was just to consider the persistence of levels from the previous day.

	Average number of analogues used	Average euclidean distance
ALTERNATIVE 1	259.8	12.5
ALTERNATIVE 2	269.9	9.5
ALTERNATIVE 3	517.7	16.6
ALTERNATIVE 4	258.2	9.9
ALTERNATIVE 5	269.2	10.3
ALTERNATIVE 6	266.5	7.3

Table 4.

		ALTERNATIVE 1		ALTERNATIVE 2		ALTERNATIVE 3		ALTERNATIVE 4		ALTERNATIVE 5		ALTERNATIVE 6	
		p>=0.05	p>=0.01	p>=0.05	p>=0.01	p>=0.05	p>=0.01	p>=0.05	p>=0.01	p>=0.05	p>=0.01	p>=0.05	p>=0.01
ZARAGOZA	ZONAL SURFACE MOISTURE FLUX	74.37	90.09	65.88	84.5	50.77	73.49	70.48	89.32	70.54	86.86	61.01	80.28
	MERIDIONAL SURFACE MOISTURE FLUX	57.5	76.78	35.32	58	23.17	45.13	43.48	65.88	45.95	68.95	35.16	58.36
	PRECIPITATION	0	0	0	0	0	0	0	0	0	0	0	0
TORTOSA	ZONAL SURFACE MOISTURE FLUX	72.18	89.32	55.31	77.49	36.58	61.61	58.32	80.12	66.16	84.34	46.82	67.74
	MERIDIONAL SURFACE MOISTURE FLUX	63.09	78.2	48.47	65.17	49.29	66.92	56.68	74.32	54.65	72.45	47.15	63.75
	PRECIPITATION	0	0	0	0	0	0	0	0	0	0	0	0

Table 5. Percentage of cases (%) in which the Lilliefors (K-S) test of normality of residuals is passed with p>=0.05 and p>=0.01

2.3. Normality of residuals: GLM vs MLR

As mentioned above, we understand that the focus of Dr. Benestad's concern on normality is the residuals of the regression, since General Linear Models GLM (or even General Additive Models GAM) must be considered for linear regression when (among other circumstances) the errors are not normally distributed (Crawlley, M., 2007). Table 5 shows (as percentages) the results of the Lilliefors test of normality applied to the residuals of the 65736 linear equations fitted for this review.

2.3.1. Precipitation.

In Table 5, it can be seen that the residuals of the MLR regression for precipitation variables are clearly not normally distributed for all alternatives and both locations studied. In the case of precipitation, to the best of our knowledge we do not know any scientific work that uses a GLM instead of MLR for downscaling purposes, although violation of the condition of normality of residuals is most likely in any precipitation series, due to the presence of many days with no rain (value=0), that clearly shape the pdf of the residuals.

However, as reported in the literature, the maximum performance for daily precipitation downscaling using any method, typically reaches correlation coefficients between predictions and observations of about 0.5 (Timbal and Jones, 2008; Wei Yang et al., 2010, Cavazos and Hewitson, 2005). These are the same performance boundaries than the ones reached with our MLR equations (see Table 6). Therefore, we can conclude that the violation of the condition of normality of residuals and subsequent use of MLR instead of a GLM, does not critically affect the quality of the downscaling. It is important to mention that we can conclude this because ofour own results and additionally, because,the work by other authors shows the limits we can expect in performance.

2.3.2. Surface moisture flux.

A different issue is the downscaling of the zonal and meridional components of the surface moisture flux. Again, to the best of our knowledge, there are not previous downscaling studies in the literature that focus on these variables. This means that the lack of previous performance boundaries likely to be expected, makes the concern of normality of residuals and subsequent choice of either MLR or GLM, a methodological challenge by itself that simply cannot be disregarded.

An analysis of Table 5 shows that for the six alternatives, the residuals of the vast majority of MLR equations fitted are either strictly gaussian or very close to normality. This supports the choice made by the authors of using MLR for this work.

Combining the information from Tables 3, 4 and 5 it can be seen that departure from normality seems to be linked to the number of analogues used. In **ALTERNATIVE 3** a total amount of 140 EOF were needed to retain the most important fractions of the variability. In other alternatives, a smaller number were needed (Table 3). As a result, for the rest of alternatives, a number of 250~270 analogues have been used, but for **ALTERNATIVE 3**, due to its higher number of EOF, roughly twice this amount has been needed (Table 4). This means that a higher number of more dissimilar cases have been included for regression purposes (average euclidean distance is also higher, Table 4) and this could explain why the fraction of cases with a notorious departure from normality is higher for **ALTERNATIVE 3** (Table 5).

However, it is worth mentioning that MLR (and RF) are applied after a previous stage of analogue selection and one of the conclusions of this work is that most of the prediction capabilities of the final model can be attributed to the analogue stage. Fitting at a second stage a MLR (or RF) model on the previously selected analogues, only represents a statistically significant but not dramatic improvement if compared with the calculation of a plain average obtained from previously selected analogues.This is strictly true for the downscaling of surface moisture flux. In the particular case of precipitation where departure from normality is clear, the improvement is negligible.

3. RESULTS.

For comparison purposes, the downscaling results obtained with each alternative are shown using the same set of statistical indicators as used in the original version of our paper (Tables 6-11).

For the six alternatives, the models based on RF and fed with ERA40 (RF ERA_40) performs best, but in the case of precipitation do not overperform analogues or analogues followed by MLR.

It can be seen that differences in results with the different alternatives are really small, so for each of the best downscaling model (RF ERA_40) applied to each variable, 95% confidence level boundaries of the differences have been assessed using bootstrap resampling. The results can be seen in Table 12-17. "=" means that the observed differences are not significant at a 95% confidence level. "<>" means that at the same confidence level, it can be stated that they are truly different.

Analysis of results gathered in Tables 12-17 indicates that the use of different domains or mixedEOF does not represent an overwhelming improvement in the results of downscaling.

However, small differences, though statistically significant, can be detected among the different alternatives and it can be concluded that ALTERNATIVE 1 (original) and ALTERNATIVE 5 (smaller doinion) tend to show a slightly overall better performance. Additionally, for the same domain, the alternatives based on mixed EOF (ALTERNATIVE. 2-4-6) exhibit a slightly poorer performance than alternatives based on independent EOF (ALTERNATIVE. 1-3-5)

As stated in the original paper, for the six alternatives, the most influential variables are surface dew point temperature, temperature, surface meridional wind speed and mean sea level pressure (denoted as D2, T2, V10 and MSL, Table 2).

A graphical representation of the factor loadings over the 9x10 domain corresponding to the leading EOF, shows that the leading EOF of these variables exhibit a small spatial variability, with similar values of the factor loadings over the area studied (Figures 4-7).

