



Llywodraeth Cymru
Welsh Government

Capability, Suitability & Climate Programme

Effect of Climate Change on the predictive ALC map of Wales v2

5 March 2020

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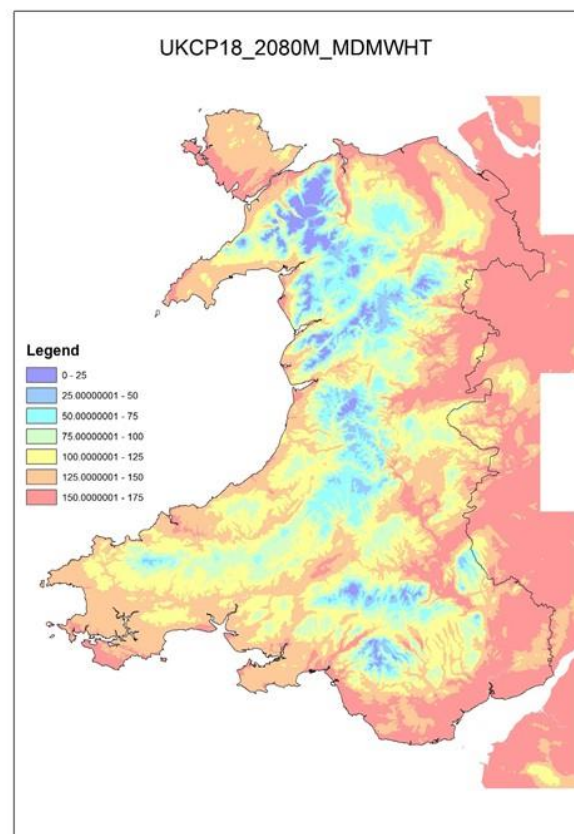
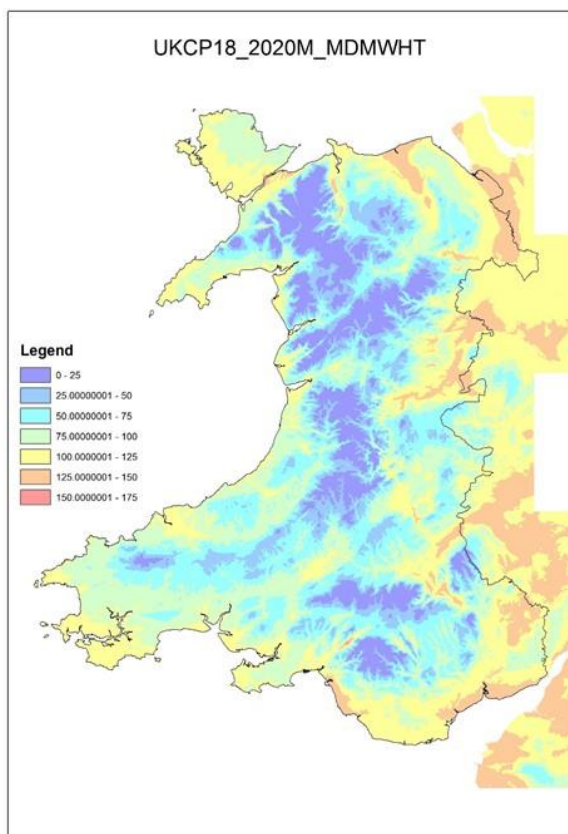


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Effect of Climate Change on the predictive ALC map of Wales v2

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Date: 05 March 2020



Contents

1	INTRODUCTION.....	3
2	METHOD	3
3	APPENDIX 1 – 5 km Agroclimatic UKCP maps.....	8
4	APPENDIX 2 – New ALC Predictions using Climate Scenarios	19
5	APPENDIX 3 Code.....	24
5.1	Perl Script to generate SQL insert script from CSV files	24
5.2	Filling in missing 5k Climate data.....	25
5.3	Interpolating 5k Climate data to 50m	29
5.4	Creating ALC grades for climate scenarios	33

Tables

<i>Table 1 5km Climate Data for England and Wales.....</i>	<i>3</i>
<i>Table 2 Parameters for Linear Regression equations</i>	<i>3</i>
<i>Table 3 Multiple Regression Equations for AT0.....</i>	<i>5</i>
<i>Table 4 Locations of additional climate scenario data</i>	<i>7</i>

Figures

<i>Figure 1 UKCP09 - Annual Average Rainfall 5km</i>	<i>8</i>
<i>Figure 2 UKCP18 - Annual Average Rainfall 5km</i>	<i>9</i>
<i>Figure 3 UKCP09 - Annual Summer Rainfall 5km</i>	<i>10</i>
<i>Figure 4 UKCP18 - Annual Summer Rainfall 5km</i>	<i>11</i>
<i>Figure 5 UKCP09 - Accumulated Temperature above 0° 5km</i>	<i>12</i>
<i>Figure 6 UKCP18 - Accumulated Temperature above 0° 5km</i>	<i>13</i>
<i>Figure 7 UKCP09 - Field Capacity Days 5km</i>	<i>14</i>
<i>Figure 8 UKCP18 - Field Capacity Days 5km</i>	<i>15</i>
<i>Figure 9 UKCP09 - Moisture Deficit for Wheat 5km</i>	<i>16</i>
<i>Figure 10 UKCP18 - Moisture Deficit for Wheat 5km</i>	<i>17</i>
<i>Figure 11 UKCP09 - Moisture Deficit for Wheat (using MORECS equation) 5km</i>	<i>18</i>
<i>Figure 12 ALC Classified by Droughtiness for UKCP18 climate scenarios</i>	<i>19</i>
<i>Figure 13 ALC Classified by Climate for UKCP18 climate scenarios</i>	<i>20</i>
<i>Figure 14 ALC Classified by Wetness for UKCP18 climate scenarios</i>	<i>21</i>
<i>Figure 15 ALC Grade (by Climate, wetness, drought, slope, depth, texture) for UKCP18 climate scenarios</i>	<i>22</i>
<i>Figure 16 Predictive ALC grade for UKCP18 climate scenarios</i>	<i>23</i>

1 INTRODUCTION

ADAS provided Cranfield with UKCP09 agroclimatic data interpolated from the Met Office data to a 5km grid using similar methods to those used in the original SP1104 project. This 5km grid data was then interpolated to a 50m grid using the OSTerrain50 dataset for the altitude at each 50m point. The methodology for interpolation was as described in 1989 Meteorological Office publication – Climatological Data for Agricultural Land Classification.

2 METHOD

1. The Nine 5km datasets from ADAS were first loaded into Oracle. To do this a perl script was written (UKCP18import.pl) which takes each .csv file and generates the required SQL code to create the tables in Oracle and load the data.

Table 1 5km Climate Data for England and Wales

ADAS file	SQL loading script	SQL table	50m Table
2020H.csv	cr_UKCP18_2020H.sql	UKCP18_2020H	ALC_CLIMATE_50M_2020H18
2020L.csv	cr_UKCP18_2020L.sql	UKCP18_2020L	ALC_CLIMATE_50M_2020L18
2020M.csv	cr_UKCP18_2020M.sql	UKCP18_2020M	ALC_CLIMATE_50M_2020M18
2050H.csv	cr_UKCP18_2050H.sql	UKCP18_2050H	ALC_CLIMATE_50M_2050H18
2050L.csv	cr_UKCP18_2050L.sql	UKCP18_2050L	ALC_CLIMATE_50M_2050L18
2050M.csv	cr_UKCP18_2050M.sql	UKCP18_2050M	ALC_CLIMATE_50M_2050M18
2080H.csv	cr_UKCP18_2080H.sql	UKCP18_2080H	ALC_CLIMATE_50M_2080H18
2080L.csv	cr_UKCP18_2080L.sql	UKCP18_2080L	ALC_CLIMATE_50M_2080L18
2080M.csv	cr_UKCP18_2080M.sql	UKCP18_2080M	ALC_CLIMATE_50M_2080M18

2. The 5km climate data provided had many missing grids around the coast. The UKCP09 and UKCP18 having different missing points. Although the missing points were not significant in the SP1104 project once the data was interpolated to 50m it became a major issue, especially in Anglesey. It was therefore decided to fill in the missing values by using regression equations based on the analyses differences between the future climate values and the original values from MetOffice(1989). The relationships were analysed and the linear equations were defined see Table 2. Unfortunately the R^2 for AT0 and ATS were not a very strong relationship. It was therefore decided to use multi-regression analysis for AAR using the Easting, Northing, Altitude and Original AT0 see Table 3. ATS was then calculated from AT0 using the original equation for calculating ATS from AT0 and Easting (to the nearest 100m):

$$ATS = 611 + 1.11 \text{ AT0} + 0.042 \text{ EAST}$$

Table 2 Parameters for Linear Regression equations

		ukcp09			ukcp18		
		slope	intercept	R ²	slope	intercept	R ²
2020L	AT0	0.753324	629.4214	0.693104	1.075337	55.0903743	0.593202

		ukcp09			ukcp18		
		slope	intercept	R ²	slope	intercept	R ²
	ATS	0.815794	794.0155	0.714957	1.047116	95.10998732	0.639527
	AAR	0.958037	24.95593	0.949484	0.959156	22.56721597	0.950847
	ASR	0.806985	39.94931	0.906026	0.803406	42.5912798	0.91098
	FCD	0.954481	0.208584	0.943509	0.953428	0.674081054	0.946419
	MDW	0.919519	43.40369	0.887654	1.011495	21.5357702	0.839131
	MDP	1.025825	46.23278	0.866474	1.12812	19.09067377	0.796251
2020M	AT0	0.754373	646.0848	0.693126	1.072816	54.8185848	0.592301
	ATS	0.819732	807.0802	0.714131	1.046093	92.91176693	0.639349
	AAR	0.958622	24.54535	0.949384	0.958882	22.90313861	0.950851
	ASR	0.805958	39.56895	0.90571	0.804074	42.77736484	0.911085
	FCD	0.955424	-0.21002	0.943261	0.952686	0.971583417	0.946404
	MDW	0.92183	45.13103	0.886561	1.010614	21.15888126	0.839088
	MDP	1.028625	48.70129	0.865438	1.127076	18.54902548	0.79615
2020H	AT0	0.755049	656.9961	0.693132	1.07614	68.57494431	0.593304
	ATS	0.822266	815.735	0.713576	1.051312	104.3144606	0.640516
	AAR	0.958919	24.3144	0.949332	0.960517	21.66777462	0.950869
	ASR	0.805439	39.37506	0.905546	0.800084	42.42955354	0.911094
	FCD	0.955937	-0.43293	0.943133	0.95498	-0.049311958	0.946219
	MDW	0.923228	46.24886	0.885887	1.013611	23.15255209	0.838921
	MDP	1.030329	50.29917	0.864795	1.130749	21.36674233	0.796238
2050L	AT0	0.787683	748.6676	0.690692	1.102382	129.1676868	0.601648
	ATS	0.870113	877.6679	0.699574	1.090812	125.7565836	0.650067
	AAR	0.966999	0.086802	0.947123	0.962417	1.160548857	0.949624
	ASR	0.733595	27.05617	0.899675	0.716765	40.78069049	0.906637
	FCD	1.023284	-30.6778	0.938547	1.001633	-23.56787462	0.943496
	MDW	0.953	65.96724	0.869447	1.029259	37.93280684	0.838412
	MDP	1.065517	77.3372	0.848773	1.151602	41.0898643	0.798221
2050M	AT0	0.792799	831.11	0.689744	1.097163	125.9000444	0.600035
	ATS	0.889536	942.524	0.694085	1.086789	121.2667107	0.649213
	AAR	0.973871	-2.78679	0.946009	0.962727	0.592783145	0.949703
	ASR	0.727499	24.52339	0.896636	0.717076	41.02858869	0.906556
	FCD	1.031893	-34.3212	0.935888	1.001347	-23.4067654	0.94358
	MDW	0.966327	74.70985	0.861982	1.026816	36.96342754	0.838134

		ukcp09			ukcp18		
		slope	intercept	R ²	slope	intercept	R ²
	MDP	1.08145	89.83313	0.841727	1.148574	39.67251022	0.797703
2050H	AT0	0.797354	904.8127	0.688655	1.116107	185.0113891	0.60506
	ATS	0.906822	1000.492	0.68902	1.117061	166.9993998	0.654327
	AAR	0.979277	-4.82937	0.945125	0.969606	-5.313551131	0.949663
	ASR	0.723292	22.73162	0.894269	0.702629	38.76918661	0.904411
	FCD	1.0381	-36.9332	0.933775	1.015633	-29.63206271	0.942014
	MDW	0.977337	82.38023	0.855568	1.04478	46.40734083	0.836356
	MDP	1.094698	100.8048	0.835725	1.170656	53.13443371	0.797589
2080L	AT0	0.786796	827.3082	0.691395	1.128357	221.9389194	0.608881
	ATS	0.874828	976.7179	0.693066	1.117341	251.5087556	0.649666
	AAR	0.96732	1.589541	0.944722	0.981898	-8.565455646	0.946492
	ASR	0.721292	22.4106	0.894694	0.688484	37.87492553	0.900607
	FCD	1.037442	-37.6243	0.932943	1.018229	-32.26815213	0.938714
	MDW	0.961579	76.21435	0.859194	1.038532	55.23804615	0.826905
	MDP	1.074576	91.67682	0.838128	1.162583	65.09622069	0.786953
2080M	AT0	0.794904	958.0201	0.689725	1.133606	261.8120316	0.609822
	ATS	0.90561	1079.626	0.683929	1.130903	281.3460819	0.651023
	AAR	0.98327	-3.79537	0.941592	0.986	-12.13382195	0.946468
	ASR	0.708112	17.37096	0.88633	0.680328	36.87063243	0.89896
	FCD	1.056948	-45.9448	0.925575	1.027064	-36.05694155	0.937735
	MDW	0.984984	90.53668	0.844439	1.046432	60.41751086	0.825011
	MDP	1.102292	112.1033	0.824309	1.172249	72.42248032	0.785755
2080H	AT0	0.804226	1109.304	0.686938	1.165296	364.2071475	0.616293
	ATS	0.94112	1198.511	0.673031	1.185687	351.5007641	0.655912
	AAR	1.004703	-9.1731	0.93739	0.999435	-23.30436562	0.946069
	ASR	0.695597	12.10909	0.875987	0.651544	34.4820644	0.889869
	FCD	1.078114	-54.8111	0.915949	1.053924	-48.53391426	0.932368
	MDW	1.011422	106.8346	0.827314	1.074843	76.93069874	0.816079
	MDP	1.133657	135.3849	0.808262	1.207606	95.8023033	0.779577

