Ecography

ECOG-00780
Chardon, N. I., Cornwell, W. K., Flint, L. E. and Ackerly, D. D. 2014. Topographic, latitudinal and climatic distribution of Pinus coulteri: geographic range limits are not at the edge of the climate envelope. – Ecography doi: 10.1111/ecog.00780

Supplementary material

Appendix 1

Methods

Sampled points: If a tree was not present within 10 m of a designated point on a transect within a stand, we noted this and still recorded microhabitat parameters; we then classified the point as an 'unoccupied point'.

We selected twenty randomly located points not occupied by *P. coulteri* for comparison of topographic features. We recorded measurements within a 10 m radius of each sample point. When a map of the area was available and more than one road/trail ran through the area, we established a 2 by 2 km area around the previously measured stand. A Texas Instruments (TI-83 Plus) calculator (Texas Instruments Incorporated, Dallas, TX) generated twenty (X, Y) coordinates on the regional map. For each coordinate, we defined the closest point on a trail as an unoccupied point. We navigated to each point with a calibrated ruler and map of the road/trail network. When only one road/trail went through the 2 by 2 km area or a map was unavailable, we condensed the 2 by 2 km square to a 2 km stretch of road/trail. We considered the 2 km section for all sampling, with the stand occupying the middle of it. We measured occupied points within the stand (see above). When one road/trail ran through the stand, we evenly spaced unoccupied points along road/trail on either side of stand to complete the criteria distance of 2 km (e.g. if the stand occupied a 1,000 m distance, we sampled a total of twenty evenly spaced unoccupied points 500 m to either side of stand). At the Alder Peak site more than one road ran through stand and a map was unavailable, so we evenly spaced absence points along the three roads branching out of the stand within the 2 km distance criterion. If we found a *P. coulteri* individual within 10 m of a sample point, we

recorded microhabitat parameters and that point was thus included in the set of occupied points.

Table A1. Projected range changes (km^2) for *Pinus coulteri* in the state of California as well as in three specific regions, calculated based on equal model sensitivity and specificity values under ten future climate scenarios (2070-2099). Since the species is absent above the San Francisco Bay and Delta, we include the coast above the San Francisco Bay (North Coast) and the North Bay Counties (Marin, Sonoma and Napa), which lie just north of this species' dispersal barrier. This species is currently present in the coast south the San Francisco Bay (South Coast). We discuss the scenarios indicated in red in the manuscript.

Scenario	*California*	*North Coast*	*South Coast*	*North Bay Counties*
(Current Range)	-5442	-588	-3507	-358
CCSM4-rcp8.5	-1710	-257	-1020	-129
CNRM-rcp8.5	3	-327	-249	-182
CSIRO-A1B	-1471	-519	-611	-320
FGOALS-rcp8.5	-1976	61	-1792	51
GFDL-A2	-946	559	-1485	237
GISS-AOM-A1B	-1385	-146	-834	-80
MIROC-rcp6.0	-2596	-194	-1973	-111
MIROC-rcp8.5	-2137	288	-2138	100
MIROC3-2-A2	-3019	-49	-2276	-30
PCM-A2	-1083	-224	-915	-113

Figure A1. Projected suitability values for ten future climate scenarios (2070-2099). Bluer colors show areas with more suitable conditions. We selected the equal sensitivity and specificity threshold of 0.244 to eliminate low suitability values.

Figure A2. Projected range expansions and contractions in the state of California and the Bay Area (insets) under ten future climate scenarios (2070-2099), determined by projected presence or absence of the species relative to its current range. The color schemes are as follows: grey = absent, red = range contraction, blue = range expansion, green = range persistence.