This would explain the very low sensitivity of results to the domain, at least in the frame of our analysis, ranging from 3x3 to 9x10 gridpoints (we use a grid with a distance of 1.125º ~125 km between adjacent points)

If we express this in square kilometres this range roughly represents an order of magnitude:

3x3 gridpoints=0.14e06 sq. km

10x9 gridpoints=1.5 e06 sq. km

4. CONCLUSIONS.

It is the opinion of the authors that the results shown so far provide a sound scientific basis to conclude that:

1. For this area of the Iberian Peninsule, changing the area covered by the domain by an order of magnitude does not have an important impact on results. This is due to the fact that the most influential variables used for downscaling exhibit a small spatial variability.
2. As a consequence, using independent EOF or mixed EOF obtained from variables that do not have an important spatial variability, does not have an important effect on results either.
3. Using MLR is correct due to the fact that the distribution of residuals is mainly gaussian for surface moisture flux. For precipitation, departure from normality does not affect the quality of the results.
4. All this indicates that the results obtained in the first version of our paper cannot be beaten by any of the other 5 alternatives considered.

Additional references:

1. Balasch, J.Carles, Damià Vericat & R. J. Batalla (2007). Deposición de sedimentos durante una crecida en un tramo del Ebro medio. *Rev. C & G.,* 21 (1-2), 41-55.2007.
2. Batalla, R.J., Kondolf, G.M. y Gomez, C.M. (2004). Reservoir induced hydrological changes in the Ebro River basin, NE Spain. *Journal of Hydrology,* 290, 117-136.
3. Cavazos, T., and Hewitson, B.C.: Performance of NCEP–NCAR reanalysis variables in statistical downscaling of daily precipitation, Clim. Res., 28, 95–107, 2005.
4. Frutos, L.M.; Ollero, A. y Sánchez, M. (2004). *Caracterización del río Ebro y su cuenca y variaciones en su comportamiento hidrológico.* En Gil Olcina, A. (coord.): Alteración de los regimenes fluviales peninsulares, Fundación Cajamurcia, Murcia, 233-280.
5. Gallart, F. y Llorens, P. (2002). Water resources and environmental change in Spain. A key issue for sustainable catchment management. En García-Ruiz, J.M., Jones, J.A.A. y Arnáez J. (eds.): Environmental Change and Water Sustainability. IPE (CSIC), Zaragoza, 11-20.
6. Crawlley, M.2007. The R book. John Wiley & Sons, Ltd. 2007).
7. Hanna, S.R., Strimaitis, D.G. and J.C. Chang, 1991: Hazard response modeling uncertainty (a quantitative method). Vol. I: User's guide for software for evaluating hazardous gas dispersion models. Sigma Research Corporation, Westford, Ma.
8. Grömping, U.,: Variable Importance Assessment in Regression: Linear Regression versus Random Forest, Amer. Stat., 63, 4, 2009.
9. Liaw, M. and Wiener, M.: Classification and Regression by randomForest, R News 2(3), 18-22, 2002.
10. Matulla, C., Zhang, X., Wang, X.L., Wang, J., Zorita, E., Wagner, S., von Storch, H.: Influence of similarity measures on the performance of the analog method for downscaling daily precipitation, Clim. Dyn., 30,133-144, 2008.
11. Olesen, H.R., 1995b, Toward the establishment of a common framework for model evaluation. Paper presented at the 21 International Meeting on Air Pollution Modeling and its Applications in Baltimore, Nov. 6-10, 1995.
12. Olesen, H.R., 1997, Tools for model evaluation. In: Air Pollution Modeling and Its Application XII, pp. 519-528. Edited by S-E.Gryning and N. Chaumerliac, Plenum Press, New York.
13. Olesen, H.R., 1997, Pilot study: Extension of the Model Validation Kit. Paper presented at the 4th workshop on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes, Oostende, Belgium, 6-9 May, 1996. *Int. J. Environment and Pollution*, Vol. 8, Nos. 3-6, pp. 378-387.
14. Timbal,B. and Jones, D.A.: Future projections of winter rainfall in southeast Australia using a statistical downscaling technique, Clim. Chan. 86:165–187, 2008.
15. Wei Yang, Bárdossy, A., Caspary, H.J.: Downscaling daily precipitation time series using a combined circulation- and regression-based approach, Theor. Appl. Climatol., 102, 439-454, 2010.

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ GPCP **	ERA-Interim */ Persistence **
ZARAGOZA	Zonal q10 *	R	0.86	0.84	0.81	0.20	0.82	0.46	0.61
		RSD	0.90	0.87	1.01	1.93	0.79	0.40	0.50
		RMSE	16.35	17.89	19.41	61.80	18.42	27.56	24.72
		FA2	0.70	0.66	0.63	0.35	0.63	0.28	0.36
		RM	1.46	1.54	1.40	2.21	1.45	0.54	0.62
		D	0.74	0.71	0.70	0.38	0.69	0.37	0.47
	Meridional q10*	R	0.85	0.82	0.78	0.46	0.82	0.75	0.82
		RSD	0.62	0.58	0.93	1.70	0.52	0.55	0.77
		RMSE	14.59	15.39	15.65	37.62	16.00	21.40	17.48
		FA2	0.56	0.53	0.57	0.35	0.53	0.34	0.53
		RM	0.78	0.83	1.01	1.25	0.86	0.14	0.32
		D	0.68	0.65	0.70	0.47	0.63	0.55	0.66
	Precipitation **	R	0.55	0.43	0.47	0.15	0.53	**0.38**	**0.16**
		RSD	0.33	0.37	0.68	1.20	0.26	**1.17**	**1.00**
		RMSE	2.97	3.10	3.13	5.12	3.05	**4.24**	**4.43**
		FA2	0.08	0.08	0.07	0.05	0.09	**0.05**	**0.03**
		RM	0.66	1.13	1.48	2.56	0.80	**2.02**	**1.00**
		D	0.60	0.45	0.52	0.32	0.53	**0.49**	**0.51**

Zaragoza. Statistical indicators. ALTERNATIVE 1.

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ GPCP **	ERA-Interim */ Persistence **
ZARAGOZA	Zonal q10 *	R	0.83	0.78	0.80	0.60	0.79	0.46	0.61
		RSD	0.72	0.65	1.10	1.16	0.54	0.40	0.50
		RMSE	18.12	20.08	20.45	30.39	20.83	27.56	24.72
		FA2	0.63	0.56	0.61	0.46	0.5	0.28	0.36
		RM	1.41	1.42	1.32	1.55	1.44	0.54	0.62
		D	0.68	0.63	0.69	0.55	0.59	0.37	0.47
	Meridional q10*	R	0.81	0.77	0.77	0.63	0.78	0.75	0.82
		RSD	0.51	0.49	0.82	0.83	0.34	0.55	0.77
		RMSE	16.67	17.14	15.75	19.73	18.85	21.40	17.48
		FA2	0.47	0.48	0.54	0.43	0.45	0.34	0.53
		RM	0.76	0.88	0.94	0.86	0.89	0.14	0.32
		D	0.6	0.58	0.68	0.58	0.47	0.55	0.66
	Precipitation **	R	0.47	0.38	0.45	0.32	0.48	**0.38**	**0.16**
		RSD	0.34	0.57	0.59	0.57	0.18	**1.17**	**1.00**
		RMSE	3.03	3.26	3.09	3.35	3.15	**4.24**	**4.43**
		FA2	0.08	0.09	0.08	0.07	0.08	**0.05**	**0.03**
		RM	0.80	1.77	1.40	1.40	0.77	**2.02**	**1.00**
		D	0.55	0.41	0.51	0.46	0.45	**0.49**	**0.51**

Zaragoza. Statistical indicators. ALTERNATIVE 2.

