Assessing the Land Use and Land Cover Data Representation on Weather Forecast Quality: A Case Study in central Mexico

(Supplementary Material)

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Table S1 LULC change matrix for USGS1993-NALCMS2005 (area in km²). Figure 3c shows in white the areas that changed (the elements off the diagonal of the matrix) while yellow represents the areas that did not show LULC changes (diagonal of the matrix).

Land cover class	1	2	3	5	6	7	8	9	10	11	13	14	15	16	18	19	21	24	Total NAL CMS
1-Urban and Built-Up Land	**660**	18	0	0	0	7	6	0	0	0	0	14	0	0	0	0	0	0	705
2-Dryland Cropland and Pasture	399	**3,985**	0	0	0	355	612	0	0	502	423	216	620	46	0	104	0	21	7,283
3-Irrigated Cropland and Pasture	39	985	**0**	0	0	160	340	0	0	594	0	2	5	10	0	0	0	0	2,135
5-Cropland/ Grassland Mosaic	1	162	0	**0**	0	21	301	0	0	309	12	111	240	1	0	0	0	0	1,158
6-Cropland/ Woodland Mosaic	0	1,701	0	0	**0**	0	182	0	0	531	284	118	1,225	0	0	0	0	0	4,041
7-Grassland	1,522	8,674	0	0	0	**5,948**	7,418	0	0	1,501	0	311	130	137	1	20	0	0	25,662
8-Shrubland	1,466	9,675	0	0	0	4,339	**7,223**	0	0	1,979	2	280	128	108	2	50	0	0	25,252
9-Mixed Shrubland/ Grassland	3	0	0	0	0	0	0	**0**	0	0	0	0	0	0	0	4	0	0	7
10-Savanna	102	6,931	0	0	0	169	3,772	0	**0**	5,589	174	599	713	39	0	2	0	0	18,090