Figure A1

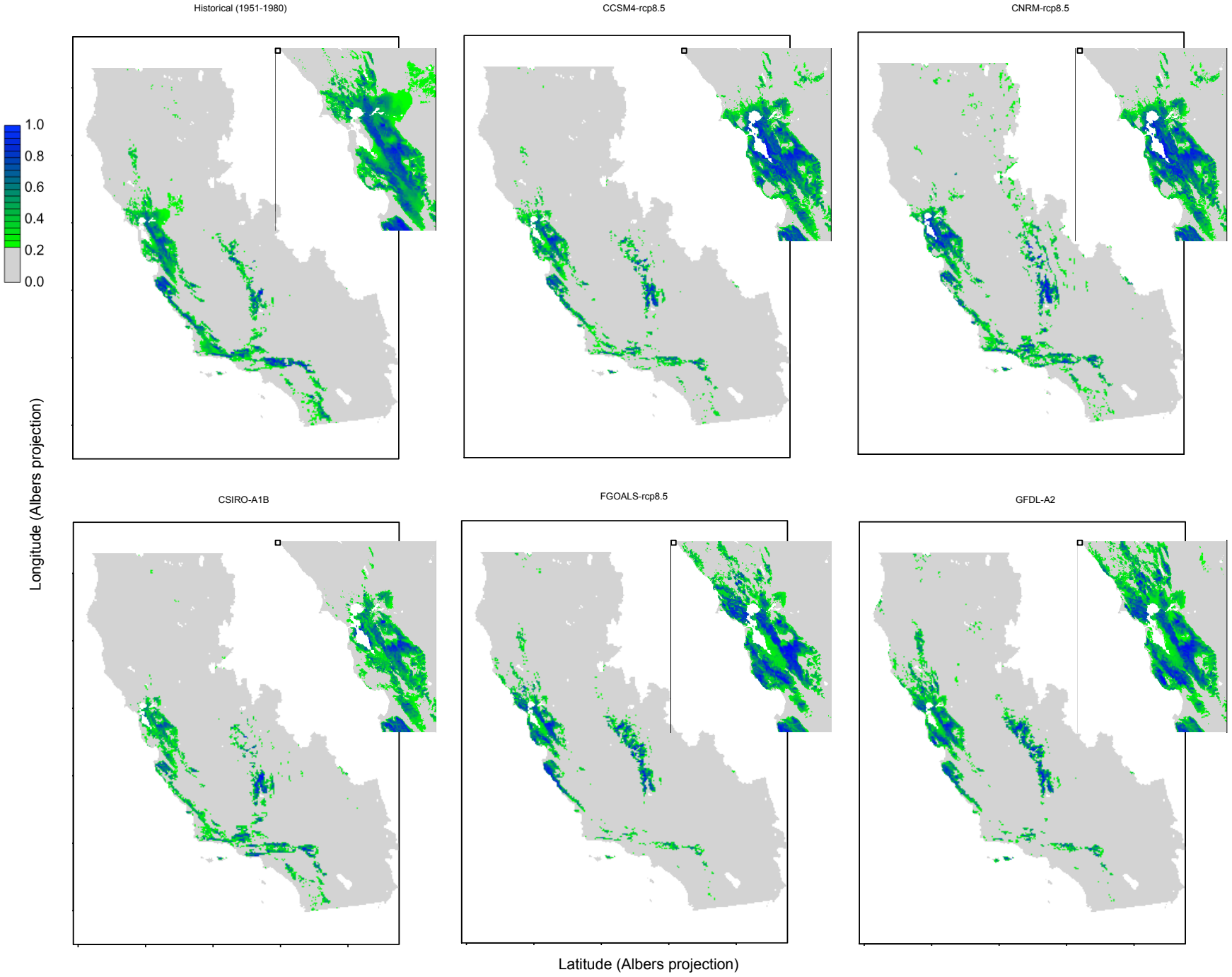
Historical (1951-1980)
CCSM4-rcp8.5
CNRM-rcp8.5
CSIRO-A1B
FGOALS-rcp8.5
GFDL-A2
1.0
0.8
0.6
0.4
0.2
0.0
Longitude (Albers projection)
Latitude (Albers projection)

Figure A1 (cont.)