Table 6. Results in Zaragoza. ALTERNATIVES 1 & 2

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP** **	ERA-Interim */ **Persistence** **
ZARAGOZA	Zonal q10 *	R	0.86	0.85	0.83	0.59	0.79	0.46	0.61
		RSD	0.87	0.84	1.07	1.24	0.66	0.40	0.50
		RMSE	16.83	17.84	18.78	32.02	20.26	27.56	24.72
		FA2	0.67	0.65	0.64	0.46	0.57	0.28	0.36
		RM	1.50	1.62	1.24	1.55	1.61	0.54	0.62
		D	0.73	0.71	0.72	0.55	0.63	0.37	0.47
	Meridional q10*	R	0.84	0.84	0.79	0.57	0.81	0.75	0.82
		RSD	0.60	0.58	0.90	1.06	0.43	0.55	0.77
		RMSE	14.94	15.02	15.49	23.62	17.28	21.40	17.48
		FA2	0.55	0.54	0.57	0.42	0.50	0.34	0.53
		RM	0.78	0.83	1.10	1.03	0.91	0.14	0.32
		D	0.67	0.66	0.70	0.56	0.56	0.55	0.66
	Precipitation **	R	0.52	0.50	0.48	0.28	0.49	**0.38**	**0.16**
		RSD	0.36	0.46	0.72	0.92	0.23	**1.17**	**1.00**
		RMSE	2.89	2.89	3.01	3.78	3.02	**4.24**	**4.43**
		FA2	0.09	0.09	0.08	0.06	0.08	**0.05**	**0.03**
		RM	0.78	1.23	1.59	2.00	0.77	**2.02**	**1.00**
		D	0.58	0.51	0.51	0.41	0.49	**0.49**	**0.51**

Zaragoza. Statistical indicators. ALTERNATIVE 3.

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP** **	ERA-Interim */ **Persistence** **
ZARAGOZA	Zonal q10 *	R	0.83	0.79	0.80	0.64	0.78	0.46	0.61
		RSD	0.73	0.71	1.10	1.18	0.56	0.40	0.50
		RMSE	18.34	19.78	20.77	29.91	21.19	27.56	24.72
		FA2	0.63	0.60	0.61	0.49	0.55	0.28	0.36
		RM	1.50	1.53	1.41	1.74	1.58	0.54	0.62
		D	0.68	0.66	0.69	0.58	0.59	0.37	0.47
	Meridional q10*	R	0.82	0.78	0.78	0.67	0.82	0.75	0.82
		RSD	0.51	0.50	0.83	0.82	0.51	0.55	0.77
		RMSE	16.29	16.85	15.49	18.66	16.29	21.40	17.48
		FA2	0.49	0.49	0.54	0.46	0.49	0.34	0.53
		RM	0.79	0.89	1.03	0.88	0.79	0.14	0.32
		D	0.61	0.59	0.68	0.60	0.61	0.55	0.66
	Precipitation **	R	0.51	0.44	0.43	0.35	0.50	**0.38**	**0.16**
		RSD	0.36	0.51	0.67	0.59	0.19	**1.17**	**1.00**
		RMSE	2.93	3.01	3.10	3.19	3.07	**4.24**	**4.43**
		FA2	0.08	0.09	0.08	0.07	0.08	**0.05**	**0.03**
		RM	0.75	1.46	1.50	1.28	0.74	**2.02**	**1.00**
		D	0.57	0.45	0.50	0.49	0.47	**0.49**	**0.51**

Zaragoza. Statistical indicators. ALTERNATIVE 4.

Table 7. Results in Zaragoza. ALTERNATIVES 3 & 4

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP** **	ERA-Interim */ **Persistence** **
ZARAGOZA	Zonal q10 *	R	0.86	0.85	0.83	0.69	0.81	0.46	0.61
		RSD	0.90	0.92	1.07	1.27	0.74	0.40	0.50
		RMSE	16.15	17.24	18.67	28.29	18.38	27.56	24.72
		FA2	0.71	0.69	0.65	0.52	0.64	0.28	0.36
		RM	1.39	1.50	1.34	1.15	1.40	0.54	0.62
		D	0.75	0.73	0.72	0.62	0.68	0.37	0.47
	Meridional q10*	R	0.84	0.82	0.79	0.58	0.81	0.75	0.82
		RSD	0.61	0.62	0.84	1.01	0.48	0.55	0.77
		RMSE	14.82	14.90	14.96	22.87	16.72	21.40	17.48
		FA2	0.55	0.55	0.58	0.44	0.49	0.34	0.53
		RM	0.78	0.86	0.97	0.76	0.83	0.14	0.32
		D	0.67	0.67	0.70	0.59	0.59	0.55	0.66
	Precipitation **	R	0.55	0.50	0.48	0.29	0.55	**0.38**	**0.16**
		RSD	0.38	0.54	0.73	1.01	0.38	**1.17**	**1.00**
		RMSE	2.83	2.90	3.02	3.87	2.83	**4.24**	**4.43**
		FA2	0.08	0.09	0.07	0.05	0.08	**0.05**	**0.03**
		RM	0.72	1.40	1.57	1.83	0.72	**2.02**	**1.00**
		D	0.60	0.50	0.52	0.43	0.60	**0.49**	**0.51**

Zaragoza. Statistical indicators. ALTERNATIVE 5.