11-Deciduous Broadleaf Forest	6	143	0	0	0	18	1	0	0	**0**	0	0	3	0	0	0	0	0	171
13-Evergreen Broadleaf Forest	0	134	0	0	0	0	5	0	0	23	**23**	13	99	0	0	0	0	0	297
14-Evergreen Needleleaf Forest	122	2,805	0	0	0	741	1,856	0	0	2,555	1	**108**	178	22	0	1	0	0	8,389
15-Mixed Forest	67	6,982	0	0	0	253	6,000	0	0	2,472	426	5,895	**7,594**	40	0	32	0	2	29,763
16-Water Bodies	0	29	0	0	0	0	6	0	0	3	1	3	1	**73**	0	20	0	0	136
18-Wooded Wetland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0	0
19-Barren or Sparsely Vegetated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0
21-Wooded Tundra	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0	1
24-Snow or	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0
Total USGS	4,388	42,224	0	0	0	12,011	27,722	0	0	16,058	1,346	7,670	10,936	476	3	233	0	23	**123,090**

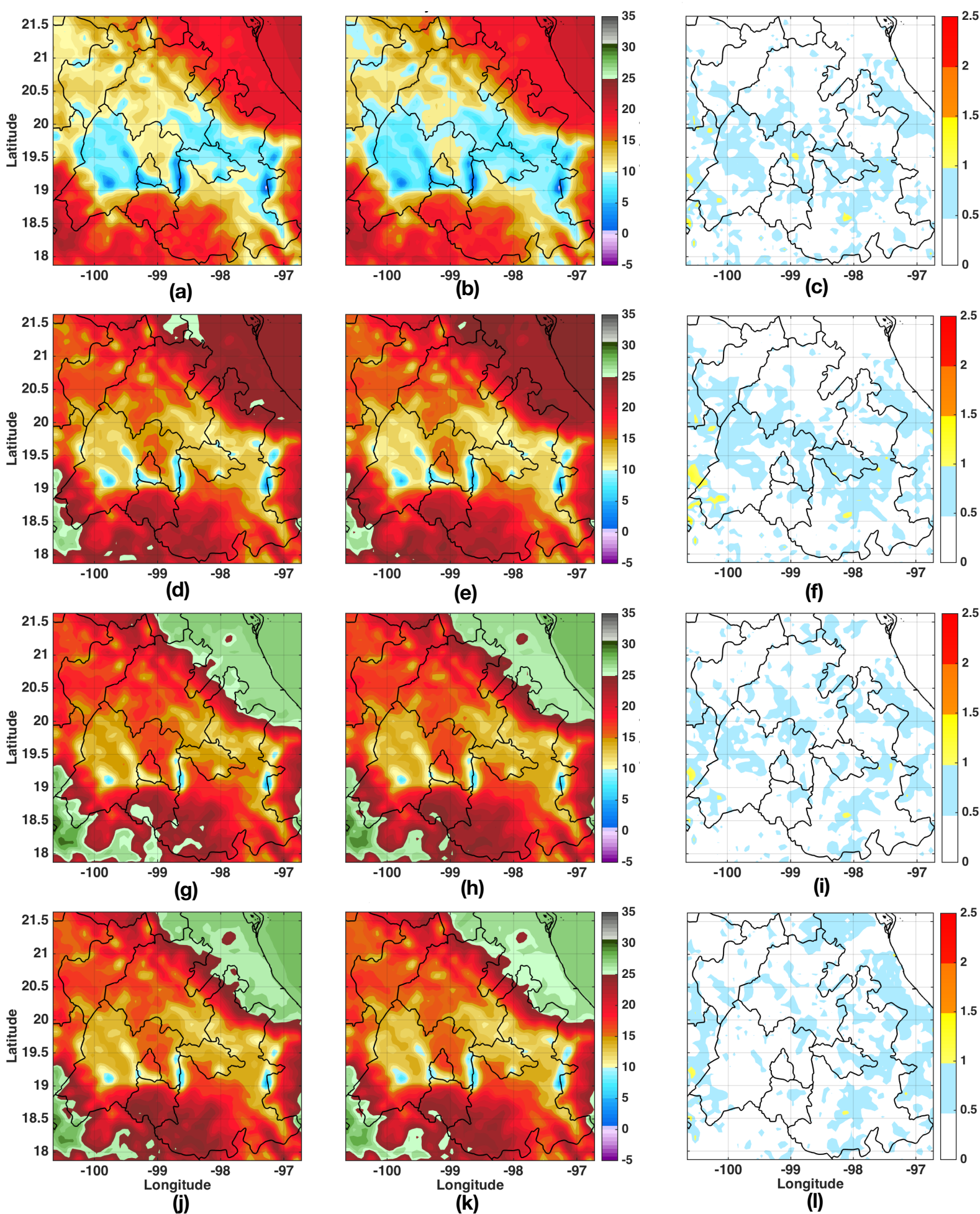**Figure S1** Maps of monthly average temperature (°C) for the 48-hours forecast. Dry season (January (a-b) and April (d-e)), Rainy season (July (g-h) and September (j-k)). First column shows the numerical simulations using the USGS1993 dataset, second column using the NALCMS2005 updated dataset, and third column shows the absolute value of the differences between NALCMS2005 minus USGS1993.
