Nh/U Calculations

Nh/U values were calculated when a trajectory crossed any of the defined 1°x1° open ocean domains (Figure DR1) located far upstream of Sierran topography (i.e., outside Rossby radius of deformation; see Galewsky and Sobel, 2005). *N* and *U* values were calculated first as mass-weighted atmospheric column averages for Brunt-Väisälä frequency (*N*) and cross-mountain wind speed (*U*; assuming Sierran strike of N20W), respectively, over a pressure range of 1000 – 550 mbar (~ 0 – 5000 m.a.s.l.; 15 pressure levels) and then averaged over the entire 1°x1° ocean domain to obtain a bulk *Nh/U* value. Final reported *Nh/U* values (Table 1) include only trajectories with wind azimuth values within ± 45° of perpendicular to Sierran strike (S65E to N25E). Ocean domains and azimuthal restriction were selected in order to isolate trajectories that are most likely to interact with Sierran topography downwind. Because of these restrictions the number of trajectories for which *Nh/U* is calculated is less than the total number of precipitating trajectories arriving at each site (*n* in Table 1). Both dry and moist *N* values are calculated (see Hughes et al., 2009 for equations and references). *Nh/U* is calculated with N_{moist} if surface relative humidity (RH) over the corresponding ocean domain is > 75% and N_{dry} if RH < 75%. Using a RH cutoff of 90% does not significantly change results.

FIGURE CAPTIONS

Figure DR1. DEM of western US study area. Boxes outline the 1°x1° open ocean domains upstream of Sierran topography where trajectory *Nh/U* values were calculated using climate variables provided by the NARR dataset.

Figure DR2. Trajectory contour plots for initialization height of 1 km above site of interest. Contour interval is the same as Figure 2.

Figure DR3. Trajectory contour plots for initialization height of 2 km above site of interest. Contour interval is the same as Figure 2.

Figure DR4. Sierran physiographic, latitudinal domains used to calculate trajectory proportions presented in Table 1. Domains were defined in order to quantify the frequency of trajectory events crossing the high Sierra Nevada (> 2.5 km mean crest elevation; ‘Sierra’ domain) versus trajectories traveling north or south of the Sierra Nevada or north from the Gulf of CA. Domain boundaries were also constructed in order to minimize trajectory interactions with more than one domain (e.g., reduce spatial overlap between ‘GCA’ and ‘S of Sierra’ domains). GCA = Gulf of California.

REFERENCES CITED

Galewsky, J., and Sobel, A., 2005, Moist dynamics and orographic precipitation in northern and central California during the New Year's flood of 1997: Monthly Weather Review, v. 133, p. 1594-1612, doi: 10.1175/MWR2943.1.

Hughes, M., Hall, A., and Fovell, R., 2009, Blocking in areas of complex topography, and its influence on rainfall distribution: Journal of the Atmospheric Sciences, v. 66, p. 508-518, doi: 10.1175/2008JAS2689.1

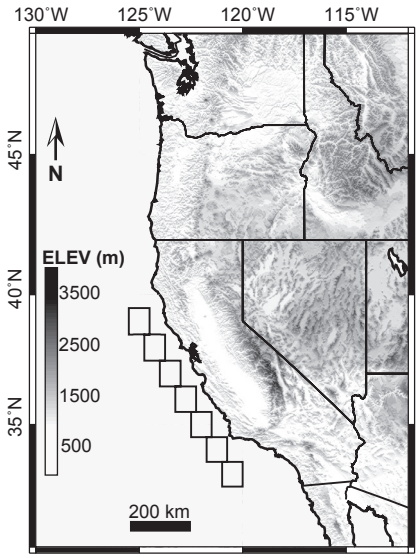
130°W
125°W
120°W
115°W
45°N
40°N
35°N
N
ELEV (m)
3500
2500
1500
500
200 km