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP** **	ERA-Interim */ **Persistence** **
ZARAGOZA	Zonal q10 *	R	0.81	0.79	0.79	0.70	0.77	0.46	0.61
		RSD	0.72	0.72	0.98	1.14	0.55	0.40	0.50
		RMSE	18.64	19.27	19.58	25.89	20.71	27.56	24.72
		FA2	0.63	0.59	0.63	0.53	0.55	0.28	0.36
		RM	1.41	1.41	1.33	1.43	1.36	0.54	0.62
		D	0.67	0.66	0.69	0.62	0.59	0.37	0.47
	Meridional q10*	R	0.79	0.77	0.77	0.70	0.79	0.75	0.82
		RSD	0.51	0.53	0.73	0.78	0.51	0.55	0.77
		RMSE	16.92	16.86	15.88	17.76	16.92	21.40	17.48
		FA2	0.46	0.47	0.54	0.46	0.46	0.34	0.53
		RM	0.77	0.84	0.91	0.83	0.77	0.14	0.32
		D	0.60	0.59	0.66	0.62	0.60	0.55	0.66
	Precipitation **	R	0.48	0.45	0.48	0.46	0.49	**0.38**	**0.16**
		RSD	0.34	0.58	0.59	0.61	0.22	**1.17**	**1.00**
		RMSE	3.01	3.07	2.98	3.03	3.08	**4.24**	**4.43**
		FA2	0.08	0.09	0.08	0.07	0.08	**0.05**	**0.03**
		RM	0.72	1.57	1.38	1.36	0.80	**2.02**	**1.00**
		D	0.57	0.46	0.51	0.51	0.47	**0.49**	**0.51**

Zaragoza. Statistical indicators. ALTERNATIVE 6.

Table 8. Results in Zaragoza. ALTERNATIVES 5 & 6

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP** **	ERA-Interim */ **Persistence** **
TORTOSA	Zonal q10 *	R	0.80	0.75	0.71	0.13	0.76	0.53	0.55
		RSD	0.63	0.55	0.83	1.60	0.55	0.76	0.72
		RMSE	12.12	13.37	13.88	34.14	13.31	18.99	18.58
		FA2	0.49	0.41	0.48	0.24	0.45	0.34	0.34
		RM	0.90	0.68	1.02	0.53	1.48	-2.26	-2.35
		D	0.65	0.59	0.63	0.35	0.60	0.50	0.49
	Meridional q10*	R	0.83	0.79	0.77	0.22	0.79	0.71	0.74
		RSD	0.93	0.82	1.02	1.70	0.82	0.66	0.79
		RMSE	12.71	13.87	15.47	40.51	14.31	16.30	15.65
		FA2	0.65	0.57	0.57	0.30	0.60	0.46	0.52
		RM	1.02	0.73	0.48	-1.12	2.61	-0.14	-0.61
		D	0.76	0.70	0.70	0.39	0.71	0.61	0.66
	Precipitation **	R	0.49	0.40	0.46	0.21	0.50	**0.33**	**0.26**
		RSD	0.41	0.47	0.75	1.50	0.34	**0.75**	**1.00**
		RMSE	4.70	4.96	5.05	9.20	4.72	**5.56**	**6.54**
		FA2	0.07	0.06	0.06	0.03	0.07	**0.03**	**0.02**
		RM	0.74	1.34	1.50	3.31	0.94	**1.38**	**1.00**
		D	0.61	0.43	0.53	0.29	0.53	**0.52**	**0.55**

Tortosa. Statistical indicators. ALTERNATIVE 1.

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP** **	ERA-Interim */ **Persistence** **
TORTOSA	Zonal q10 *	R	0.76	0.74	0.70	0.61	0.73	0.53	0.55
		RSD	0.54	0.48	0.78	0.77	0.36	0.76	0.72
		RMSE	13.23	13.92	13.88	15.59	15.57	18.99	18.58
		FA2	0.41	0.35	0.46	0.40	0.33	0.34	0.34
		RM	1.08	1.34	0.45	0.56	2.60	-2.26	-2.35
		D	0.59	0.54	0.62	0.56	0.46	0.50	0.49
	Meridional q10*	R	0.81	0.77	0.77	0.63	0.78	0.71	0.74
		RSD	0.51	0.49	0.82	0.83	0.34	0.66	0.79
		RMSE	16.67	17.14	15.75	19.73	18.85	16.30	15.65
		FA2	0.61	0.48	0.56	0.43	0.46	0.46	0.52
		RM	0.76	0.88	0.94	0.86	0.89	-0.14	-0.61
		D	0.72	0.65	0.69	0.58	0.58	0.61	0.66
	Precipitation **	R	0.46	0.38	0.50	0.35	0.48	**0.33**	**0.26**
		RSD	0.41	0.76	0.69	0.77	0.23	**0.75**	**1.00**
		RMSE	4.77	5.57	4.81	5.63	4.90	**5.56**	**6.54**
		FA2	0.08	0.07	0.06	0.07	0.04	**0.03**	**0.02**
		RM	0.85	2.20	1.53	1.91	0.85	**1.38**	**1.00**
		D	0.57	0.38	0.53	0.43	0.45	**0.52**	**0.55**

Tortosa. Statistical indicators. ALTERNATIVE 2.

Table 9. Results in Tortosa. ALTERNATIVES 1 & 2

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP ****	ERA-Interim */ **Persistence ****
TORTOSA	Zonal q10 *	R	0.80	0.79	0.72	0.39	0.80	0.53	0.55
		RSD	0.61	0.55	0.87	1.01	0.61	0.76	0.72
		RMSE	12.19	12.80	13.63	21.63	12.19	18.99	18.58
		FA2	0.47	0.43	0.47	0.34	0.47	0.34	0.34
		RM	0.92	0.60	1.18	-0.56	0.92	-2.26	-2.35
		D	0.64	0.60	0.64	0.48	0.64	0.50	0.49
	Meridional q10*	R	0.83	0.82	0.77	0.58	0.78	0.71	0.74
		RSD	0.89	0.81	1.02	1.22	0.72	0.66	0.79
		RMSE	12.85	13.09	15.40	23.74	14.87	16.30	15.65
		FA2	0.65	0.60	0.58	0.42	0.55	0.46	0.52
		RM	0.75	0.18	1.39	-0.88	3.28	-0.14	-0.61
		D	0.75	0.72	0.70	0.56	0.67	0.61	0.66
	Precipitation **	R	0.47	0.45	0.44	0.24	0.46	**0.33**	**0.26**
		RSD	0.42	0.59	0.76	0.99	0.29	**0.75**	**1.00**
		RMSE	4.68	4.81	5.04	6.53	4.77	**5.56**	**6.54**
		FA2	0.07	0.07	0.05	0.03	0.06	**0.03**	**0.02**
		RM	0.88	1.50	1.60	2.24	0.95	**1.38**	**1.00**
		D	0.57	0.48	0.51	0.36	0.47	**0.52**	**0.55**

Tortosa. Statistical indicators. ALTERNATIVE 3.