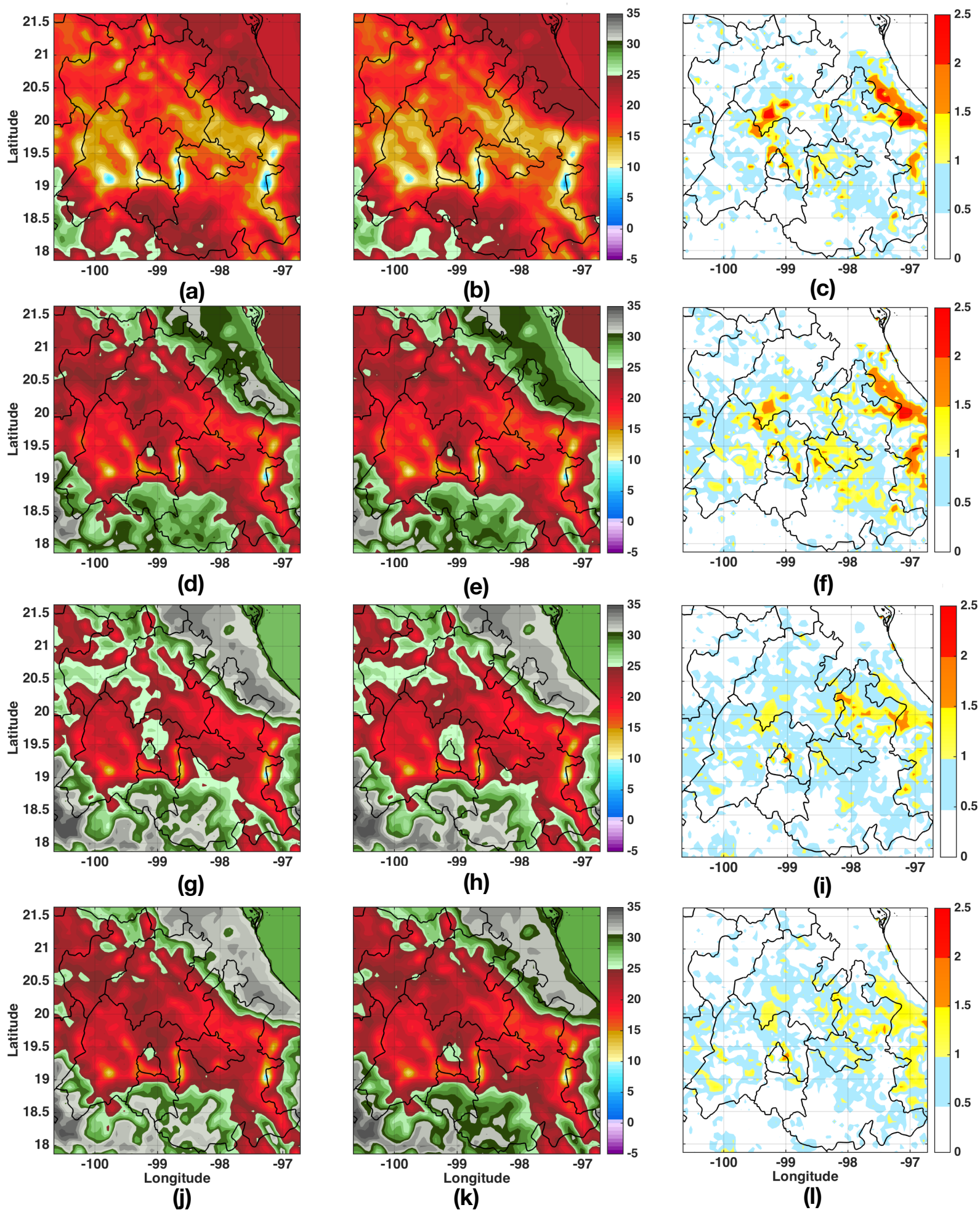
Figure S2 Maps of monthly average daily maximum temperature (ºC) for the 48-hours forecast. Dry season (January (a-b) and April (d-e)), Rainy season (July (g-h) and September (j-k)). First column shows the numerical simulations using the USGS1993 dataset, second column using the NALCMS2005 updated dataset, and third column shows the absolute difference of average daily maximum temperatures between NALCMS2005 and USGS1993.