Table 3 Multiple Regression Equations for AT0

UKCP09

		Intercept	EAST	NORTH	ALT	AT0	R2
2020L	AT0	1393.092	0.000131	-0.00049	-0.29227	0.278037	0.787125
2020M	AT0	1426.221	0.000132	-0.00049	-0.30221	0.268793	0.788296
2020H	AT0	1962.273	-1.8E-06	-0.00062	-0.52444	-0.04784	0.794554
2050L	AT0	2101.349	3.63E-05	-0.00067	-0.51425	-0.0525	0.814655
2050M	AT0	2190.115	4.8E-05	-0.00068	-0.50738	-0.05476	0.819981
2050H	AT0	2269.449	5.86E-05	-0.00069	-0.50123	-0.05677	0.824562
2080L	AT0	2185.789	2.22E-05	-0.00068	-0.51148	-0.05289	0.816059
2080M	AT0	2326.526	4.09E-05	-0.00069	-0.50059	-0.05648	0.824197
2080H	AT0	2489.361	6.24E-05	-0.00071	-0.48795	-0.06062	0.832939

UKCP18

	Var	Intercept	EAST	NORTH	ALT	AT0	R2
2020L	AT0	-4687.13	0.000731	0.001171	3.190336	3.832125	0.595447
2020M	AT0	-4745.56	0.000735	0.001189	3.227603	3.864328	0.787125
2020H	AT0	2006.964	-0.0003	-0.00053	-1.00567	-0.0982	0.605413
2050L	AT0	2107.459	-0.00027	-0.00057	-0.99778	-0.10419	0.617262
2050M	AT0	2098.598	-0.00028	-0.00056	-0.99807	-0.10355	0.614898
2050H	AT0	2182.554	-0.00025	-0.00059	-0.99262	-0.10682	0.623006
2080L	AT0	2248.995	-0.00027	-0.00062	-0.99494	-0.10586	0.627028
2080M	AT0	2298.33	-0.00027	-0.00063	-0.99214	-0.10716	0.628941
2080H	AT0	2444.489	-0.00022	-0.00067	-0.98368	-0.11257	0.641678

3. As a result of the shift from the 5km point in the original ALC climate data to the centroid point in the UKCP data provided from ADAS (at 2500m offset) several points around the coast ended up over 5km away from the nearest 5km climate data. Extra points were therefore required. To populate these with meaningful data the ALC interpolation routines were used and the data extrapolated from the nearest surrounding 5km climate data in each climate scenario.

Table 4 Locations of additional climate scenario data

EAST	NORTH	UNIQUE	ID_5K
167500	222500	220165	6193
167500	227500	225165	6333
172500	222500	220170	6194
172500	207500	205170	5774
172500	212500	210170	5914
212500	322500	320210	9002
227500	392500	390225	10965
227500	397500	395225	11105
232500	372500	370230	10406
237500	362500	360235	10127
242500	362500	360240	10128

4. The 5km datasets were interpolated to 50m using an SQL script (interp_scenario.sql)

This function loops through the OS Terrain 50 points getting the easting, northing and altitude of each 50m point. The four surrounding 5km points are then selected from the 5km climate scenario data (where they exist) and the interpolation routines described in METOFFICE (1989) used to derive the climate variables at the point. The original 5km climate data in METOFFICE (1989) was on the origins of the 5km grid, while the new 5km scenario data are situated at the centre of the 5km grid (2500m offset from the origin). The Lapse rate data used to adjust the rainfall data in the original datasets was not provided in the new data. The lapse rate was therefore taken from the original data matched to the southwest corner of the 5km square.

5. The 50m datasets were then used along with the Soils_of_Wales 50m series data to create the ALC classifications (cr_ALC_GRADE_SERIES_CLIMATE.sql).

3 APPENDIX 1 – 5 km Agroclimatic UKCP maps

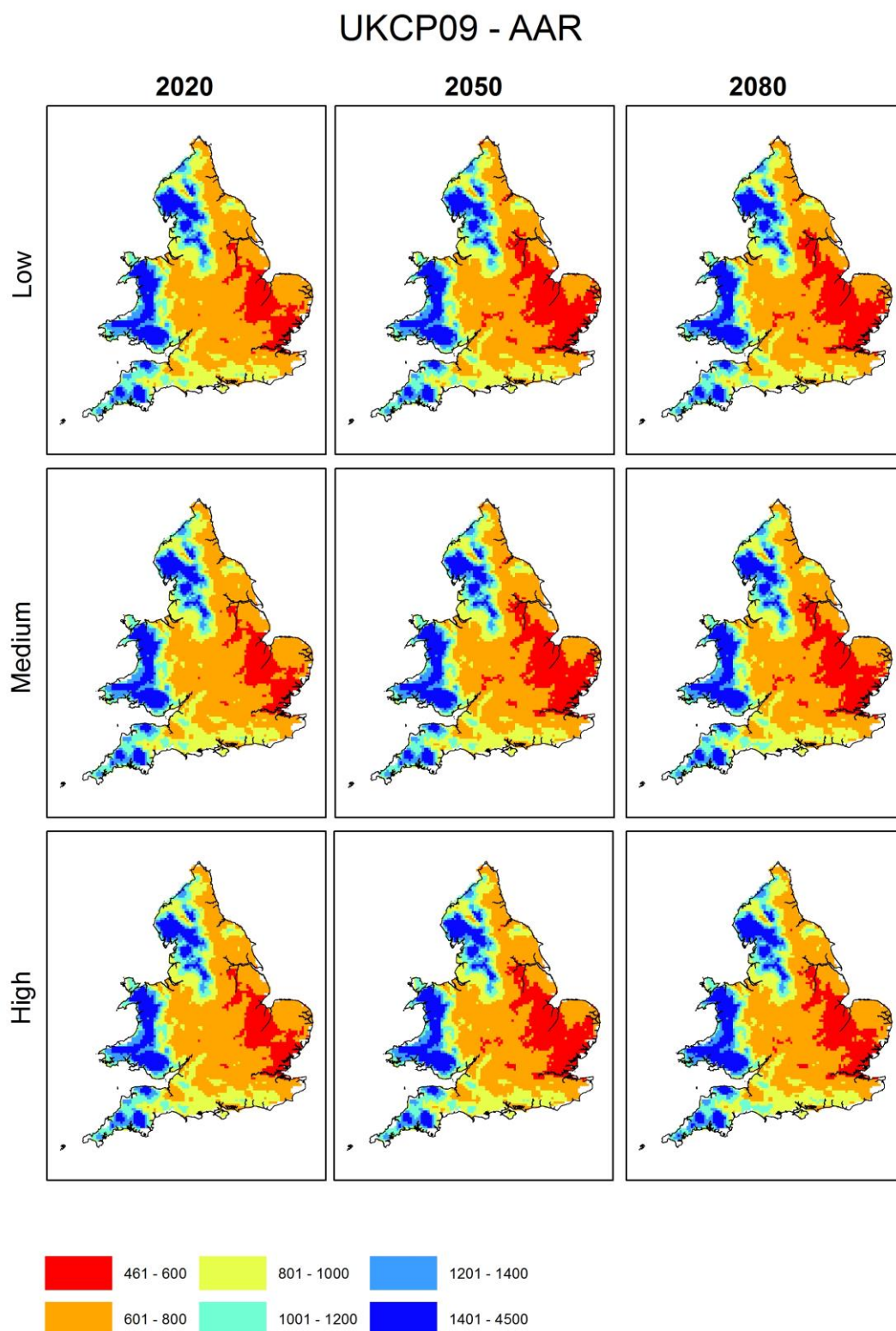


Figure 1 UKCP09 - Annual Average Rainfall 5km

UKCP18 - AAR (new)