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP ****	ERA-Interim */ **Persistence ****
TORTOSA	Zonal q10 *	R	0.76	0.72	0.69	0.57	0.72	0.53	0.55
		RSD	0.54	0.48	0.80	0.83	0.37	0.76	0.72
		RMSE	13.27	14.19	14.09	16.68	15.32	18.99	18.58
		FA2	0.43	0.35	0.46	0.38	0.33	0.34	0.34
		RM	0.87	0.97	0.63	0.32	2.06	-2.26	-2.35
		D	0.59	0.53	0.62	0.55	0.46	0.50	0.49
	Meridional q10*	R	0.81	0.77	0.78	0.61	0.77	0.71	0.74
		RSD	0.80	0.69	1.09	1.13	0.57	0.66	0.79
		RMSE	13.44	14.63	16.47	21.56	16.77	16.30	15.65
		FA2	0.60	0.50	0.54	0.42	0.44	0.46	0.52
		RM	1.41	2.14	-1.27	-0.17	5.48	-0.14	-0.61
		D	0.72	0.65	0.68	0.58	0.59	0.61	0.66
	Precipitation **	R	0.46	0.42	0.44	0.33	0.46	**0.33**	**0.26**
		RSD	0.39	0.70	0.67	0.76	0.24	**0.75**	**1.00**
		RMSE	4.73	5.12	4.88	5.54	4.84	**5.56**	**6.54**
		FA2	0.07	0.08	0.05	0.05	0.06	**0.03**	**0.02**
		RM	0.82	1.87	1.46	1.81	0.87	**1.38**	**1.00**
		D	0.56	0.43	0.52	0.44	0.46	**0.52**	**0.55**

Tortosa. Statistical indicators. ALTERNATIVE 4.

Table 10. Results in Tortosa. ALTERNATIVES 3 & 4

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP ****	ERA-Interim */ **Persistence ****
TORTOSA	Zonal q10 *	R	0.79	0.77	0.71	0.48	0.76	0.53	0.55
		RSD	0.63	0.59	0.77	0.96	0.54	0.76	0.72
		RMSE	12.18	12.76	13.61	19.24	13.26	18.99	18.58
		FA2	0.49	0.44	0.48	0.38	0.43	0.34	0.34
		RM	1.09	0.79	1.41	0.77	1.52	-2.26	-2.35
		D	0.65	0.62	0.64	0.53	0.60	0.50	0.49
	Meridional q10*	R	0.83	0.82	0.81	0.59	0.80	0.71	0.74
		RSD	0.93	0.86	0.98	1.24	0.83	0.66	0.79
		RMSE	12.95	13.17	13.99	23.60	14.12	16.30	15.65
		FA2	0.64	0.61	0.61	0.44	0.61	0.46	0.52
		RM	1.23	0.41	1.22	4.15	-2.85	-0.14	-0.61
		D	0.75	0.73	0.72	0.58	0.72	0.61	0.66
	Precipitation **	R	0.50	0.46	0.53	0.38	0.52	**0.33**	**0.26**
		RSD	0.44	0.62	0.86	0.95	0.36	**0.75**	**1.00**
		RMSE	4.60	4.82	4.84	5.75	4.61	**5.56**	**6.54**
		FA2	0.07	0.07	0.06	0.04	0.06	**0.03**	**0.02**
		RM	0.81	1.54	1.81	1.65	0.97	**1.38**	**1.00**
		D	0.61	0.48	0.52	0.47	0.53	**0.52**	**0.55**

Tortosa. Statistical indicators. ALTERNATIVE 5.

			RF ERA-40	RF ERA-Interim	MLR ERA-40	MLR ERA-Interim	Analogues	ERA-40 */ **GPCP ****	ERA-Interim */ **Persistence ****
TORTOSA	Zonal q10 *	R	0.75	0.74	0.72	0.67	0.75	0.53	0.55
		RSD	0.56	0.53	0.70	0.74	0.56	0.76	0.72
		RMSE	13.19	13.62	13.46	14.33	13.19	18.99	18.58
		FA2	0.41	0.37	0.45	0.43	0.41	0.34	0.34
		RM	1.85	2.59	0.58	2.21	1.85	-2.26	-2.35
		D	0.60	0.57	0.62	0.59	0.60	0.50	0.49
	Meridional q10*	R	0.80	0.77	0.79	0.65	0.76	0.71	0.74
		RSD	0.84	0.76	1.02	1.08	0.61	0.66	0.79
		RMSE	13.58	14.55	15.12	19.94	16.32	16.30	15.65
		FA2	0.61	0.55	0.58	0.45	0.47	0.46	0.52
		RM	1.17	1.64	-0.04	0.86	4.40	-0.14	-0.61
		D	0.72	0.67	0.70	0.60	0.61	0.61	0.66
	Precipitation **	R	0.48	0.42	0.52	0.44	0.51	**0.33**	**0.26**
		RSD	0.43	0.79	0.74	0.75	0.29	**0.75**	**1.00**
		RMSE	4.70	5.33	4.75	5.07	4.75	**5.56**	**6.54**
		FA2	0.07	0.06	0.06	0.06	0.06	**0.03**	**0.02**
		RM	0.80	1.95	1.61	1.62	0.93	**1.38**	**1.00**
		D	0.58	0.43	0.52	0.50	0.47	**0.52**	**0.55**

Tortosa. Statistical indicators. ALTERNATIVE 6.

Table 11. Results in Tortosa. ALTERNATIVES 5 & 6

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
R	0.86	0.83	0.86	0.83	0.86	0.81
RSD	0.90	0.72	0.87	0.73	0.90	0.72
RMSE	16.35	18.12	16.83	18.34	16.15	18.64
FA2	0.70	0.63	0.67	0.63	0.71	0.63
RM	1.46	1.41	1.50	1.50	1.39	1.41
D	0.74	0.68	0.73	0.68	0.75	0.67
R	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RSD	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RMSE	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
FA2	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			=	=	<>	=
ALT. 3				=	=	=
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RM	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	<>	=
ALT. 2			<>	<>	=	=
ALT. 3				=	<>	<>
ALT. 4					<>	<>
ALT. 5						=
ALT. 6						
D	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						

Table. 12. Zaragoza. Zonal surface moisture flux. Statistical indicators of the best model (RF_ERA 40)obtained for the six alternatives considered, and results of the test of equality of indicators at a 95% confidence level. "<>" : different at a 95% confidence level. "=": equal at a 95% confidence level

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
R	0.85	0.81	0.84	0.82	0.84	0.79
RSD	0.62	0.51	0.60	0.51	0.61	0.51
RMSE	14.59	16.67	14.94	16.29	14.82	16.93
FA2	0.56	0.47	0.55	0.49	0.55	0.46
RM	0.78	0.76	0.78	0.79	0.78	0.79
D	0.68	0.60	0.67	0.61	0.67	0.60
R	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					=	<>
ALT. 5						<>
ALT. 6						
RSD	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RMSE	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
FA2	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RM	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			<>	<>	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
D	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						

Table. 13. Zaragoza. Meridional surface moisture flux. Statistical indicators of the best model (RF_ERA 40) obtained for the six alternatives considered, and results of the test of equality of indicators at a 95% confidence level. "<>" : different at a 95% confidence level. "=": equal at a 95% confidence level