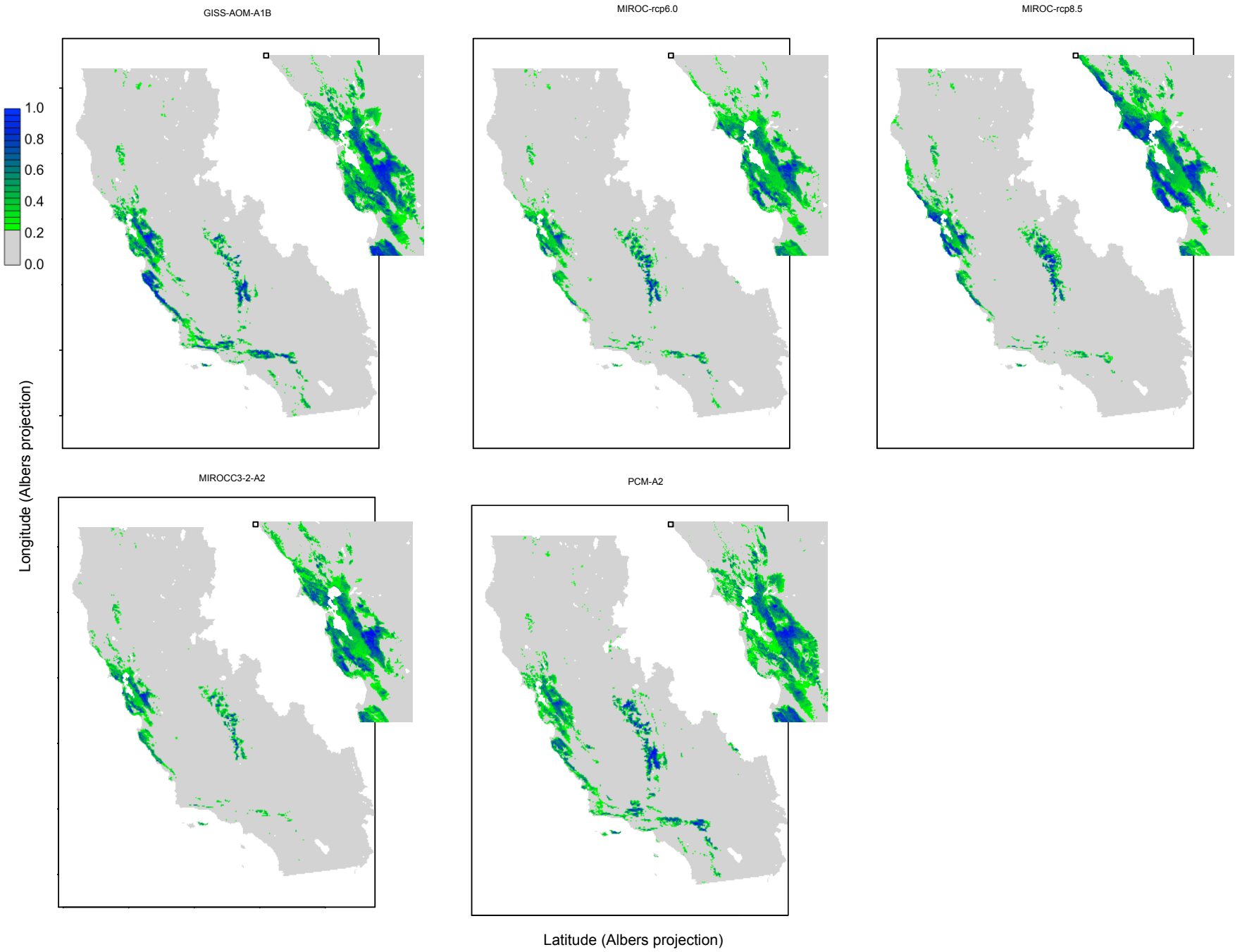

Figure A2

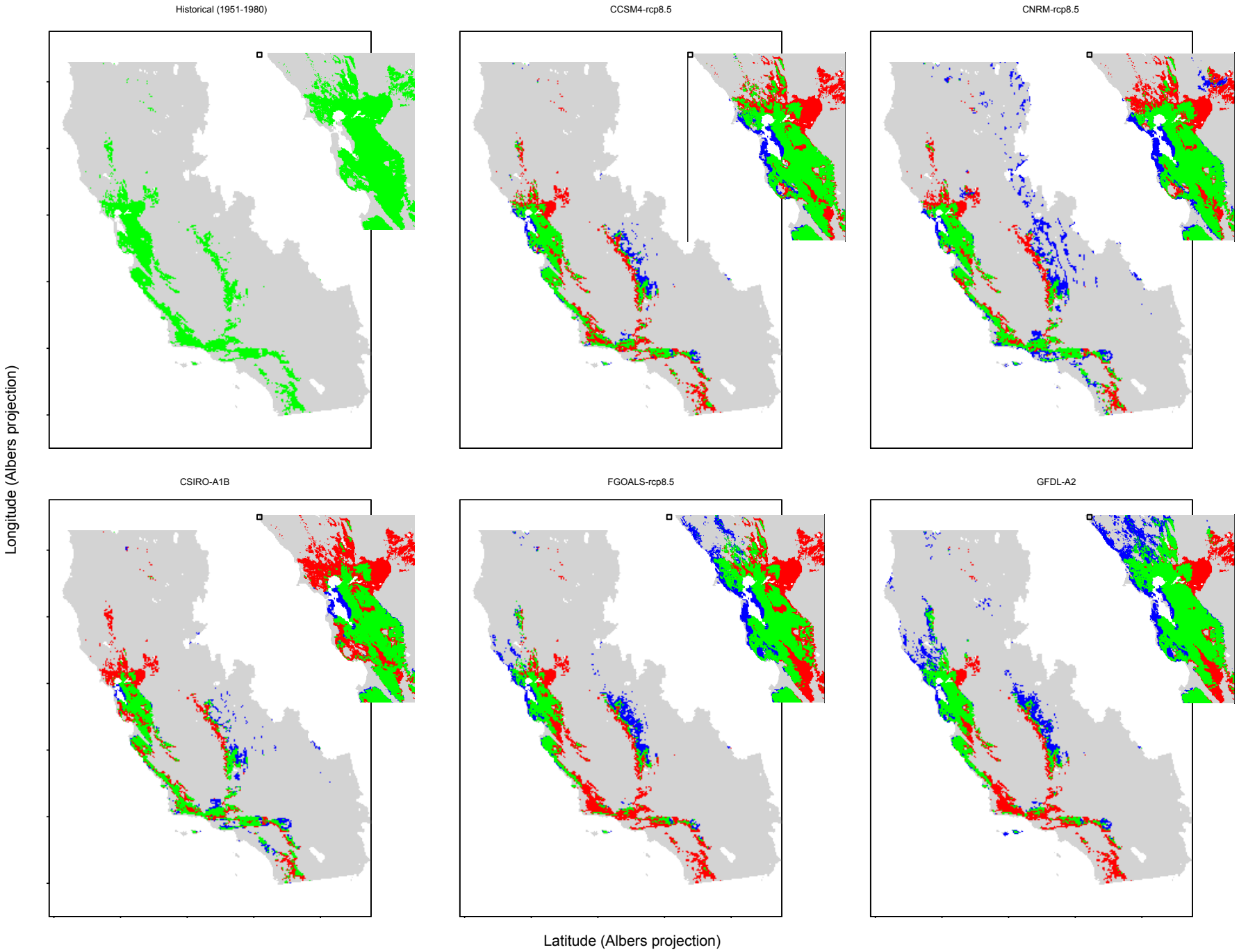
Historical (1951-1980)
CCSM4-rcp8.5
CNRM-rcp8.5
CSIRO-A1B
FGOALS-rcp8.5
GFDL-A2
Longitude (Albers projection)
Latitude (Albers projection)

Figure A2 (cont.)