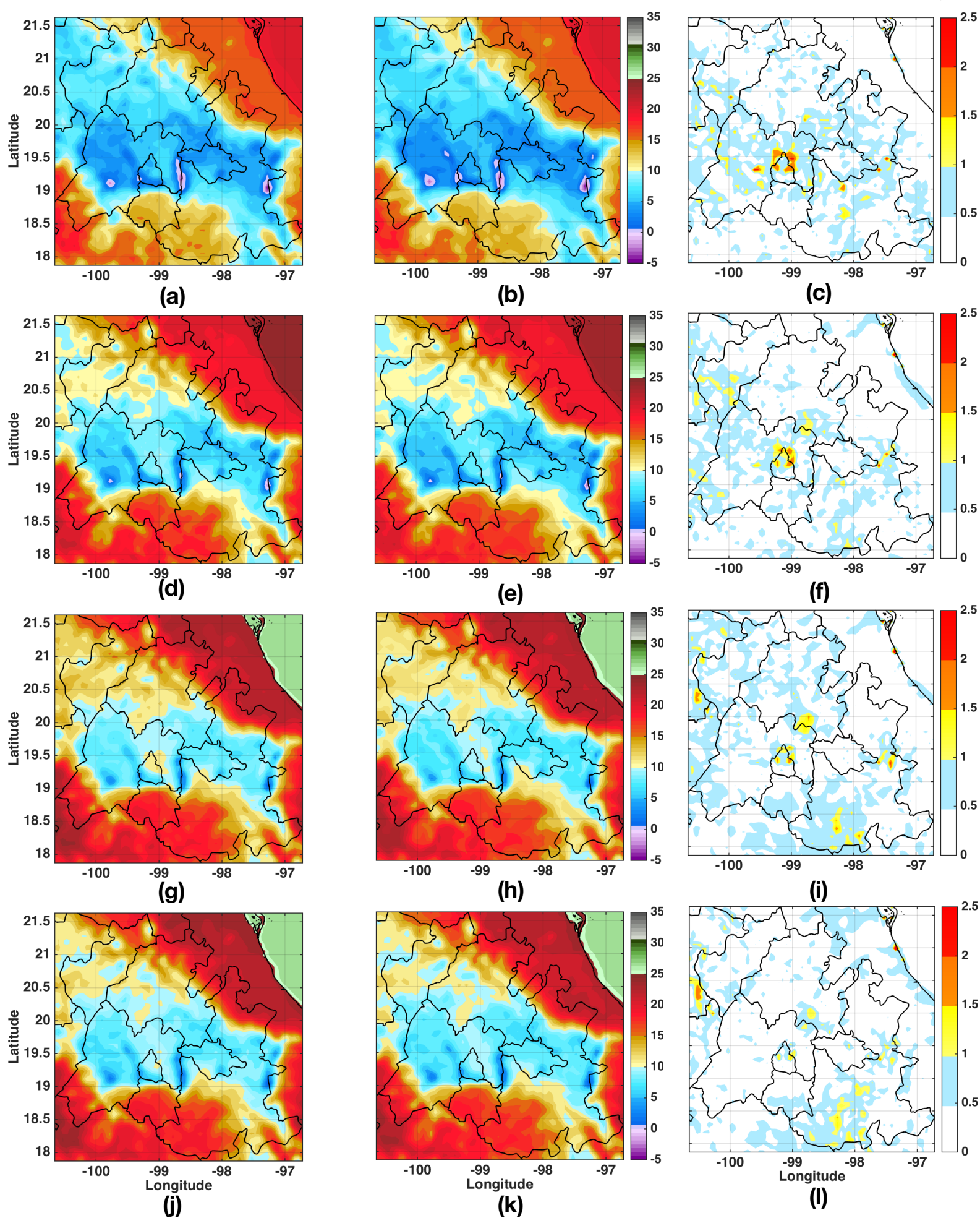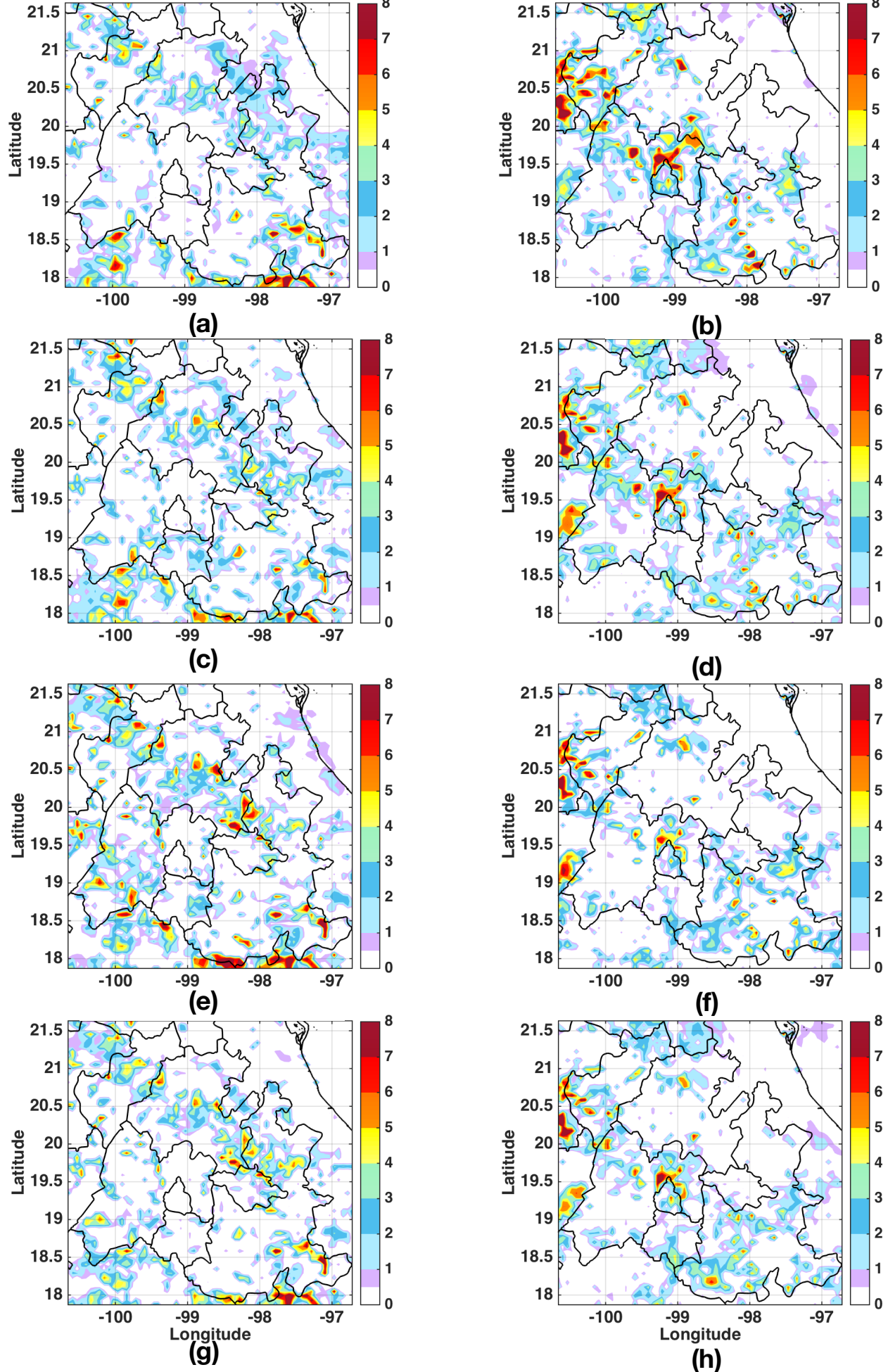
Figure S3 Maps of monthly average daily minimum temperature (°C) for the 48-hours forecast. Dry season (January (a-b) and April (d-e)), Rainy season (July (g-h) and September (j-k)). First column shows the numerical simulations using the USGS1993 dataset, second column using the NALCMS2005 updated dataset, and third column shows the absolute difference of average daily minimum temperatures between NALCMS2005 and USGS1993.

Figure S4 Absolute difference maps of monthly average daily maximum wind (km/h) between NALCMS and USGS for the 48-hours forecast. Dry season (January (a-b) and April (c-d)), Rainy season (July (e-f) and September (g-h)). Left column shows the result of the operation considering only the NALCMS2005 contribution (positive values of the subtraction between NALCMS and USGS), and right column shows the result of the difference considering the USGS1993 contribution (absolute value of the negative values of the difference NALCMS - USGS).