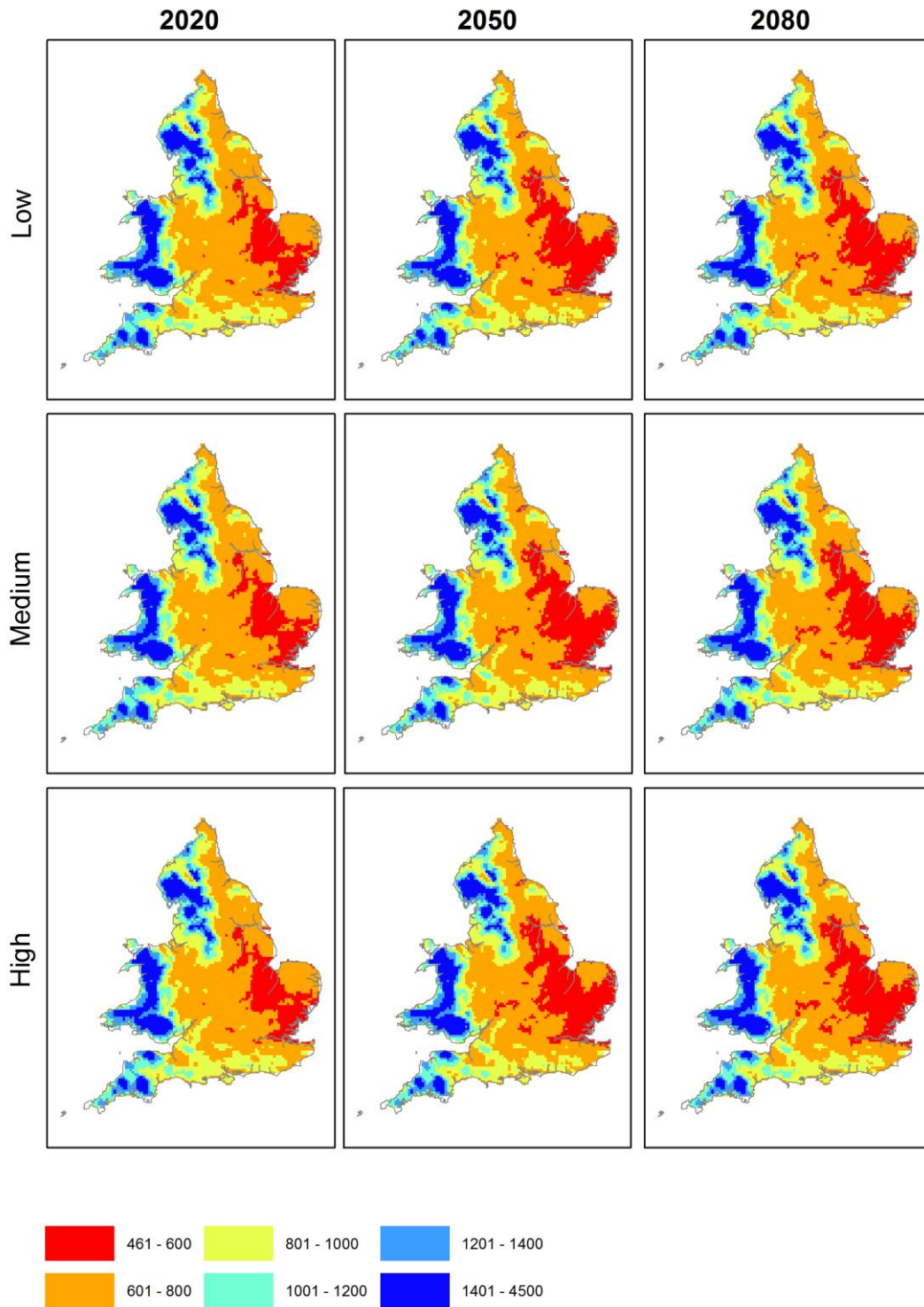


Figure 2 UKCP18 - Annual Average Rainfall 5km

UKCP09 - ASR

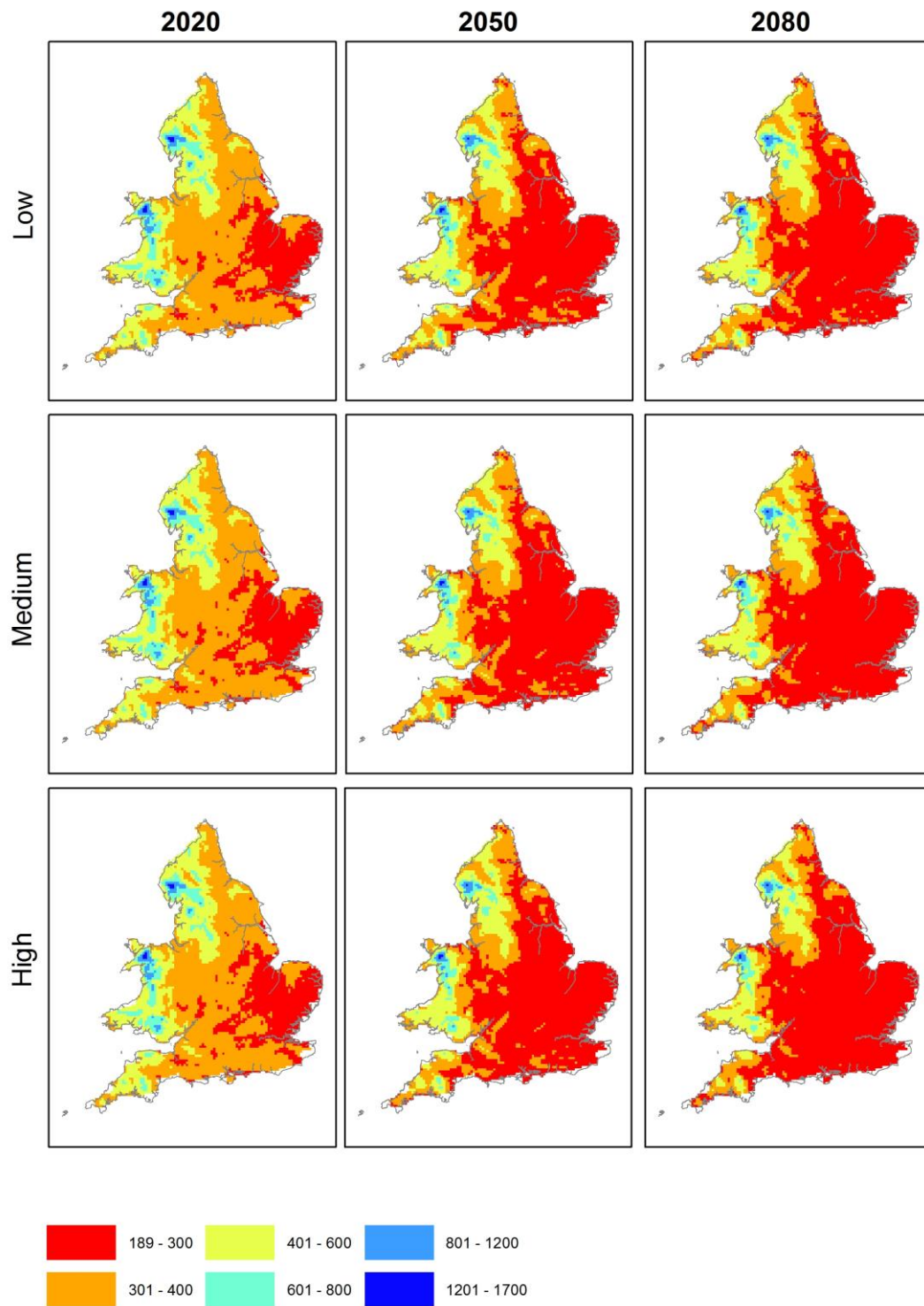


Figure 3 UKCP09 - Annual Summer Rainfall 5km

UKCP18 - ASR

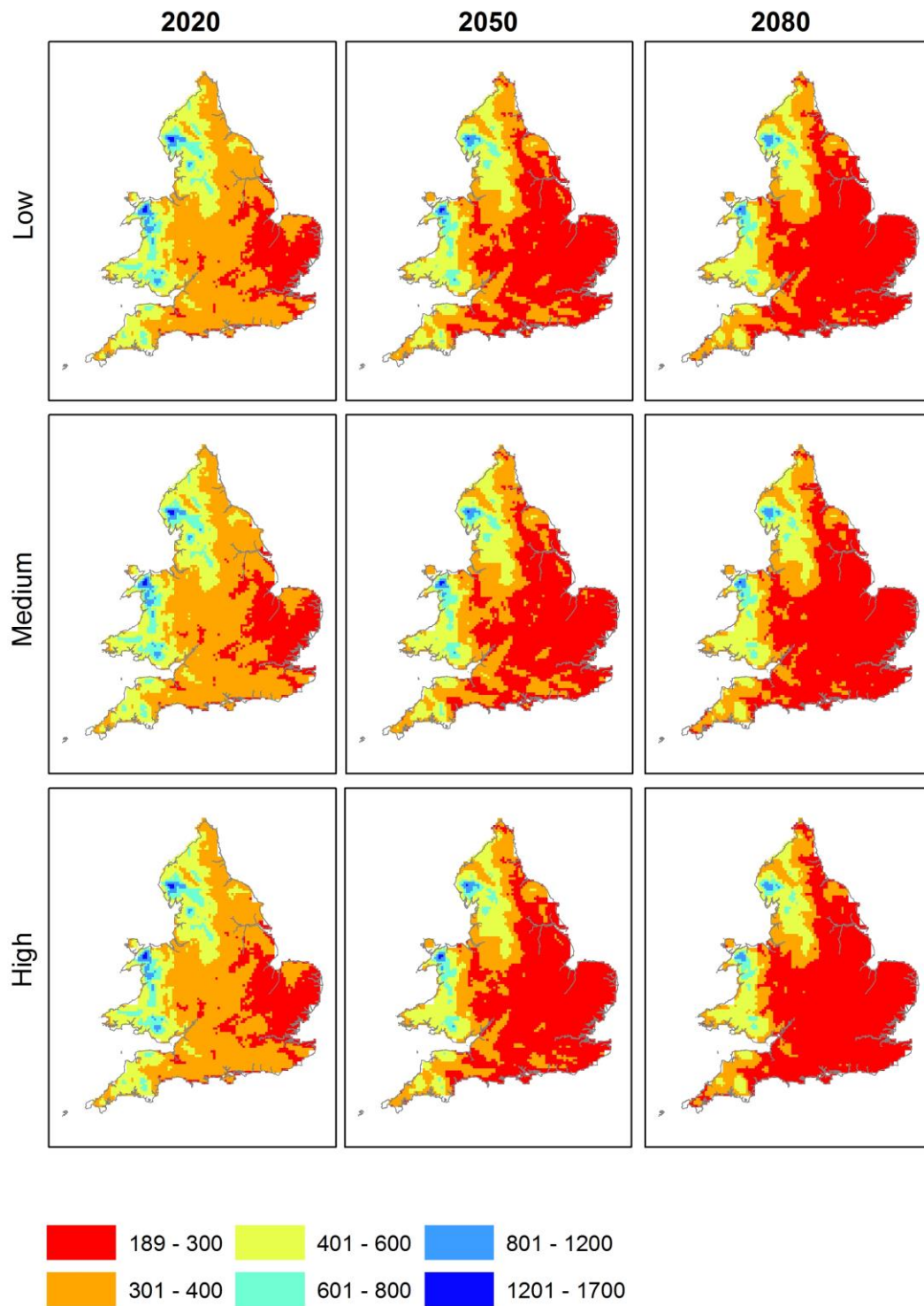


Figure 4 UKCP18 - Annual Summer Rainfall 5km

UKCP09 - AT0

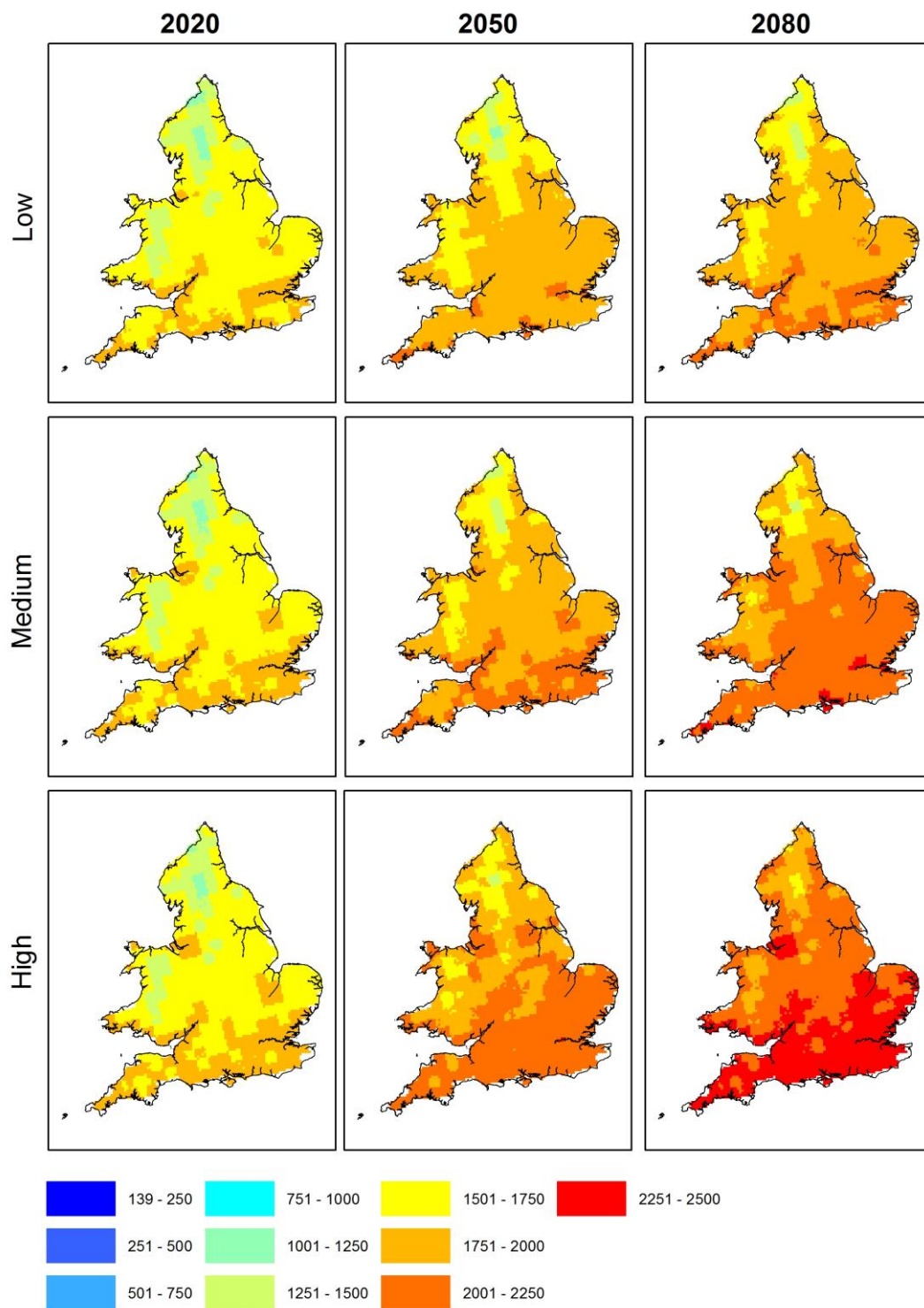


Figure 5 UKCP09 - Accumulated Temperature above 0° 5km

UKCP18 - AT0

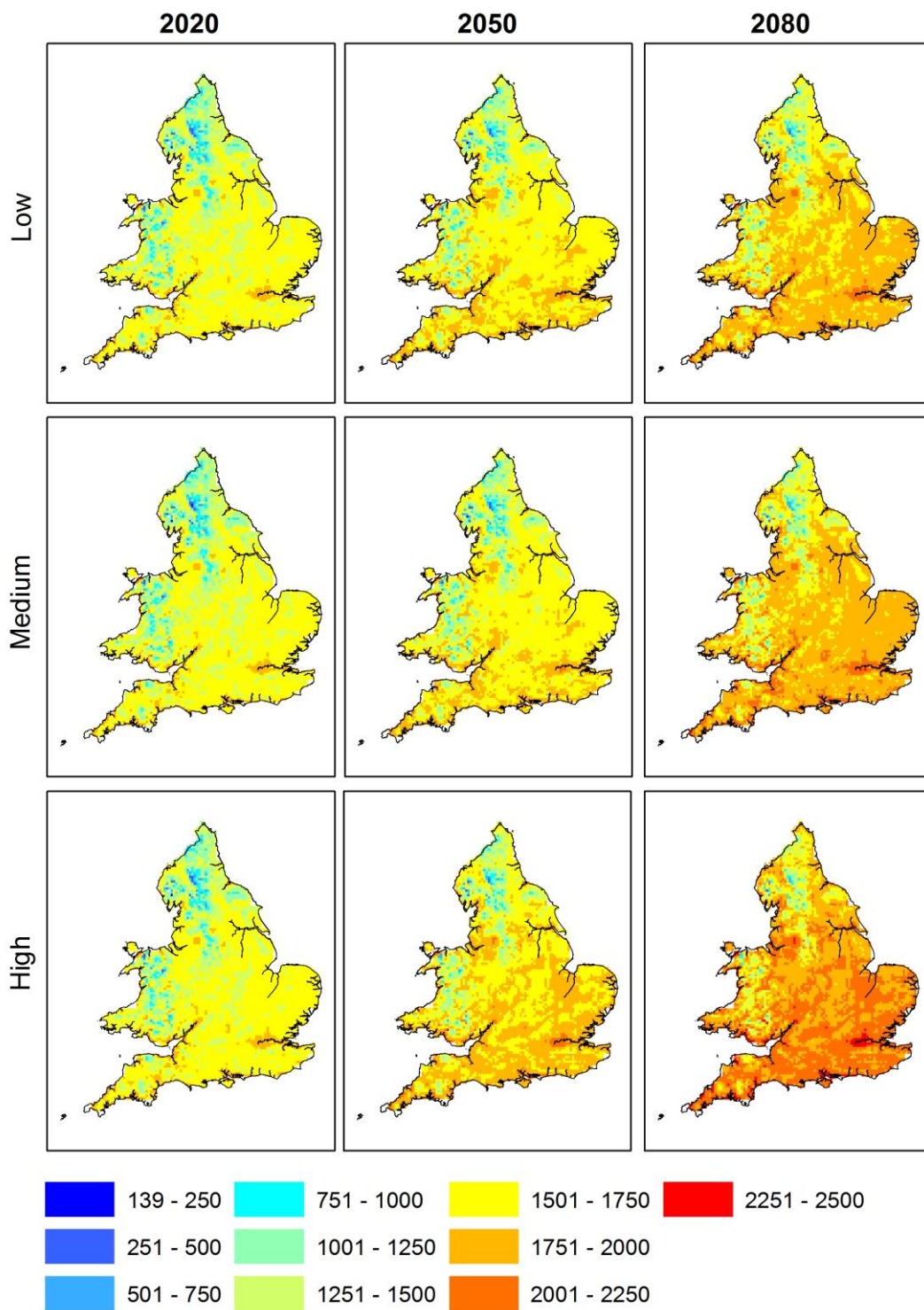


Figure 6 UKCP18 - Accumulated Temperature above 0° 5km

UKCP09 - FCD

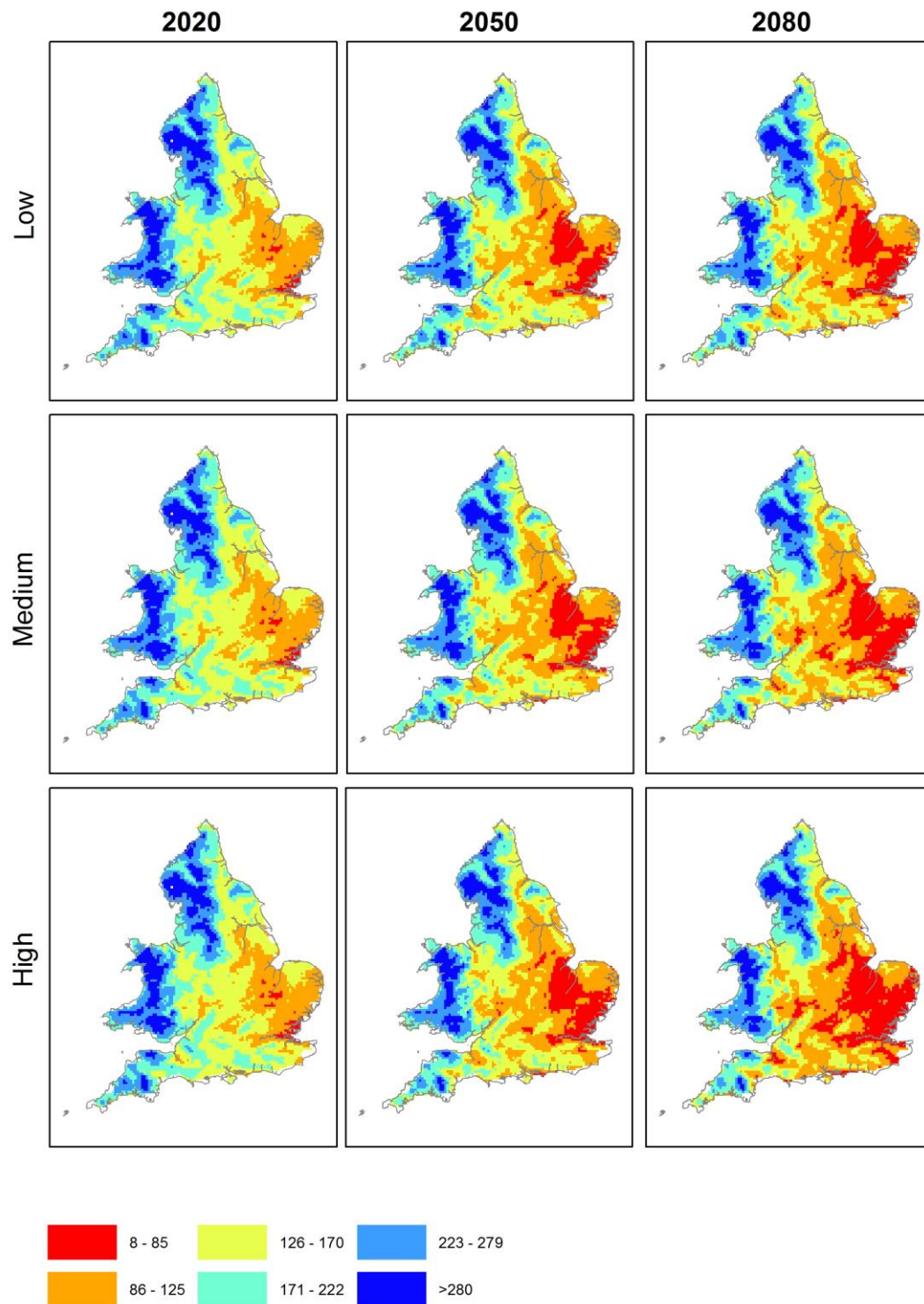


Figure 7 UKCP09 - Field Capacity Days 5km

UKCP18 - FCD

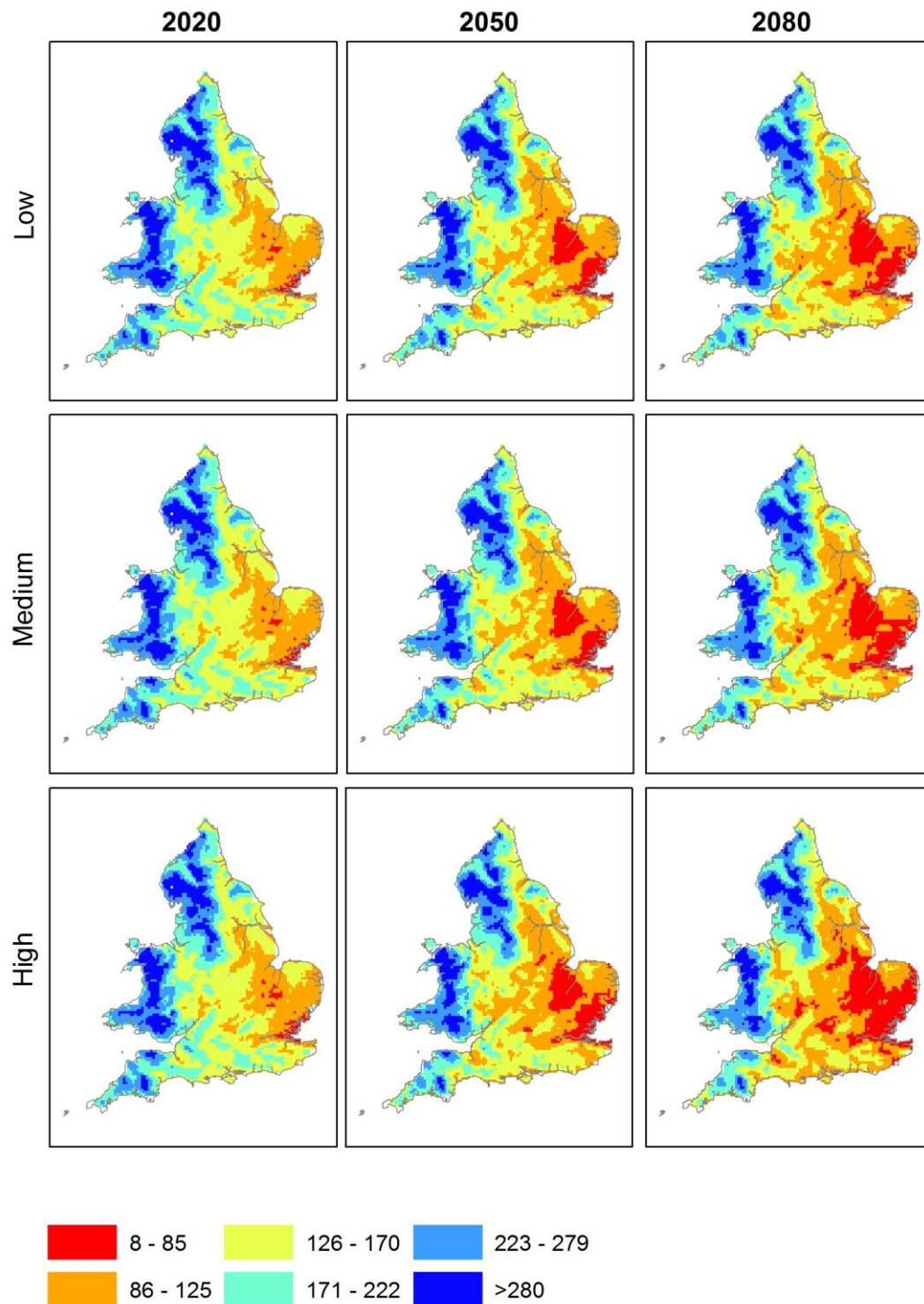


Figure 8 UKCP18 - Field Capacity Days 5km

UKCP09 - MDW

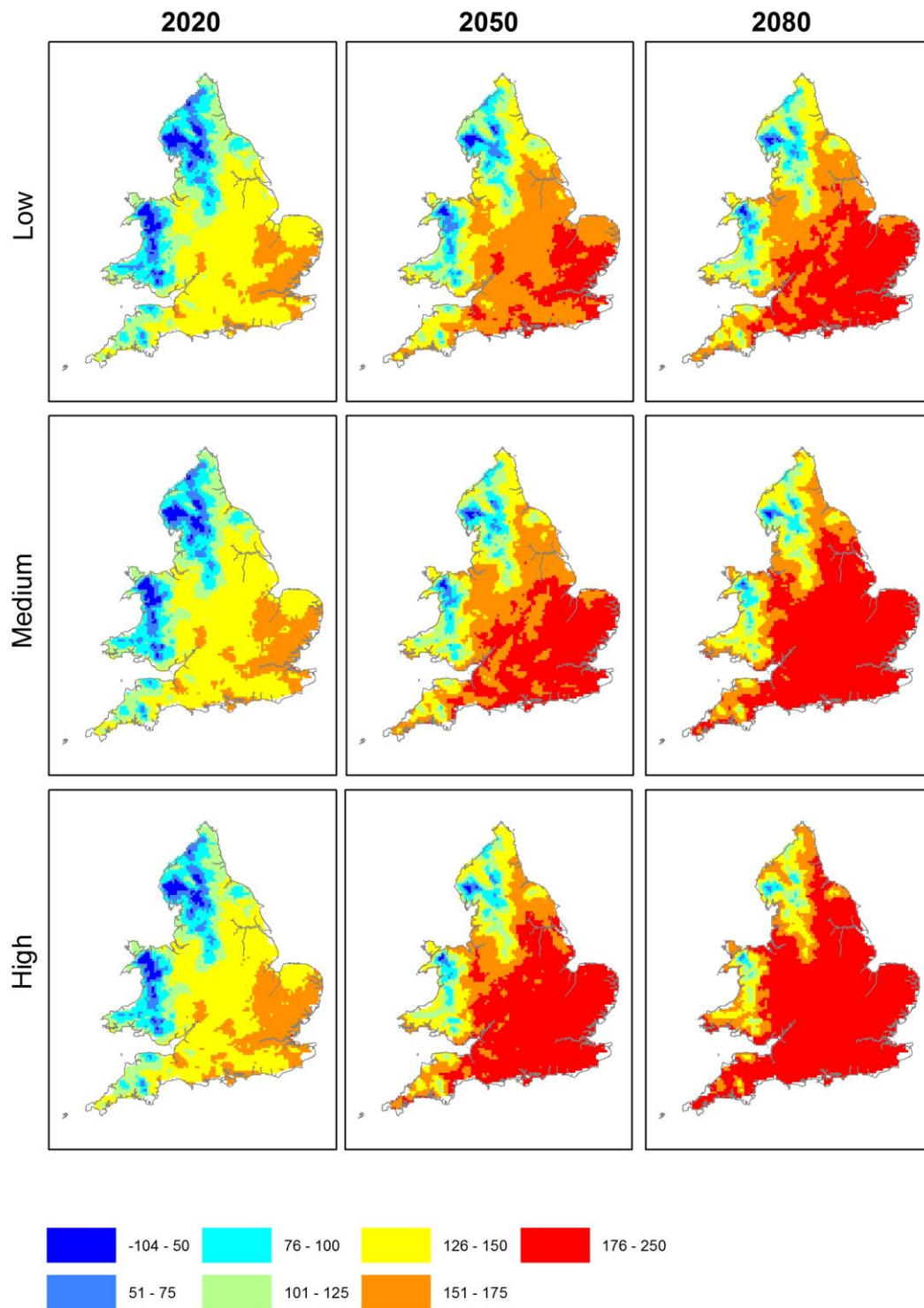


Figure 9 UKCP09 - Moisture Deficit for Wheat 5km