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
R	0.55	0.47	0.52	0.51	0.55	0.48
RSD	0.33	0.34	0.36	0.36	0.38	0.34
RMSE	2.97	3.03	2.89	2.93	2.83	3.01
FA2	0.08	0.08	0.09	0.08	0.08	0.08
RM	0.66	0.80	0.78	0.75	0.72	0.72
D	0.60	0.55	0.58	0.57	0.60	0.60
R	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
RSD	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				<>	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
RMSE	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						<>
ALT. 6						
FA2	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
RM	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	=	=	=
ALT. 2			=	=	<>	<>
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
D	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	<>	=	=	<>
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						<>
ALT. 6						

Table. 14. Zaragoza. Precipitation. Statistical indicators of the best model (RF_ERA 40) obtained for the six alternatives considered, and results of the test of equality of indicators at a 95% confidence level. “<>” : different at a 95% confidence level. “=”: equal at a 95% confidence level

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
R	0.80	0.76	0.80	0.76	0.79	0.75
RSD	0.63	0.54	0.61	0.54	0.63	0.56
RMSE	12.13	13.23	12.19	13.27	12.18	13.19
FA2	0.49	0.41	0.47	0.43	0.49	0.41
RM	1.00	1.08	0.92	0.87	1.09	1.85
D	0.65	0.59	0.64	0.59	0.65	0.60
R	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RSD	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	<>
ALT. 5						<>
ALT. 6						
RMSE	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
FA2	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	=	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				=	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RM	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	=	<>	=
ALT. 2			<>	<>	=	=
ALT. 3				<>	<>	<>
ALT. 4					<>	=
ALT. 5						=
ALT. 6						
D	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						

Table. 15. Tortosa. Zonal surface moisture flux. Statistical indicators of the best model (RF_ERA 40) obtained for the six alternatives considered, and results of the test of equality of indicators at a 95% confidence level. “<>” : different at a 95% confidence level. “=”: equal at a 95% confidence level

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
R	0.83	0.81	0.83	0.81	0.83	0.80
RSD	0.93	0.51	0.89	0.81	0.93	0.84
RMSE	12.71	16.67	12.85	13.44	12.95	13.58
FA2	0.65	0.61	0.65	0.60	0.64	0.61
RM	1.02	0.76	0.75	1.41	1.23	1.17
D	0.76	0.72	0.75	0.72	0.75	0.72
R	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	=	<>	=	<>
ALT. 2			=	=	<>	=
ALT. 3				=	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						
RSD	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	<>	=	<>
ALT. 2			<>	=	<>	<>
ALT. 3				<>	=	<>
ALT. 4					<>	<>
ALT. 5						<>
ALT. 6						
RMSE	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	<>	=	<>
ALT. 2			=	=	=	=
ALT. 3				=	=	<>
ALT. 4					=	=
ALT. 5						=
ALT. 6						
FA2	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	<>	=	=
ALT. 2			<>	=	=	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						=
ALT. 6						
RM	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	<>	=	<>	=
ALT. 2			<>	=	=	=
ALT. 3				<>	<>	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
D	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	<>	=	<>
ALT. 2			<>	=	<>	=
ALT. 3				<>	=	<>
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						

Table. 16. Tortosa. Meridional surface moisture flux. Statistical indicators of the best model (RF_ERA 40) obtained for the six alternatives considered, and results of the test of equality of indicators at a 95% confidence level. "<>" : different at a 95% confidence level. "=": equal at a 95% confidence level

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6
R	0.49	0.46	0.47	0.46	0.50	0.48
RSD	0.41	0.41	0.42	0.39	0.44	0.43
RMSE	4.70	4.77	4.68	4.73	4.60	4.70
FA2	0.07	0.08	0.07	0.07	0.07	0.07
RM	0.74	0.85	0.88	0.82	0.81	0.80
D	0.61	0.57	0.57	0.56	0.61	0.58
R	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
RSD	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				<>	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
RMSE	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
FA2	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		=	=	=	=	=
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
RM	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	=	=	=
ALT. 2			=	=	=	=
ALT. 3				=	=	=
ALT. 4					=	=
ALT. 5						=
ALT. 6						
D	**ALT. 1**	**ALT. 2**	**ALT. 3**	**ALT. 4**	**ALT. 5**	**ALT. 6**
ALT. 1		<>	<>	<>	=	=
ALT. 2			=	=	<>	=
ALT. 3				=	<>	=
ALT. 4					<>	=
ALT. 5						<>
ALT. 6						

Table. 17. Tortosa. Precipitation. Statistical indicators of the best model (RF_ERA 40) obtained for the six alternatives considered, and results of the test of equality of indicators at a 95% confidence level. "<>" : different at a 95% confidence level. "=": equal at a 95% confidence level