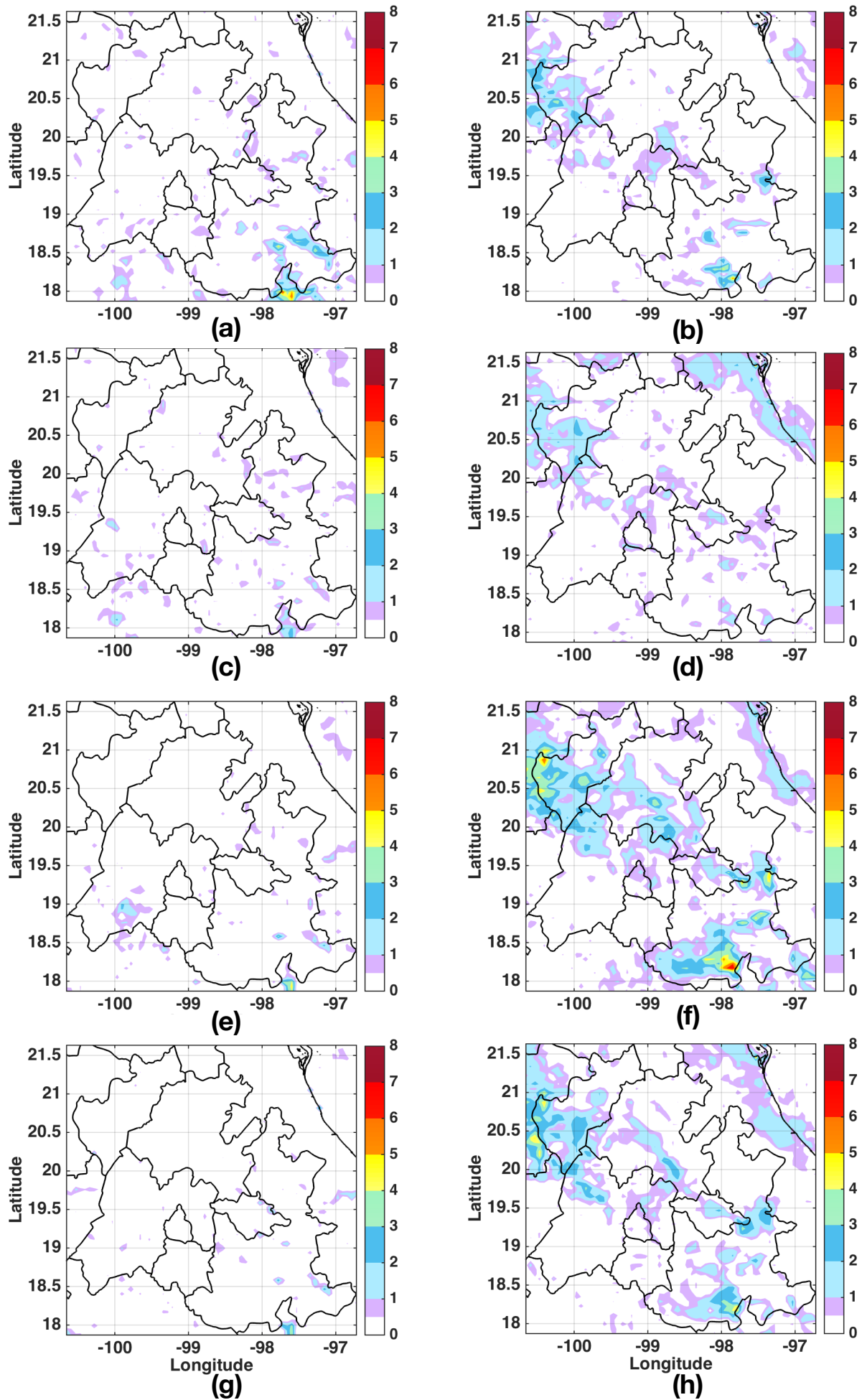
Figure S5 Absolute difference maps of monthly average daily minimum wind (km/h) between NALCMS and USGS for the 48-hours forecast. Dry season (January (a-b) and April (c-d)), Rainy season (July (e-f) and September (g-h)). Left column shows the result of the operation considering only the NALCMS2005 contribution (positive values of the subtraction between NALCMS and USGS), and right column shows the result of the difference considering the USGS1993 contribution (absolute value of the negative values of the difference between NALCMS and USGS).