UKCP18 - MDW

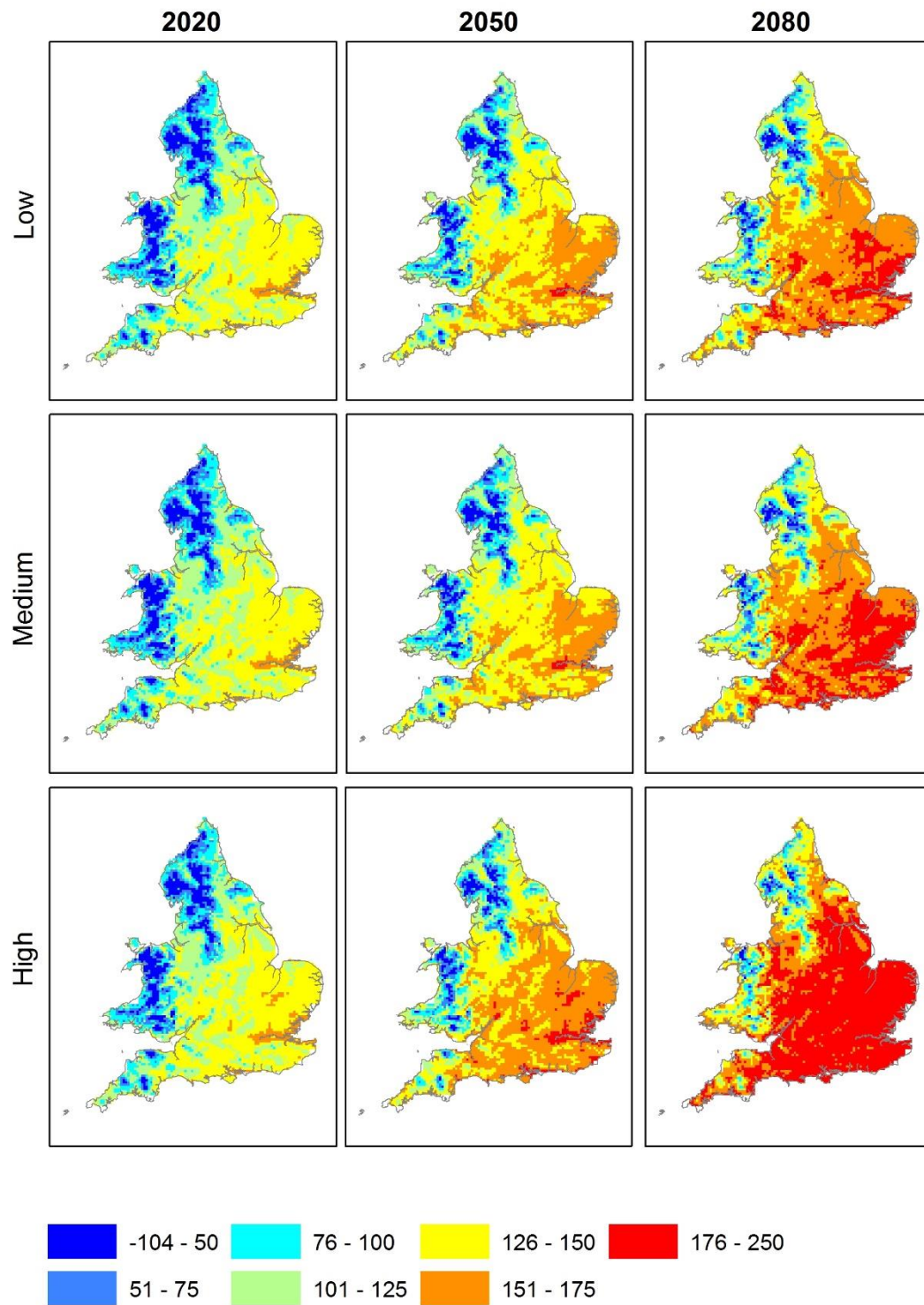


Figure 10 UKCP18 - Moisture Deficit for Wheat 5km

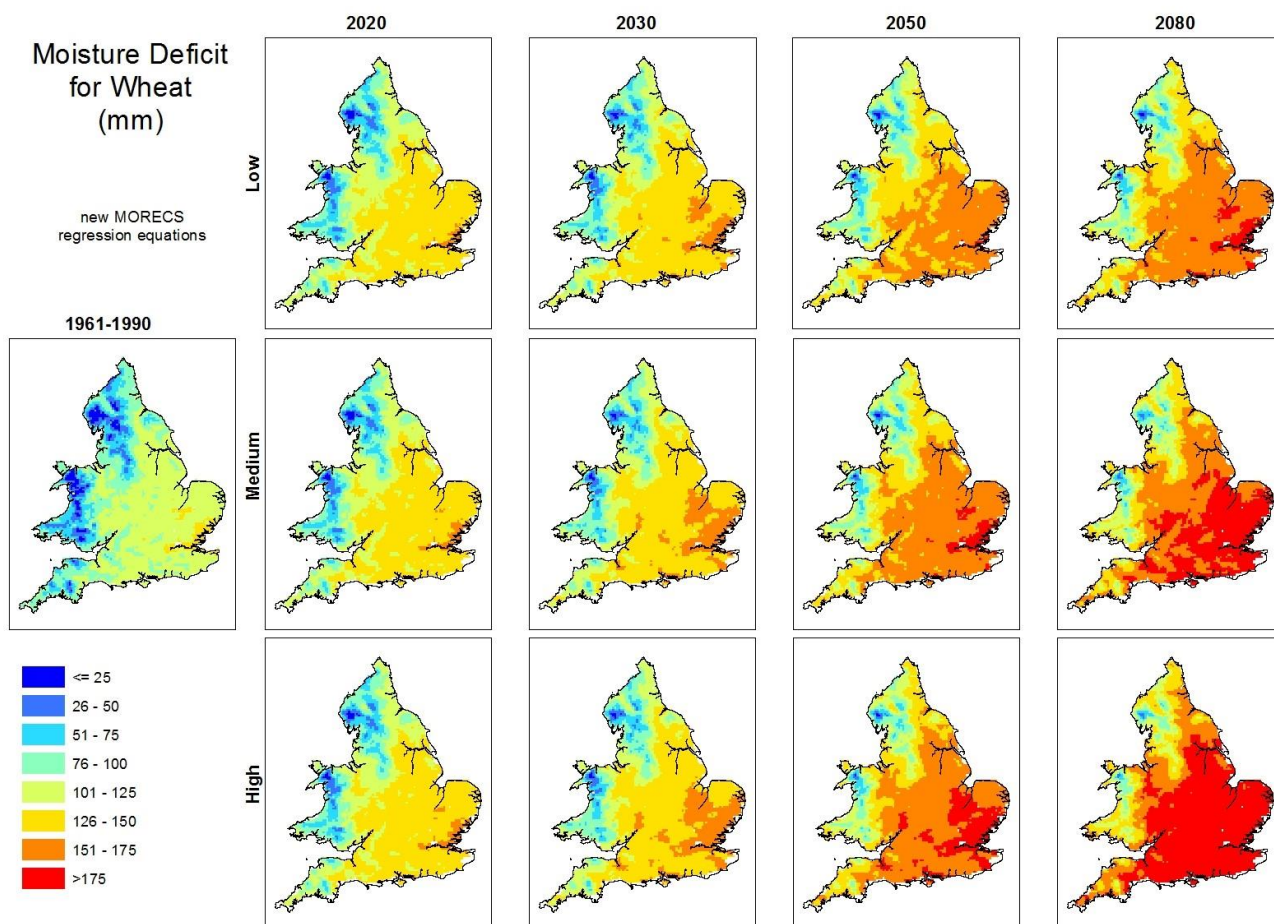


Figure 11 UKCP09 - Moisture Deficit for Wheat (using MORECS equation) 5km

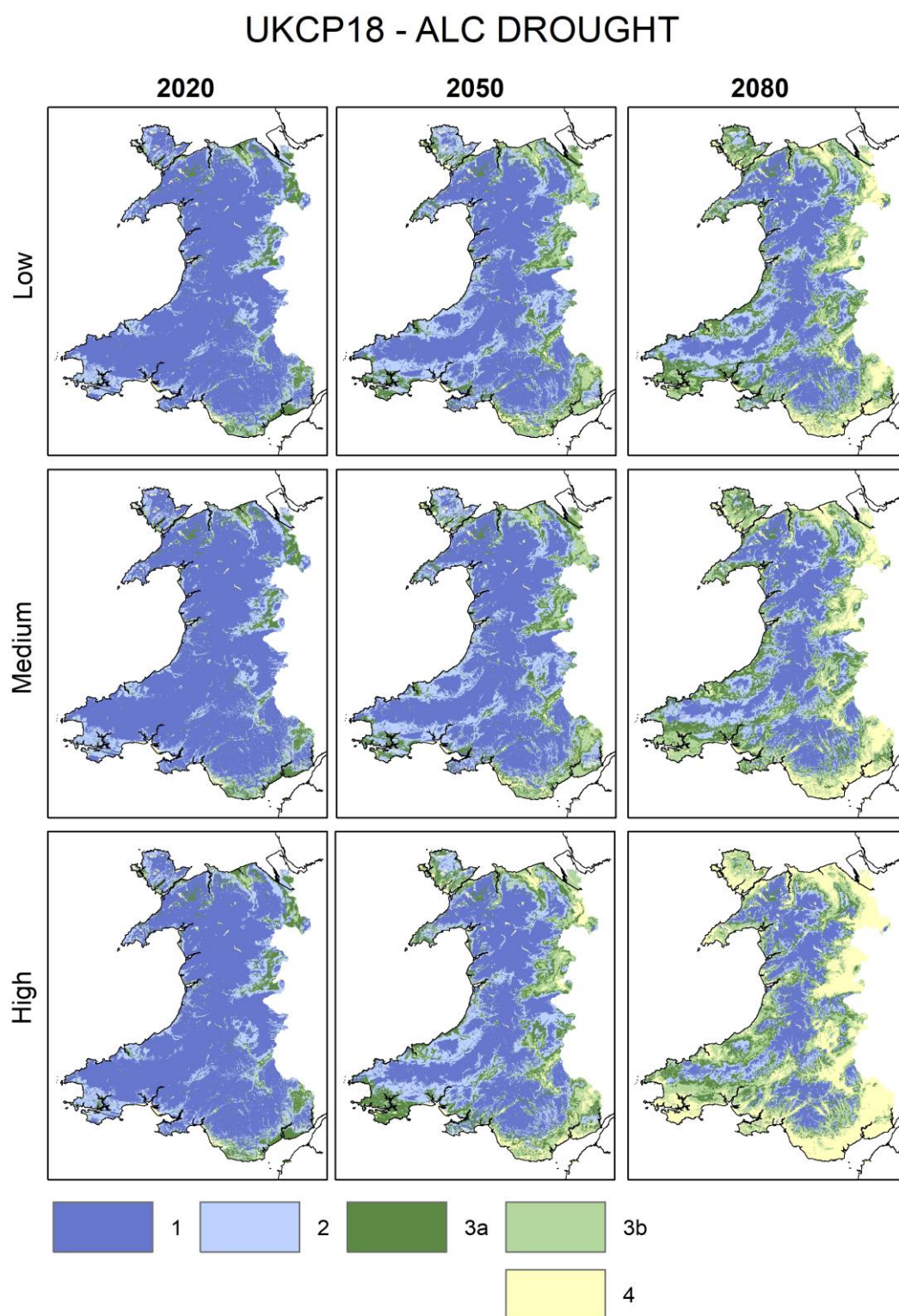


Figure 12 ALC Classified by Droughtiness for UKCP18 climate scenarios

UKCP18 - ALC CLIMATE

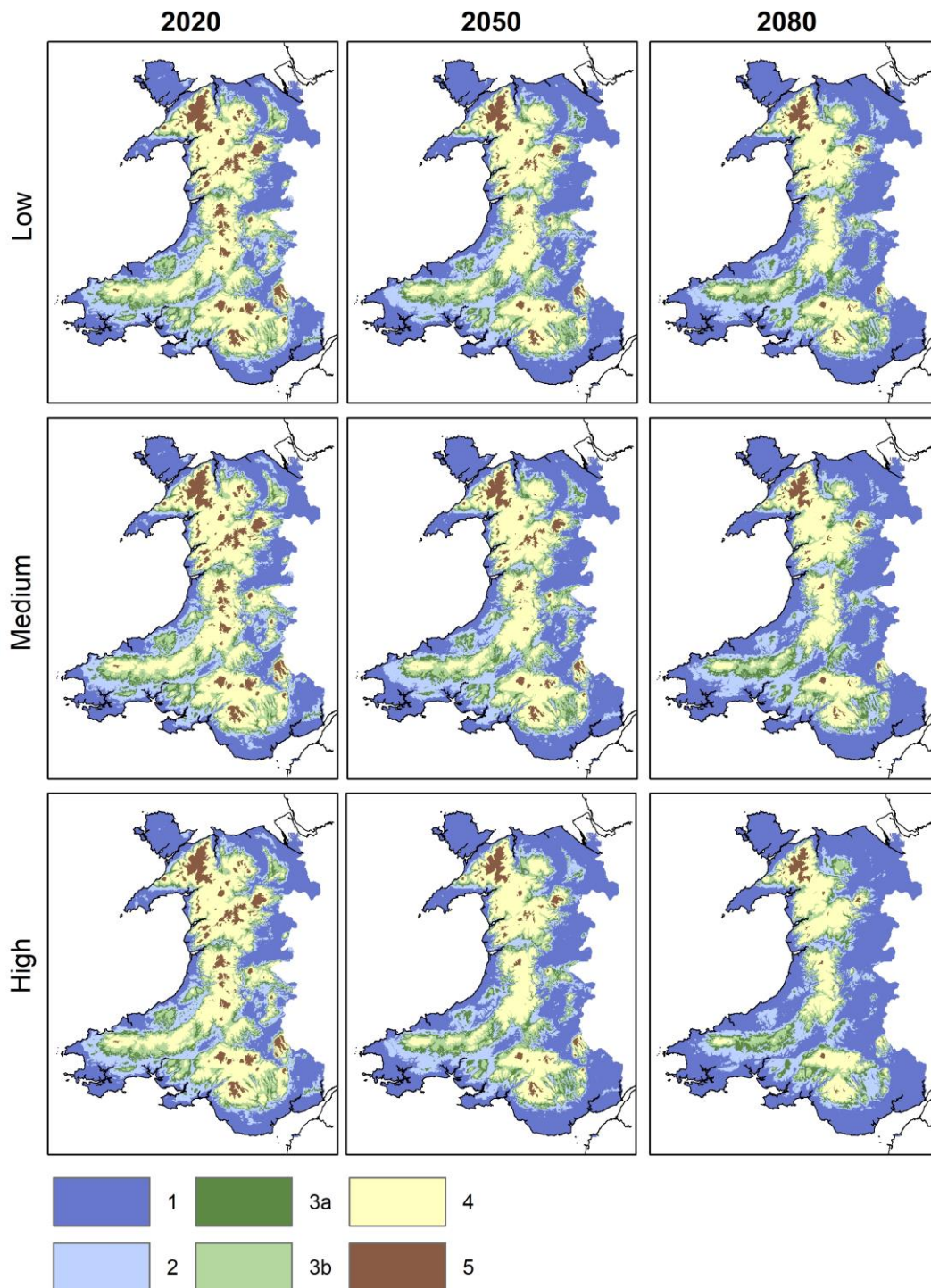


Figure 13 ALC Classified by Climate for UKCP18 climate scenarios

UKCP18 - ALC WETNESS

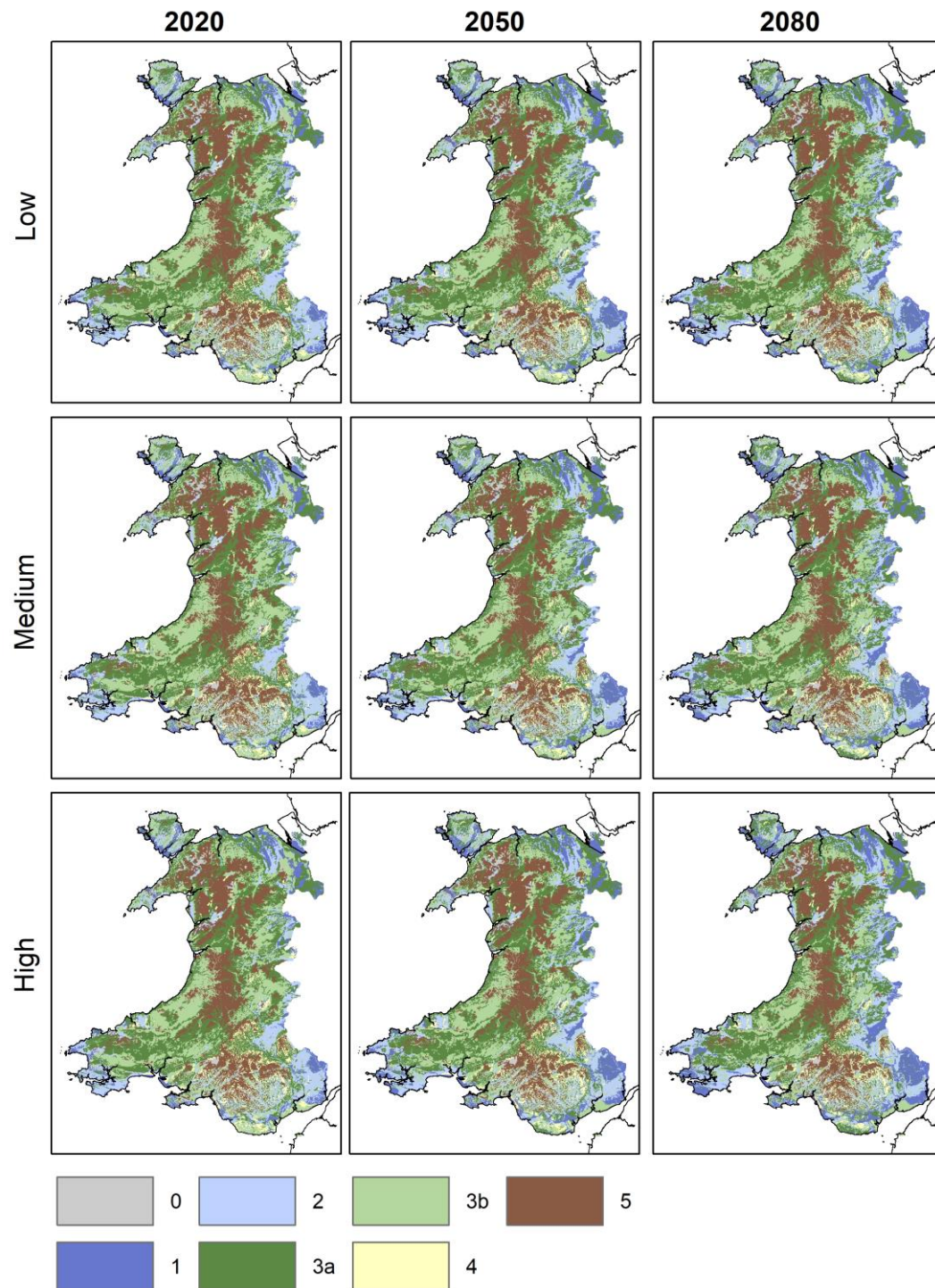


Figure 14 ALC Classified by Wetness for UKCP18 climate scenarios

UKCP18 - ALC GRADE

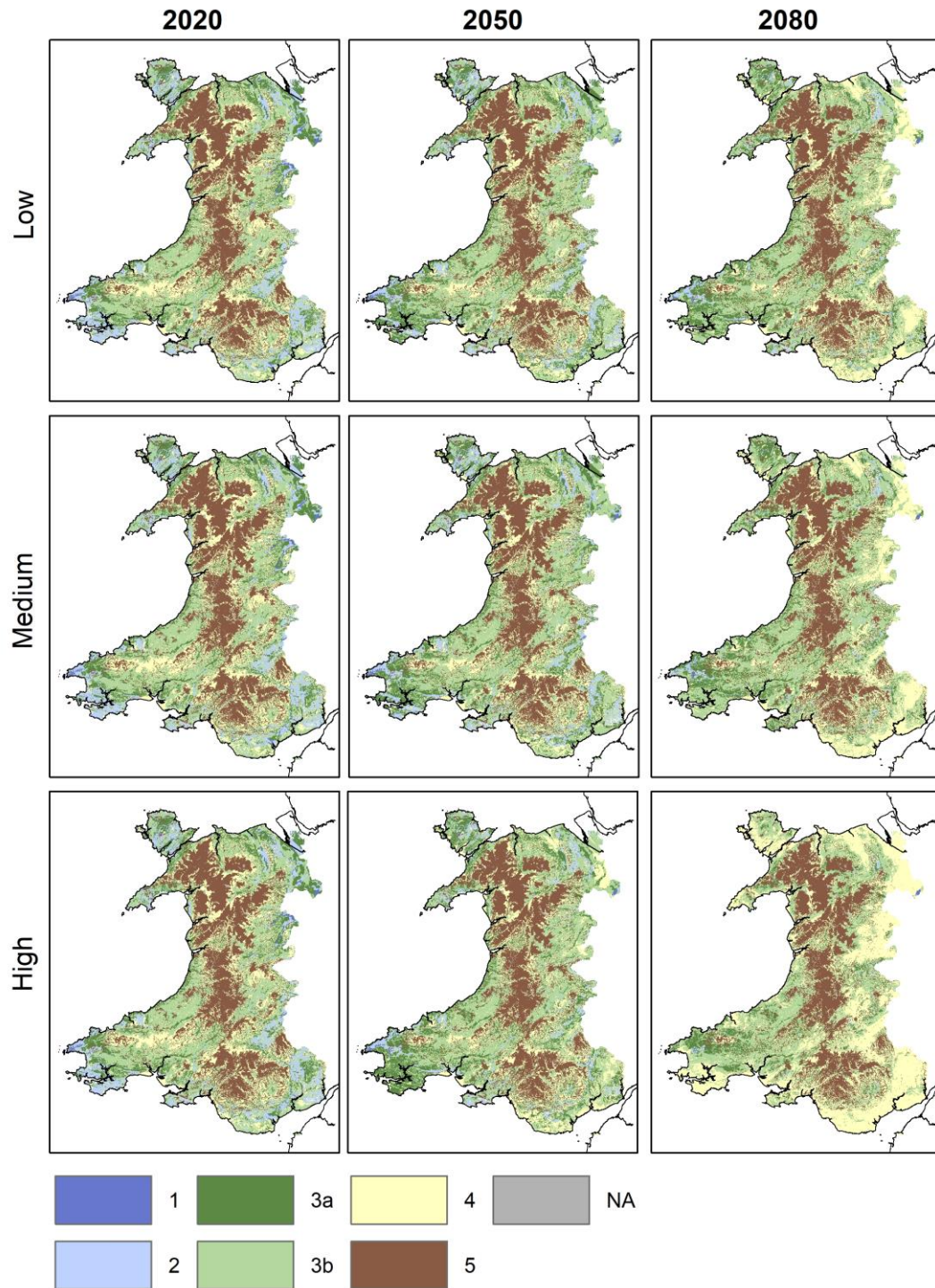


Figure 15 ALC Grade (by Climate, wetness, drought, slope, depth, texture) for UKCP18 climate scenarios

UKCP18 - PREDICTIVE ALC GRADE

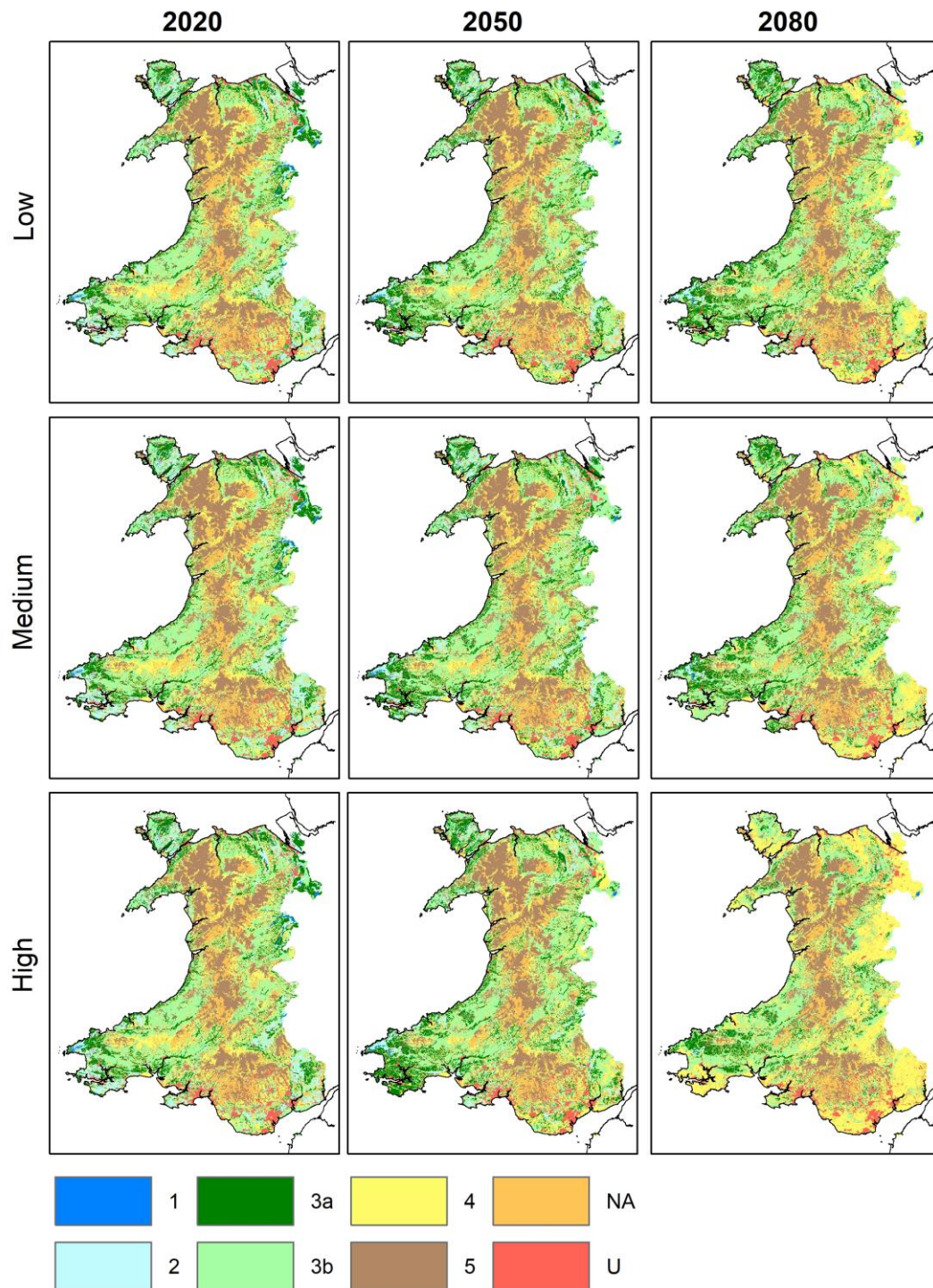