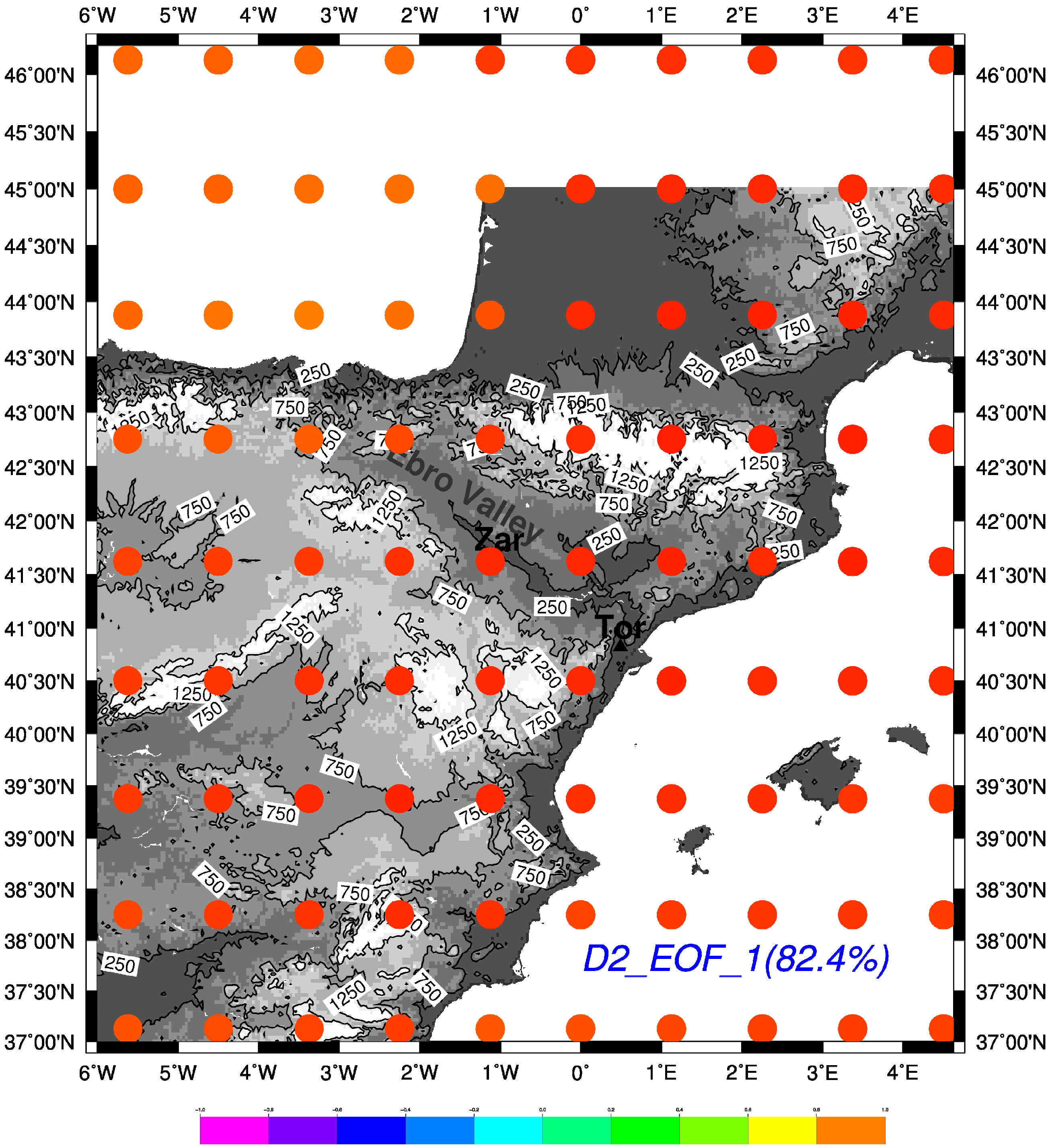

Figure 4. Spatial distribution of the factor loadings corresponding to the first EOF of D2. In brackets the fraction of the variability this EOF accounts for.

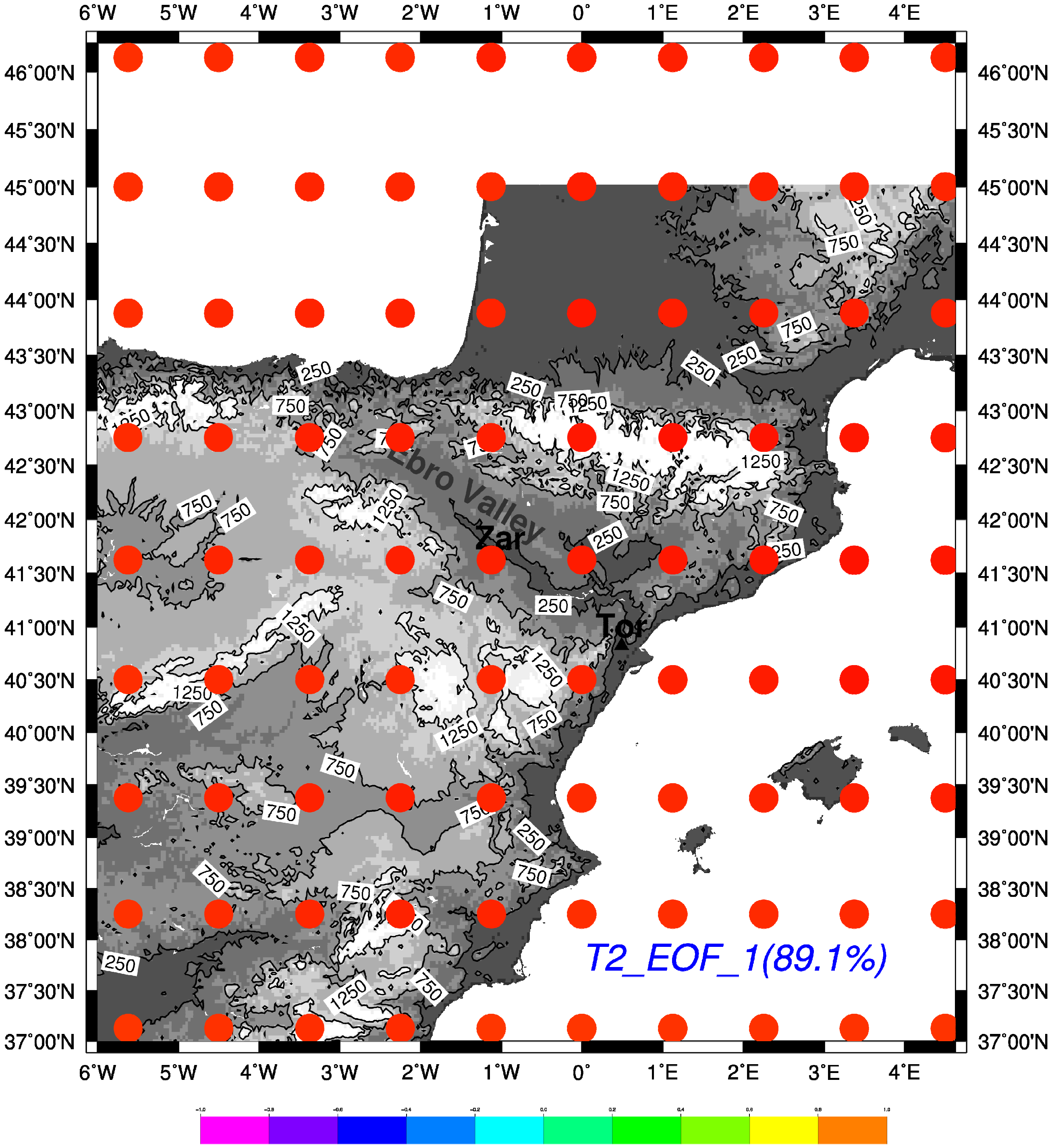

Figure 5. Spatial distribution of the factor loadings corresponding to the first EOF of T2. In brackets the fraction of the variability this EOF accounts for.