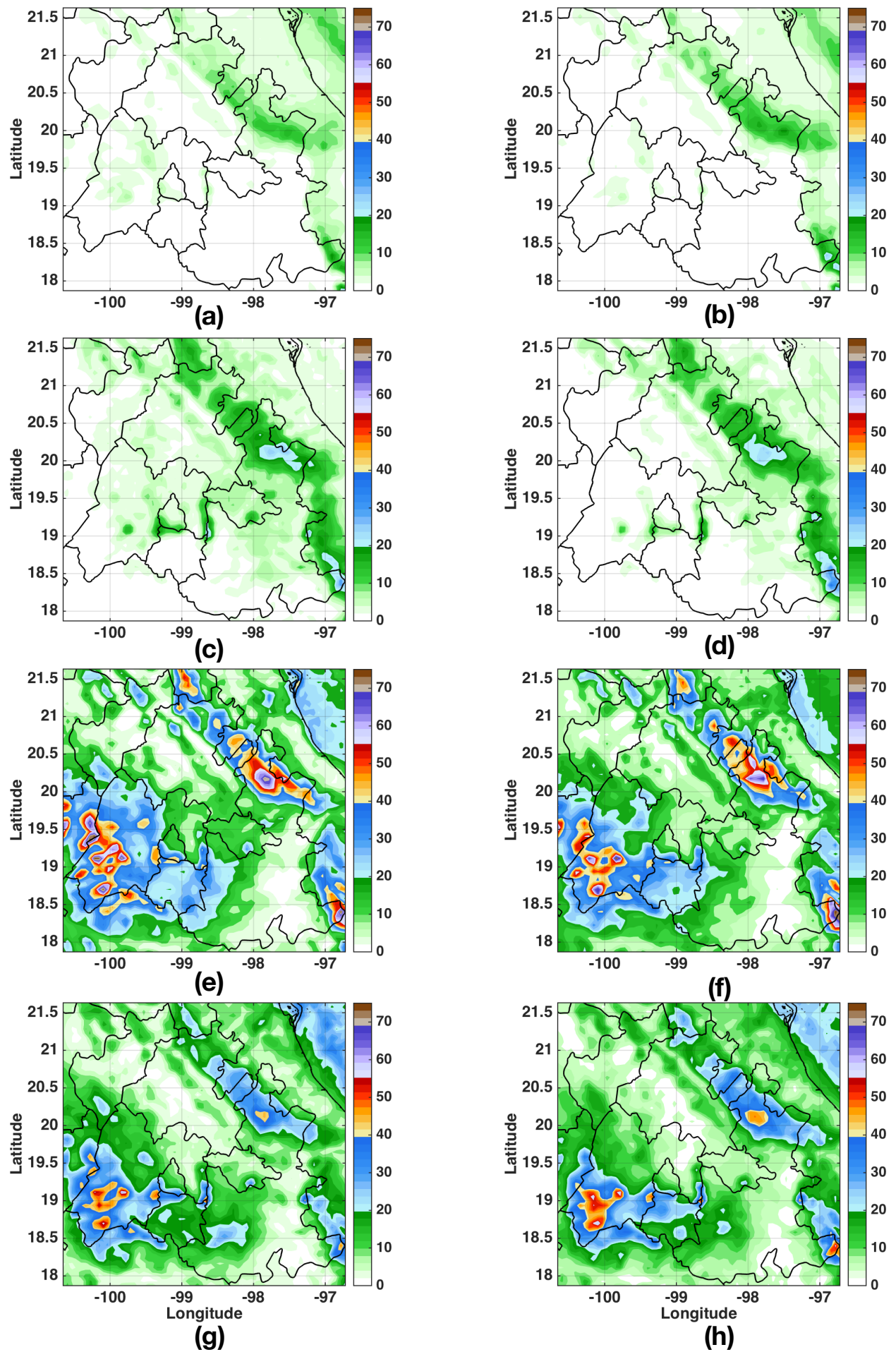
Figure S6 Maps of average daily accumulated precipitation for the 48-hours forecast. Dry season (January (a-b) and April (c-d)), Rainy season (July (e-f) and September (g-h)). First column shows the numerical simulations using the NALCMS dataset, second column using the USGS1993 dataset.