Figure 16 Predictive ALC grade for UKCP18 climate scenarios

5 APPENDIX 3 Code

5.1 Perl Script to generate SQL insert script from CSV files

```
#!/usr/bin/perl
####
#   CAK 03/07/2019
#   Call as 'perl UKCP18import.pl'
###

while ($f=<*.csv>) {
    chop ($f);chop ($f);chop ($f);chop ($f);
    open (OUTFILE, ">cr_UKCP18_$.sql");
    printf OUTFILE "DROP TABLE UKCP18_$.sql\n";
    printf OUTFILE "CREATE TABLE UKCP18_$.sql\n";
    printf OUTFILE "( GRID5K NUMBER(7,0) PRIMARY KEY,\n";
    printf OUTFILE "    UNIQUEID NUMBER(7,0),\n";
    printf OUTFILE "    EASTING NUMBER(7,0),\n";
    printf OUTFILE "    NORTHING NUMBER(7,0),\n";
    printf OUTFILE "    ALT NUMBER(11,4),\n";
    printf OUTFILE "    ATO NUMBER(11,4),\n";
    printf OUTFILE "    ATS NUMBER(11,4),\n";
    printf OUTFILE "    AAR NUMBER(11,4),\n";
    printf OUTFILE "    ASR NUMBER(11,4),\n";
    printf OUTFILE "    AWR NUMBER(11,4),\n";
    printf OUTFILE "    FCD NUMBER(11,4),\n";
    printf OUTFILE "    MDW NUMBER(11,4),\n";
    printf OUTFILE "    MDP NUMBER(11,4)\n";
    printf OUTFILE ");\n";

    open (INFILE, $.csv);
    print "Processing: ".$f."\n";
    $line=1;
    while (<INFILE>) {
        chop();
        ($sunq,$id25,$alt,$east,$north,$at0,$ats,$aar,$asr,$awr,$fcd,$mdw,$mdp) = split(/,/);
        if ($line>1) {
            print OUTFILE "INSERT INTO UKCP18_$.sql VALUES
(",int($north/5000)*140+int($east/5000),"",,$sunq,"",,$east,"",,$north,"",,$alt,"",,$at0,"",,$ats,"",,$aar,
",",$asr,"",,$awr,"",,$fcd,"",,$mdw,"",,$mdp,")\n";
        }
        $line=2;
    }
    close INFILE;
    print OUTFILE "COMMIT;\n";
    close OUTFILE;
}

# <EOF: ADASimport.pl>
```

