

Primary contact:

Sean Parks
Aldo Leopold Wilderness Research Institute
Rocky Mountain Research Station
US Forest Service
sean.parks@usda.gov

File name:

climate.connectivity.datasets.7z

Brief description:

This 7z file contains the raster products that were produced for the paper cited below.

Citation:

Parks SA, Carroll C, Dobrowski SZ, Allred BW (2020). Human land uses reduce climate connectivity across North America. *Global Change Biology*. <https://doi.org/10.1111/gcb.15009>

This 7z file contains gridded datasets depicting:

1. Climate velocity for the climate scenario (filename = 'velocity.S1.tif')
2. Climate velocity for the climate-HMG scenario (filename = 'velocity.S2.tif')
3. Climate exposure for the climate scenario (filename = 'CE.S1.tif')
4. Climate exposure for the climate-HMG scenario (filename = 'CE.S2.tif')
5. Human exposure for the climate scenario (filename = 'HE.S1.tif')
6. Climate corridors for the climate scenario (filename = 'climate.corridors.S1.tif')
7. Climate corridors for the climate-HMG scenario (filename = 'climate.corridors.S2.tif')

Datasets used in the analysis:

Reference period climate represents averages from 1981 to 2010; late-century climate represents 2071–2100 and were generated from a multi-model ensemble of 15 CMIP5 GCMs under RCP 8.5. Principal component analysis (PCA) was conducted on 11 bioclimatic variables representing climatic gradients such as mean annual precipitation and mean temperature of the warmest month. Climate was characterized using the first and second principal components (PC1 and PC2, respectively) under reference period climate. The PCA loadings from this procedure were then applied to the 11 bioclimatic variables representing late-century climate, thereby resulting in gridded PC1 and PC2 for late-century climate. All climate datasets were obtained from AdaptWest (<https://adaptwest.databasin.org/>). Human land-use intensity was characterized using the human modification gradient (HMG) (<https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.14549>). All gridded datasets were resampled to a 5km resolution.

More in-depth description of raster datasets (please see Parks et al. 2020 for further details):

1. Climate velocity for the climate scenario (filename = 'velocity.S1.tif') – this dataset represents the distance (km) between each pixel to its nearest climate analog divided by the time elapsed between the reference period and late-century climates (90 years), resulting in the velocity (km/yr). Distance was calculated based on trajectories (or paths) produced using least-cost path models between each pixel and its nearest climate analog. The least-cost path models used resistance surfaces that penalized dissimilar climates (human land-uses were not considered).

2. Climate velocity for the climate-HMG scenario (filename = 'velocity.S2.tif') – this dataset represents the distance (km) between each pixel to its nearest climate analog divided by the time elapsed between the reference period and late-century climates (90 years), resulting in the velocity (km/yr). Distance was calculated based on trajectories (or paths) produced using least-cost path models between each pixel and its nearest climate analog. The least-cost path models used resistance surfaces that penalized dissimilar climates AND penalized increasing land-use intensity as characterized by the human modification gradient (HMG).
3. Climate exposure for the climate scenario (filename = 'CE.S1.tif') – this dataset represents the cumulative exposure to dissimilar climates (measured in PCA units) along trajectories between each pixel and its nearest climate analog. These trajectories were built on the assumption that organisms would minimize exposure to dissimilar climates. Trajectories (or paths) were produced using least-cost path models between each pixel and its nearest climate analog. The least-cost path models used resistance surfaces that penalized dissimilar climates (human land-uses were not considered).
4. Climate exposure for the climate-HMG scenario (filename = 'CE.S2.tif') – this dataset represents the cumulative exposure to dissimilar climates (measured in PCA units) along trajectories between each pixel and its nearest climate analog. These trajectories were built on the assumption that organisms would minimize exposure to dissimilar climates AND increasing land-use intensity. Trajectories (or paths) were produced using least-cost path models between each pixel and its nearest climate analog. The least-cost path models used resistance surfaces that penalized dissimilar climates AND increasing land-use intensity as characterized by the human modification gradient (HMG).
5. Human exposure for the climate scenario (filename = 'HE.S1.tif') – this dataset represents the cumulative exposure to human land-uses intensity as characterized by the human modification gradient (HMG) along trajectories between each pixel and its nearest climate analog. These trajectories were built on the assumption that organisms would minimize exposure to dissimilar climates. Trajectories (or paths) were produced using least-cost path models between each pixel and its nearest climate analog. The least-cost path models used resistance surfaces that penalized dissimilar climates (human land-uses were not considered).
6. Climate corridors for the climate scenario (filename = 'climate.corridors.S1.tif') – this dataset represents the cumulative number of trajectories (or paths) overlapping each 5km pixel. The analysis produced a trajectory/path between each pixel and its nearest climate analog; over 800,000 paths were produced across North America. The dataset here counts the number of paths overlapping each 5km pixel. Trajectories (or paths) were produced using least-cost path models and used resistance surfaces that penalized dissimilar climates (human land-uses were not considered).
7. Climate corridors for the climate-HMG scenario (filename = 'climate.corridors.S1.tif') - Climate corridors for the climate scenario (filename = 'climate.corridors.S1.tif') – this dataset represents the cumulative number of trajectories (or paths) overlapping each 5km pixel. The analysis produced a trajectory/path between each pixel and its nearest climate analog; over 800,000 paths were produced across North America. The dataset here counts the number of paths overlapping each 5km pixel. Trajectories (or paths) were produced using least-cost path models

and used resistance surfaces that penalized dissimilar climates AND penalized increasing land-use intensity as characterized by the human modification gradient (HMG).

Gridded dataset properties:

File format – geotiffs; each *.tif also contains a world file (*.tfw)

Resolution – 5km

Projection – Equidistant conic