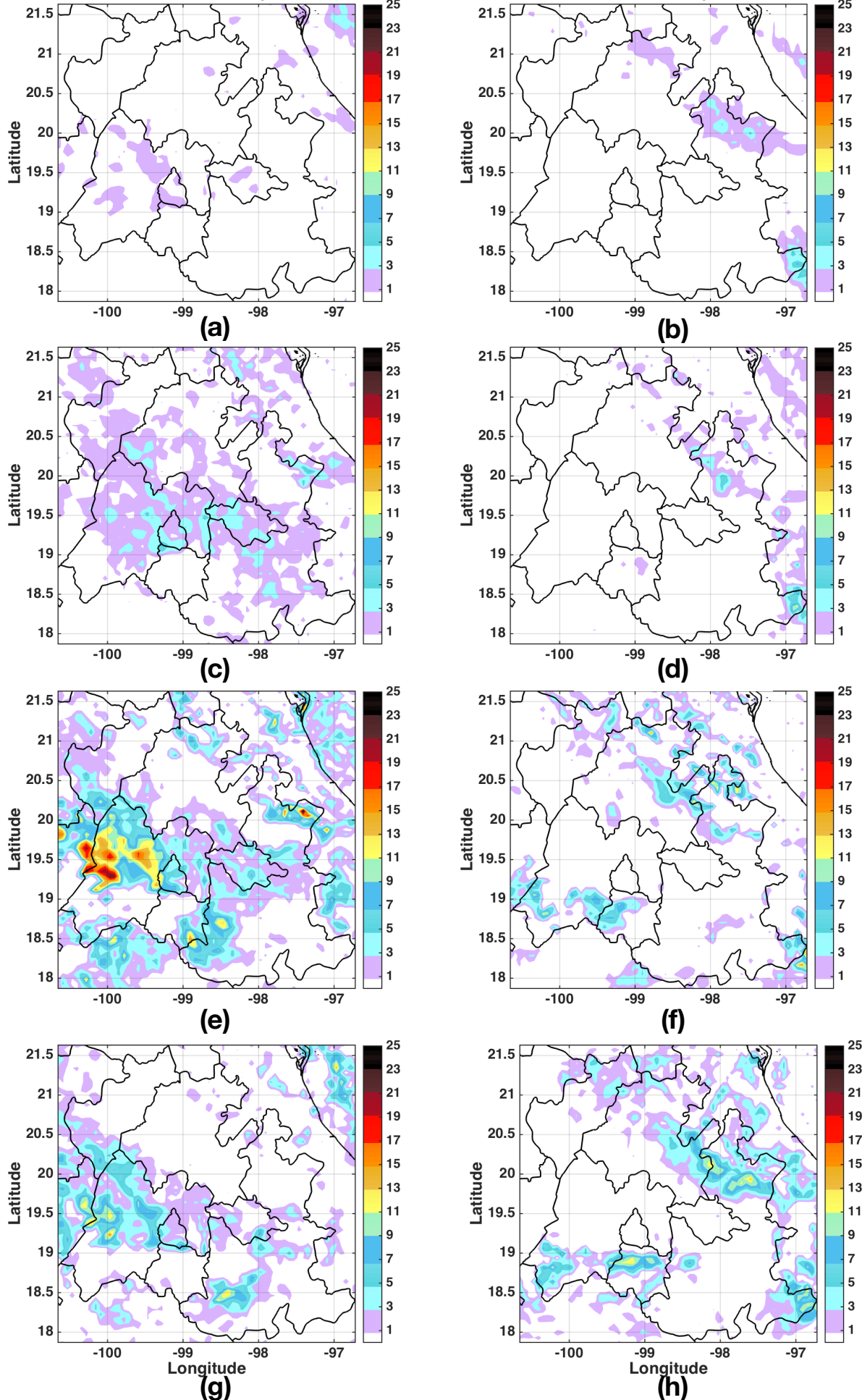
Figure S7 Absolute difference maps of average daily accumulated precipitation between NALCMS and USGS for the 48-hours forecast. Dry season (January (a-b) and April (c-d)), Rainy season (July (e-f) and September (g-h)). Left column shows the result of the operation considering only the NALCMS2005 contribution (positive values of the subtraction between NALCMS and USGS), and right column shows the result of the difference considering the USGS1993 contribution (absolute value of the negative values of the difference between NALCMS and USGS).