5.2 Filling in missing 5k Climate data

```
##
## Fix missing UKCP09 climate data based on relationship with original ALC climate data
## Data added flagged as SIMULATED
##
INSERT INTO UKCP09_2020L SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
1393.09190674181+0.000131190796215384*a.EAST+-0.00048743358796038*a.NORTH+-
0.292265845695883*a.alt+0.278036959260663*a.AT0,
NULL,
0.958037366952496*a.AAR+24.9559280355484,
0.806985325370179*a.ASR+39.9493091707204,
0.954480880838771*a.FCD+0.208583853948141,
0.919519376040438*a.MDMWHT+43.4036903603249,
1.02582524936117*a.MDMPOT+46.2327794668448,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2020L b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2020M SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
1426.22079691693+0.000132166248344868*a.EAST+-0.000493615602005055*a.NORTH+-
0.302205326534303*a.alt+0.268793410999338*a.AT0,
NULL,
0.958621784593174*a.AAR+24.545351099484,
0.805958274818238*a.ASR+39.5689543200518,
0.955424480962178*a.FCD+-0.210017994287028,
0.921829543289826*a.MDMWHT+45.1310344257577,
1.02862473015132*a.MDMPOT+48.7012888918977,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2020M b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2020H SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
1962.27275753293+-1.82756705483264E-06*a.EAST+-0.000618690406187118*a.NORTH+-0.524439786152989*a.alt+-
0.0478440782202294*a.AT0,
NULL,
0.958918713338102*a.AAR+24.3144034645044,
0.805439481962427*a.ASR+39.3750610129121,
0.955937416254484*a.FCD+-0.432932956302523,
0.923227703197371*a.MDMWHT+46.248860437607,
1.03032946102801*a.MDMPOT+50.299171448462,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2020H b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2050L SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2101.34934400592+0.000036271219872662*a.EAST+-0.000674082724971551*a.NORTH+-0.514253064843534*a.alt+-
0.0525032277339388*a.AT0,
NULL,
0.966998619831461*a.AAR+0.0868015502245498,
0.733595192098534*a.ASR+27.0561706479633,
1.02328387547926*a.FCD+-30.6777669790383,
0.953000209090015*a.MDMWHT+65.9672414925365,
1.06551708836548*a.MDMPOT+77.3372020727928,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2050L b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2050M SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2190.114743069+4.80498774294724E-05*a.EAST+-0.000684617580159193*a.NORTH+-0.507384357083268*a.alt+-
0.0547588944157172*a.AT0,
NULL,
0.973870809295639*a.AAR+-2.78678664192535,
0.727498969741274*a.ASR+24.5233866307909,
1.03189349237101*a.FCD+-34.3212173654116,
0.966327334115834*a.MDMWHT+74.7098500346177,
1.08145017417674*a.MDMPOT+89.8331339380641,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2050M b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2050H SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2269.44918653473+5.85564995356258E-05*a.EAST+-0.000694042115942008*a.NORTH+-0.501231234761646*a.alt+-
0.0567679670041373*a.AT0,
NULL,
0.979277455275475*a.AAR+-4.8293724874253,
0.723291621280475*a.ASR+22.7316155554972,
1.03810031134864*a.FCD+-36.933151276748,
0.977336786660974*a.MDMWHT+82.3802303127805,
```

```

1.09469758952671*a.MDMPOT+100.804754444756,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2050H b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2080L SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2185.78851983508+2.22495642335761E-05*a.EAST+-0.000678106819468988*a.NORTH+-0.511479655053184*a.alt+-
0.0528924672894483*a.AT0,
NULL,
0.967319672899706*a.AAR+1.58954140491164,
0.72129151808287*a.ASR+22.4105960107094,
1.0374419607202*a.FCD+-37.6243094702619,
0.961578758193276*a.MDMWHT+76.2143540336445,
1.0745755127863*a.MDMPOT+91.6768238118788,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2080L b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2080M SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2326.525889237+4.09139902402952E-05*a.EAST+-0.000694780399756904*a.NORTH+-0.500585947911159*a.alt+-
0.0564801670693741*a.AT0,
NULL,
0.983270401821108*a.AAR+-3.7953696241857,
0.708112057355095*a.ASR+17.3709594407282,
1.05694823837538*a.FCD+-45.94479307844,
0.984983856710847*a.MDMWHT+90.5366818876459,
1.10229172722669*a.MDMPOT+112.10334437122,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2080M b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP09_2080H SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2489.36086118063+6.23894659400134E-05*a.EAST+-0.000714068577352197*a.NORTH+-0.487950677793219*a.alt+-
0.0606151646608422*a.AT0,
NULL,
1.00470294300612*a.AAR+-9.17310160739896,
0.695597054404259*a.ASR+12.1090935811924,
1.07811436699852*a.FCD+-54.8111316146557,
1.01142182639598*a.MDMWHT+106.834634507446,
1.13365729909777*a.MDMPOT+135.38491351112,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp09_2080H b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;

##
## Fix missing UKCP18 climate data based on relationship with original ALC climate data
## Data added flagged as SIMULATED
##

INSERT INTO UKCP18_2020L SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
-
4687.12716985912+0.000731151133726957*a.EAST+0.00117106420934636*a.NORTH+3.1903356048658*a.alt+3.832124690
37943*a.AT0,
NULL,
0.95915569288944*a.AAR+22.5672159696991,
0.803406321732999*a.ASR+42.5912797995866,NULL,
0.953428494692034*a.FCD+0.674081053650838,
1.0114953866724*a.MDMWHT+21.5357702026589,
1.1281196267639*a.MDMPOT+19.0906737727394,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2020L b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2020M SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
-
4745.5566380634+0.000735423584905908*a.EAST+0.00118861072493228*a.NORTH+3.22760263594665*a.alt+3.864328301
6891*a.AT0,
NULL,
0.958882062924229*a.AAR+22.9031386143549,
0.80407367658498*a.ASR+42.7773648404594,NULL,
0.952685635282963*a.FCD+0.971583416740856,
1.01061350990511*a.MDMWHT+21.1588812597067,
1.12707636197815*a.MDMPOT+18.5490254772314,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2020M b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2020H SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,

```

```

2006.96376650764+-0.000300265412054946*a.EAST+-0.000528205379104034*a.NORTH+-1.00567037017496*a.alt+-
0.0981974831674906*a.AT0,
NULL,
0.960517176391054*a.AAR+21.667774616123,
0.800083577392312*a.ASR+42.4295535371003,NULL,
0.954979618164793*a.FCD+-0.0493119584967019,
1.01361071834879*a.MDMWHT+23.1525520937097,
1.13074861232473*a.MDMPOT+21.3667423272147,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2020H b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2050L SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2107.45906053048+-0.000272756671418667*a.EAST+-0.000567323274577673*a.NORTH+-0.997779499597726*a.alt+-
0.104190501772524*a.AT0,
NULL,
0.962417259968935*a.AAR+1.16054885730603,
0.716765151600857*a.ASR+40.7806904929014,NULL,
1.00163348139292*a.FCD+-23.5678746197645,
1.02925862646088*a.MDMWHT+37.9328068367727,
1.15160227792899*a.MDMPOT+41.089864295277,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2050L b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2050M SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2098.59760455249+-0.000282240195820654*a.EAST+-0.000560708190622203*a.NORTH+-0.998074024473188*a.alt+-
0.103545202396738*a.AT0,
NULL,
0.962727454588418*a.AAR+0.59278314469077,
0.717075785615016*a.ASR+41.028588692947,NULL,
1.00134735367805*a.FCD+-23.4067653960543,
1.02681576757869*a.MDMWHT+36.963427538783,
1.14857443139973*a.MDMPOT+39.6725102204528,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2050M b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2050H SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2182.55392757313+-0.000254565781899658*a.EAST+-0.000589605899477144*a.NORTH+-0.992617361404445*a.alt+-
0.1068234075003*a.AT0,
NULL,
0.96960609161941*a.AAR+-5.31355113081554,
0.702628669456201*a.ASR+38.769186611435,NULL,
1.01563269304392*a.FCD+-29.6320627066284,
1.04478013164826*a.MDMWHT+46.407340832275,
1.17065576102314*a.MDMPOT+53.134433710209,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2050H b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2080L SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2248.9951326464+-0.000269242559495039*a.EAST+-0.000615403627046473*a.NORTH+-0.994939060333789*a.alt+-
0.105860013148755*a.AT0,
NULL,
0.981897985120499*a.AAR+-8.56545564645194,
0.688484002536322*a.ASR+37.8749255299599,NULL,
1.01822889958045*a.FCD+-32.2681521283491,
1.03853210997128*a.MDMWHT+55.2380461534964,
1.16258345981899*a.MDMPOT+65.096220691332,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2080L b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2080M SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2298.33019295387+-0.000266126007992345*a.EAST+-0.000625098237713046*a.NORTH+-0.992139424847234*a.alt+-
0.107161861989518*a.AT0,
NULL,
0.985999721441057*a.AAR+-12.1338219464658,
0.680327657636142*a.ASR+36.8706324339647,NULL,
1.02706402938029*a.FCD+-36.0569415493447,
1.04643214023296*a.MDMWHT+60.4175108648075,
1.17224947029709*a.MDMPOT+72.422480323851,'Y'
FROM landis.alc_climate_5k a, metoffice.ukcp18_2080M b
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
INSERT INTO UKCP18_2080H SELECT a.id_5k, trunc(a.north/1000)*1000+trunc(a.east/1000),
a.east+2500,a.north+2500,a.alt,
2444.48895682927+-0.00022485726461786*a.EAST+-0.000673833288150932*a.NORTH+-0.983681399130201*a.alt+-
0.11256791817782*a.AT0,
NULL,

```

```
0.999434858576552*a.AAR+-23.3043656241349,  
0.651543812889636*a.ASR+34.4820643959113,NULL,  
1.05392354850122*a.FCD+-48.5339142617406,  
1.07484327662706*a.MDMWHT+76.9306987394013,  
1.20760579008171*a.MDMPOT+95.8023033036339,'Y'  
FROM landis.alc_climate_5k a, metoffice.ukcp18_2080H b  
WHERE a.id_5k =b.grid5k(+) and b.grid5k is null;
```

5.3 Interpolating 5k Climate data to 50m

```
## Interp_Scenario.sql
### &1 = 50km Sheet XYY where XX = 100km square i.e. SH and YY = NE,NW,SE,SW
### &2 = year and scenario [2020L,2020M,2020H,2050L,2050M,2050H,2080L,2080M,2080H]
### &3 = UKCP - 09 or 18
### &4 = name of tablespace in Oracle system (AGROCLIM,METOFFICE...)

DROP TABLE "ALC"."ALC_CLIMATE_50M_&1&2&3";
CREATE TABLE "ALC"."ALC_CLIMATE_50M_&1&2&3"
(
  "POINTID" NUMBER(12,0) PRIMARY KEY,
  "EAST50" NUMBER(8,0),
  "NORTH50" NUMBER(8,0),
  "AAR" NUMBER,
  "LR_AAR" NUMBER,
  "ASR" NUMBER,
  "LR_ASR" NUMBER,
  "AT0" NUMBER,
  "ATS" NUMBER,
  "MDMWHT" NUMBER,
  "MDMPOT" NUMBER,
  "FCD" NUMBER)
  TABLESPACE &4;
ALTER TABLE "ALC"."ALC_CLIMATE_50M_&1&2&3" NOLOGGING;

DECLARE
  CURSOR points50m IS SELECT a.POINTID, a.EAST50, a.NORTH50, a.ALTITUDE FROM ALC.ALC_CLIMATE_50M_&1 a;
  scenario varchar2(8);
  AAR_S number;
  LR_AAR_S number;
  ASR_S number;
  LR_ASR_S number;
  AT0_S number;
  ATS_S number;
  FCD_S number;
  MDMWHT_S number;
  MDMPOT_S number;
  emin number;
  emax number;
  nmin number;
  nmax number;
  Ct_nw number;
  Ct_sw number;
  Ct_se number;
  Ct_ne number;
  alt_nw number;
  alt_sw number;
  alt_se number;
  alt_ne number;
  aar_nw number :=0;
  aar_sw number :=0;
  aar_se number :=0;
  aar_ne number :=0;
  aara_nw number;
  aara_sw number;
  aara_se number;
  aara_ne number;
  ASR_nw number :=0;
  ASR_sw number :=0;
  ASR_se number :=0;
  ASR_ne number :=0;
  ASRa_nw number;
  ASRa_sw number;
  ASRa_se number;
  ASRa_ne number;
  AT0_nw number :=0;
  AT0_sw number :=0;
  AT0_se number :=0;
  AT0_ne number :=0;
  AT0a_nw number;
  AT0a_sw number;
  AT0a_se number;
```

```

AT0a_ne number;
FCD_nw number :=0;
FCD_sw number :=0;
FCD_se number :=0;
FCD_ne number :=0;
FCDa_nw number;
FCDa_sw number;
FCDa_se number;
FCDa_ne number;
lr_nw number;
lr_sw number;
lr_se number;
lr_ne number;
lrs_nw number;
lrs_sw number;
lrs_se number;
lrs_ne number;
MDMw_nw number;
MDMw_sw number;
MDMw_se number;
MDMw_ne number;
mdw_nw number;
mdw_sw number;
mdw_se number;
mdw_ne number;
MDMp_nw number;
MDMp_sw number;
MDMp_se number;
MDMp_ne number;
mdp_nw number;
mdp_sw number;
mdp_se number;
mdp_ne number;
dsg_nw number;
dsg_sw number;
dsg_se number;
dsg_ne number;
Wg_nw number;
Wg_sw number;
Wg_se number;
Wg_ne number;
Wp_nw number;
Wp_sw number;
Wp_se number;
Wp_ne number;
Cp_nw number;
Cp_sw number;
Cp_se number;
Cp_ne number;
Cw_nw number;
Cw_sw number;
Cw_se number;
Cw_ne number;
Wt number;
sqlstring varchar2(4000);
BEGIN

FOR pt IN points50m LOOP
    emin := trunc((pt.EAST50+2500)/5000)*5000 - 2500;
    emax := emin+5000;
    nmin := trunc((pt.NORTH50+2500)/5000)*5000 - 2500;
    nmax := nmin+5000;
    scenario := '&3'||'_'||'&2';

    BEGIN
        sqlstring := 'SELECT 1, a.alt, a.aar, b.lr_aar, a.asr,b.lr_asr, a.AT0, a.FCD, a.MDW, a.MDP
            FROM metoffice.UKCP'||scenario||' a, Landis.alc_climate_5k b
            WHERE b.id_5k=a.grid5k and a.easting=:east and a.northing=:north';
        EXECUTE IMMEDIATE sqlstring
            INTO ct_nw, alt_nw, aar_nw, lr_nw, asr_nw, lrs_nw, at0_nw, fcd_nw, mdw_nw, mdp_nw
            USING emin, nmax;
        EXCEPTION
            WHEN NO_DATA_FOUND then Ct_nw :=0; alt_nw :=0; aar_nw :=0;lr_nw :=0; asr_nw :=0;
                lrs_nw:=0; at0_nw:=0; fcd_nw:=0; mdw_nw:=0; mdp_nw :=0;
    END;
END;