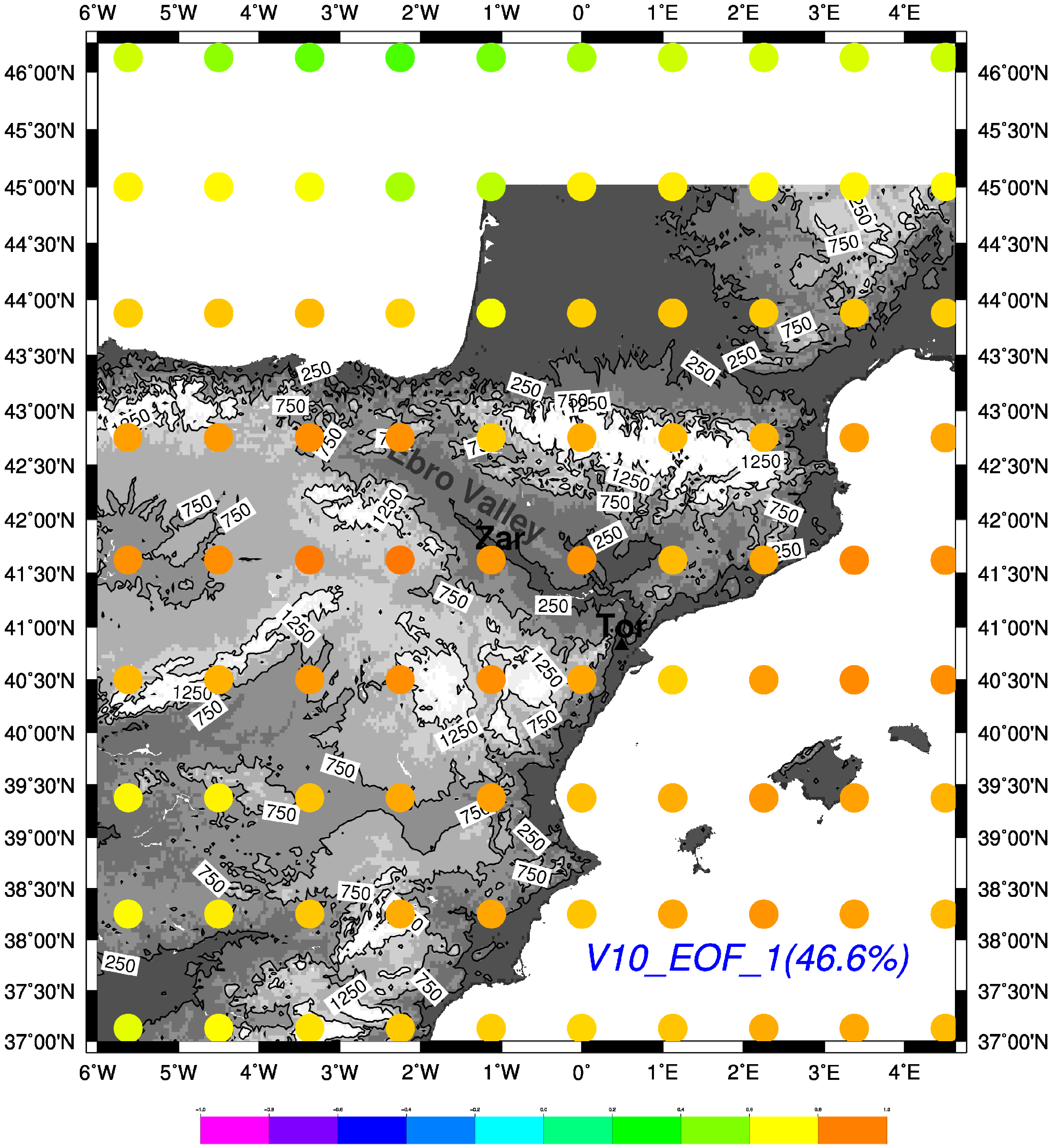

Figure 6. Spatial distribution of the factor loadings corresponding to the first EOF of V10. In brackets the fraction of the variability this EOF accounts for.

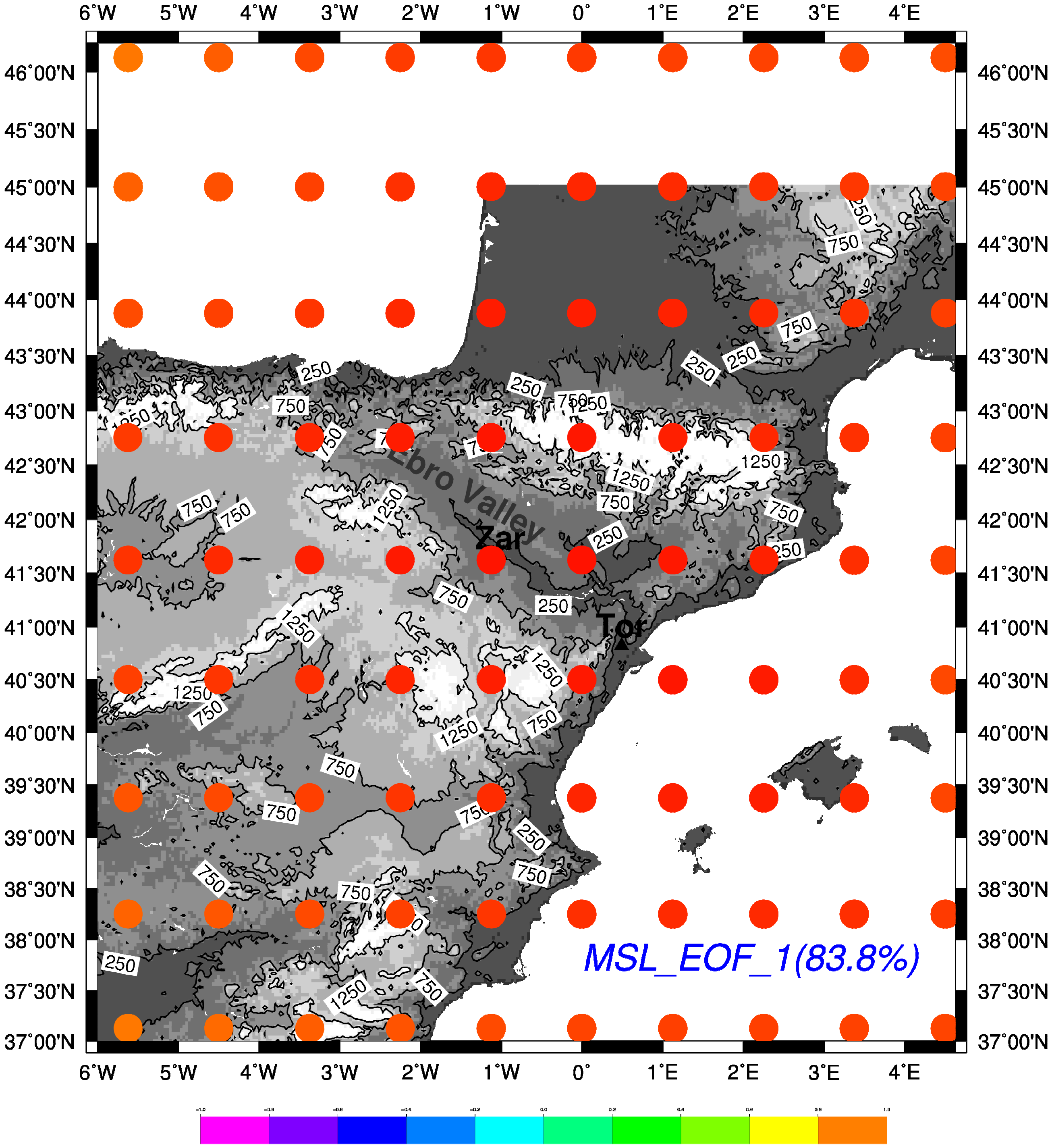

Figure 7. Spatial distribution of the factor loadings corresponding to the first EOF of MSL. In brackets the fraction of the variability this EOF accounts for.