```

```

BEGIN
    sqlstring := 'SELECT 1, a.alt, a.aar, b.lr_aar, a.asr,b.lr_asr, a.AT0, a.FCD, a.MDW, a.MDP
        FROM metoffice.UKCP'||scenario||' a, landis.alc_climate_5k b
        WHERE b.id_5k=a.grid5k and a.easting=:east and a.northing=:north';
    EXECUTE IMMEDIATE sqlstring
        INTO ct_ne, alt_ne, aar_ne, lr_ne, asr_ne, lrs_ne, at0_ne, fcd_ne, mdw_ne, mdp_ne
        USING emax, nmax;
    EXCEPTION
        WHEN NO_DATA_FOUND then Ct_ne :=0; alt_ne :=0; aar_ne :=0;lr_ne :=0; asr_ne :=0;
            lrs_ne:=0; at0_ne:=0; fcd_ne:=0; mdw_ne:=0; mdp_ne :=0;
END;
BEGIN
    sqlstring := 'SELECT 1, a.alt, a.aar, b.lr_aar, a.asr,b.lr_asr, a.AT0, a.FCD, a.MDW, a.MDP
        FROM metoffice.UKCP'||scenario||' a, landis.alc_climate_5k b
        WHERE b.id_5k=a.grid5k and a.easting=:east and a.northing=:north';
    EXECUTE IMMEDIATE sqlstring
        INTO ct_sw, alt_sw, aar_sw, lr_sw, asr_sw, lrs_sw, at0_sw, fcd_sw, mdw_sw, mdp_sw
        USING emin, nmin;
    EXCEPTION
        WHEN NO_DATA_FOUND then Ct_sw :=0; alt_sw :=0; aar_sw :=0;lr_sw :=0; asr_sw :=0;
            lrs_sw:=0; at0_sw:=0; fcd_sw:=0; mdw_sw:=0; mdp_sw :=0;
END;
BEGIN
    sqlstring := 'SELECT 1, a.alt, a.aar, b.lr_aar, a.asr,b.lr_asr, a.AT0, a.FCD, a.MDW, a.MDP
        FROM metoffice.UKCP'||scenario||' a, landis.alc_climate_5k b
        WHERE b.id_5k=a.grid5k and a.easting=:east and a.northing=:north';
    EXECUTE IMMEDIATE sqlstring
        INTO ct_se, alt_se, aar_se, lr_se, asr_se, lrs_se, at0_se, fcd_se, mdw_se, mdp_se
        USING emax, nmin;
    EXCEPTION
        when NO_DATA_FOUND then Ct_se :=0; alt_se :=0; aar_se :=0;lr_se :=0; asr_se :=0;
            lrs_se:=0; at0_se:=0; fcd_se:=0; mdw_se:=0; mdp_se :=0;
END;

Cp_nw := -0.09*(lr_nw*(pt.ALTITUDE- alt_nw))+0.12*(1.14*(alt_nw-pt.ALTITUDE));
Cp_sw := -0.09*(lr_sw*(pt.ALTITUDE- alt_sw))+0.12*(1.14*(alt_sw-pt.ALTITUDE));
Cp_se := -0.09*(lr_se*(pt.ALTITUDE- alt_se))+0.12*(1.14*(alt_se-pt.ALTITUDE));
Cp_ne := -0.09*(lr_ne*(pt.ALTITUDE- alt_ne))+0.12*(1.14*(alt_ne-pt.ALTITUDE));
cw_nw := -0.07*(lr_nw*(pt.ALTITUDE- alt_nw))+0.09*(1.14*(alt_nw-pt.ALTITUDE));
cw_sw := -0.07*(lr_sw*(pt.ALTITUDE- alt_sw))+0.09*(1.14*(alt_sw-pt.ALTITUDE));
cw_se := -0.07*(lr_se*(pt.ALTITUDE- alt_se))+0.09*(1.14*(alt_se-pt.ALTITUDE));
cw_ne := -0.07*(lr_ne*(pt.ALTITUDE- alt_ne))+0.09*(1.14*(alt_ne-pt.ALTITUDE));

AARa_nw := aar_nw + lr_nw * (pt.ALTITUDE- alt_nw);
AARa_sw := aar_sw + lr_sw * (pt.ALTITUDE- alt_sw);
AARa_se := aar_se + lr_se * (pt.ALTITUDE- alt_se);
AARa_ne := aar_ne + lr_ne * (pt.ALTITUDE- alt_ne);
ASRa_nw := ASR_nw + lrs_nw * (pt.ALTITUDE- alt_nw);
ASRa_sw := ASR_sw + lrs_sw * (pt.ALTITUDE- alt_sw);
ASRa_se := ASR_se + lrs_se * (pt.ALTITUDE- alt_se);
ASRa_ne := ASR_ne + lrs_ne * (pt.ALTITUDE- alt_ne);
AT0a_nw := AT0_nw + (1.14 * (alt_nw - pt.ALTITUDE));
AT0a_sw := AT0_sw + (1.14 * (alt_sw - pt.ALTITUDE));
AT0a_se := AT0_se + (1.14 * (alt_se - pt.ALTITUDE));
AT0a_ne := AT0_ne + (1.14 * (alt_ne - pt.ALTITUDE));
FCDa_nw := FCD_nw + 0.1446*(lr_nw * (pt.ALTITUDE- alt_nw));
FCDa_sw := FCD_sw + 0.1446*(lr_sw * (pt.ALTITUDE- alt_sw));
FCDa_se := FCD_se + 0.1446*(lr_se * (pt.ALTITUDE- alt_se));
FCDa_ne := FCD_ne + 0.1446*(lr_ne * (pt.ALTITUDE- alt_ne));
MDMw_nw := mdw_nw+cw_nw;
MDMw_sw := mdw_sw+cw_sw;
MDMw_se := mdw_se+cw_se;
MDMw_ne := mdw_ne+cw_ne;
MDMp_nw := mdp_nw+Cp_nw;
MDMp_sw := mdp_sw+Cp_sw;
MDMp_se := mdp_se+Cp_se;
MDMp_ne := mdp_ne+Cp_ne;
dsg_nw := sqrt(power((emin-pt.EAST50),2) + power((nmax-pt.NORTH50),2));
dsg_sw := sqrt(power((emin-pt.EAST50),2) + power((nmin-pt.NORTH50),2));
dsg_se := sqrt(power((emax-pt.EAST50),2) + power((nmin-pt.NORTH50),2));
dsg_ne := sqrt(power((emax-pt.EAST50),2) + power((nmax-pt.NORTH50),2));
if ((dsg_nw = 0) and (ct_nw >0)) then
    wg_nw := 1;
elsif (((pt.EAST50=emax) or (pt.NORTH50=nmin)) or (ct_nw = 0)) then
    wg_nw := 0;

```

```

else
    wg_nw := power(1/dsg_nw,2);
end if;
if((dsg_sw = 0) and (ct_sw >0)) then
    wg_sw := 1;
elseif (((pt.EAST50=emax) or (pt.NORTH50=nmax)) or (ct_sw =0)) then
    wg_sw := 0;
else
    wg_sw := power(1/dsg_sw,2);
end if;
if((dsg_se = 0) and (ct_se >0)) then
    wg_se := 1;
elseif (((pt.EAST50=emin) or (pt.NORTH50=nmax)) or (ct_se =0)) then
    wg_se := 0;
else
    wg_se := power(1/dsg_se,2);
end if;
if((dsg_ne = 0) and (ct_ne >0)) then
    wg_ne := 1;
elseif (((pt.EAST50=emin) or (pt.NORTH50=nmin)) or (Ct_ne =0)) then
    wg_ne := 0;
else
    wg_ne := power(1/dsg_ne,2);
end if;

Wt := wg_nw + wg_sw + wg_se + wg_ne;
If Wt > 0 then
    Wp_nw := wg_nw/Wt;
    Wp_sw := wg_sw/Wt;
    Wp_se := wg_se/Wt;
    Wp_ne := wg_ne/Wt;
    AAR_S := AARa_nw*Wp_nw + AARa_sw*Wp_sw + AARa_se*Wp_se + AARa_ne*Wp_ne;
    LR_AAR_S := LR_nw*Wp_nw + LR_sw*Wp_sw + LR_se*Wp_se + LR_ne*Wp_ne;
    ASR_S := ASRa_nw*Wp_nw + ASRa_sw*Wp_sw + ASRa_se*Wp_se + ASRa_ne*Wp_ne;
    LR_ASR_S := LRS_nw*Wp_nw + LRS_sw*Wp_sw + LRS_se*Wp_se + LRS_ne*Wp_ne;
    AT0_S := AT0a_nw*Wp_nw + AT0a_sw*Wp_sw + AT0a_se*Wp_se + AT0a_ne*Wp_ne;
    MDMWHT_S := MDMw_nw*Wp_nw + MDMw_sw*Wp_sw + MDMw_se*Wp_se + MDMw_ne*Wp_ne;
    MDMPOT_S := MDMP_nw*Wp_nw + MDMP_sw*Wp_sw + MDMP_se*Wp_se + MDMP_ne*Wp_ne;
    FCD_S := FCDA_nw*Wp_nw + FCDA_sw*Wp_sw + FCDA_se*Wp_se + FCDA_ne*Wp_ne;
ELSE
    AAR_S :=null;
    LR_AAR_S :=null;
    ASR_S :=null;
    LR_ASR_S := null;
    AT0_S :=null;
    FCD_S :=null;
    MDMWHT_S :=null;
    MDMPOT_S :=null;
end if;
IF AT0_S is null THEN
    ATS_S := null;
ELSE
    ATS_S := 611 + (1.11*AT0_S) + (0.042*pt.EAST50/100);
END IF;
IF FCD_S > 365 THEN
    FCD_S := 365;
END IF;
IF MDMWHT_S < 0 THEN
    MDMWHT_S := 0;
END IF;
IF MDMPOT_S < 0 THEN
    MDMPOT_S := 0;
END IF;
INSERT INTO "ALC"."ALC_CLIMATE_50M_&1&2&3" VALUES
(pt.POINTID,pt.EAST50,pt.NORTH50,AAR_S,LR_AAR_S,ASR_S,LR_ASR_S,AT0_S,ATS_S,MDMWHT_S,MDMPOT_S,FCD_S);
COMMIT;
END LOOP;
END;

```

5.4 Creating ALC grades for climate scenarios

```
## cr_ALC_GRADE_SERIES_CLIMATE
##
### &1 = 50km Sheet XYY where XX = 100km square i.e. SH and YY = NE,NW,SE,SW
### &2 = year and scenario [2020L,2020M,2020H,2050L,2050M,2050H,2080L,2080M,2080H] + UKCP - 09 or 18

### i.e. @cr_ALC_GRADE_SERIES_CLIMATE SHNW 2020L18

DROP TABLE ALC_SERIES_50M_&1&2;
CREATE TABLE ALC_SERIES_50M_&1&2 NOLOGGING AS
select a.pointid, a.east50, a.north50,
substr(' ',1,2) ALC_GRADE,
substr(' ',1,2) PREDICTIVE,
substr(metoffice.ln$ALCGRADE(a.AAR, A.AT0),1,2) ALC_CLIMATE,
ALC.LN$alcwetness(d.wc_code, c.texture, a.fcd, c.organic) ALC_WETNESS,
METOFFICE.LN$ALCDROUGHT(DECODE(b.ROCKY_PHASE,1,c.APWHT*20/decode(c.drock,999,150,0,20,c.drock),c.APWHT),
a.MDMWHT, DECODE(b.ROCKY_PHASE,1,c.APPOT*20/decode(c.drock,999,150,0,20,c.drock),c.APPOT), a.MDMPOT)
ALC_DROUGHT,
d.wc_code WC,
round(a.fcd,0) FCD
FROM ALC.ALC_CLIMATE_50M_&1&2 a, ALC.ALC_CLIMATE_50M_&1 b, ALC.WELSH_SERIES_PROPERTIES c,
ALC.WELSH_SERIES_FCZONE d
WHERE a.pointid=b.pointid and b.series=c.series AND b.series=d.series and
d.fc_code=landis.ln$fc_zone(a.fcd);
alter table ALC.ALC_SERIES_50M_&1&2 NOLOGGING;
alter table ALC.ALC_SERIES_50M_&1&2 add constraint PK_ALC_SERIES_&1&2 primary key("POINTID");
update ALC.ALC_SERIES_50M_&1&2 a set alc_grade = (select
ln$ALClimit(a.ALC_CLIMATE,a.ALC_WETNESS,a.ALC_DROUGHT,b.ALC_SLOPE, b.ALC_DEPTH, b.ALC_STONES, b.ALC_OTHER)
from ALC.ALC_SERIES_50M_&1 b where a.pointid=b.pointid);
update ALC.ALC_SERIES_50M_&1&2 a set predictive = (select
ln$ALCpredictive(a.ALC_CLIMATE,a.ALC_WETNESS,a.ALC_DROUGHT,b.ALC_SLOPE, b.ALC_DEPTH, b.ALC_STONES,
b.ALC_OTHER,b.ROCK,b.EXPOSURE,b.NONAGRIC) from ALC.ALC_SERIES_50M_&1 b where a.pointid=b.pointid);
alter table ALC.ALC_SERIES_50M_&1&2 LOGGING;
commit;
/
```