FIGURE DR1

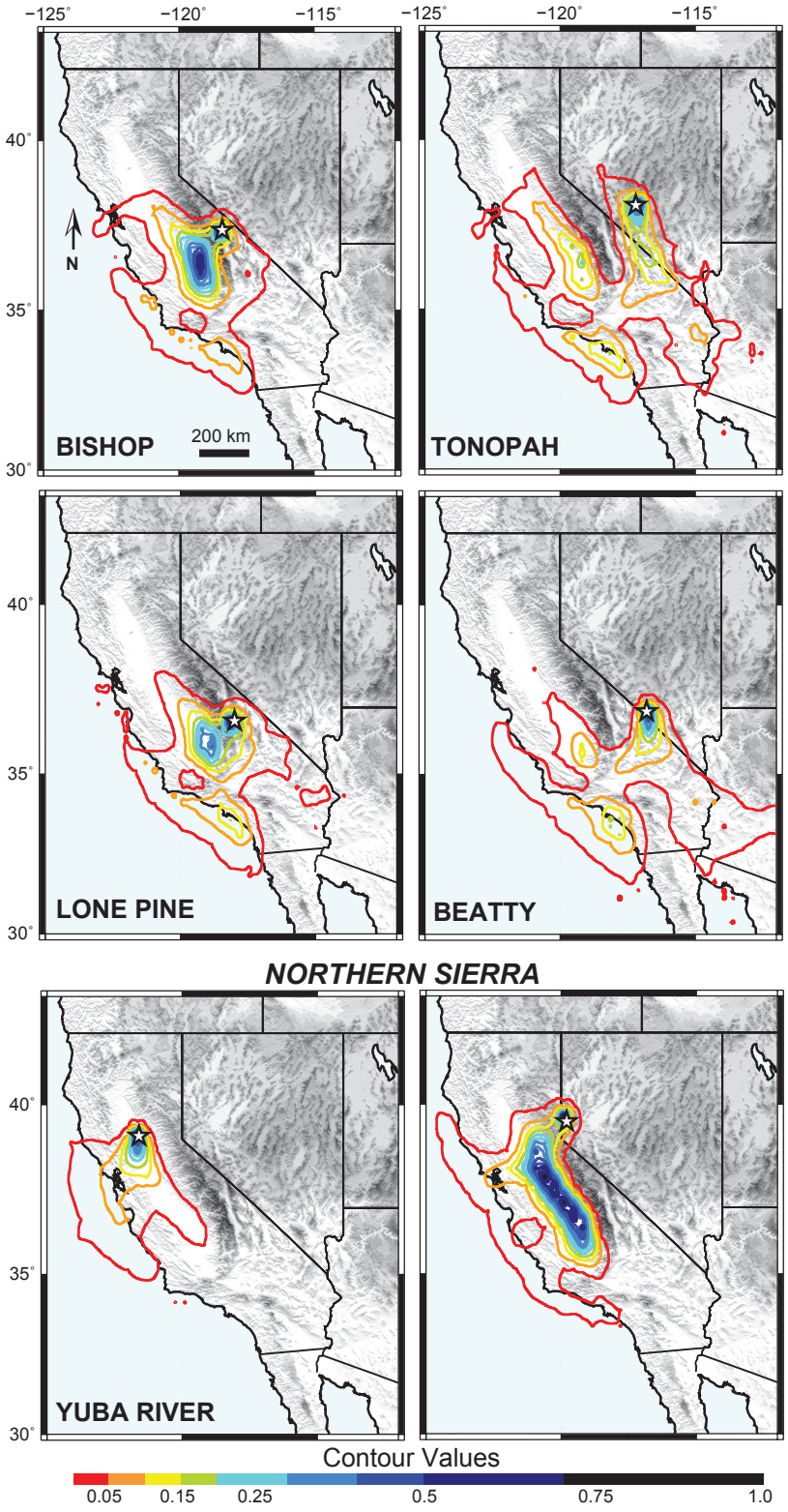
−125°
−120°
−115°
40°
35°
30°
N
BISHOP
200 km
TONOPAH
LONE PINE
BEATTY
NORTHERN SIERRA
YUBA RIVER
Contour Values
0.05
0.15
0.25
0.5
0.75
1.0

FIGURE DR2

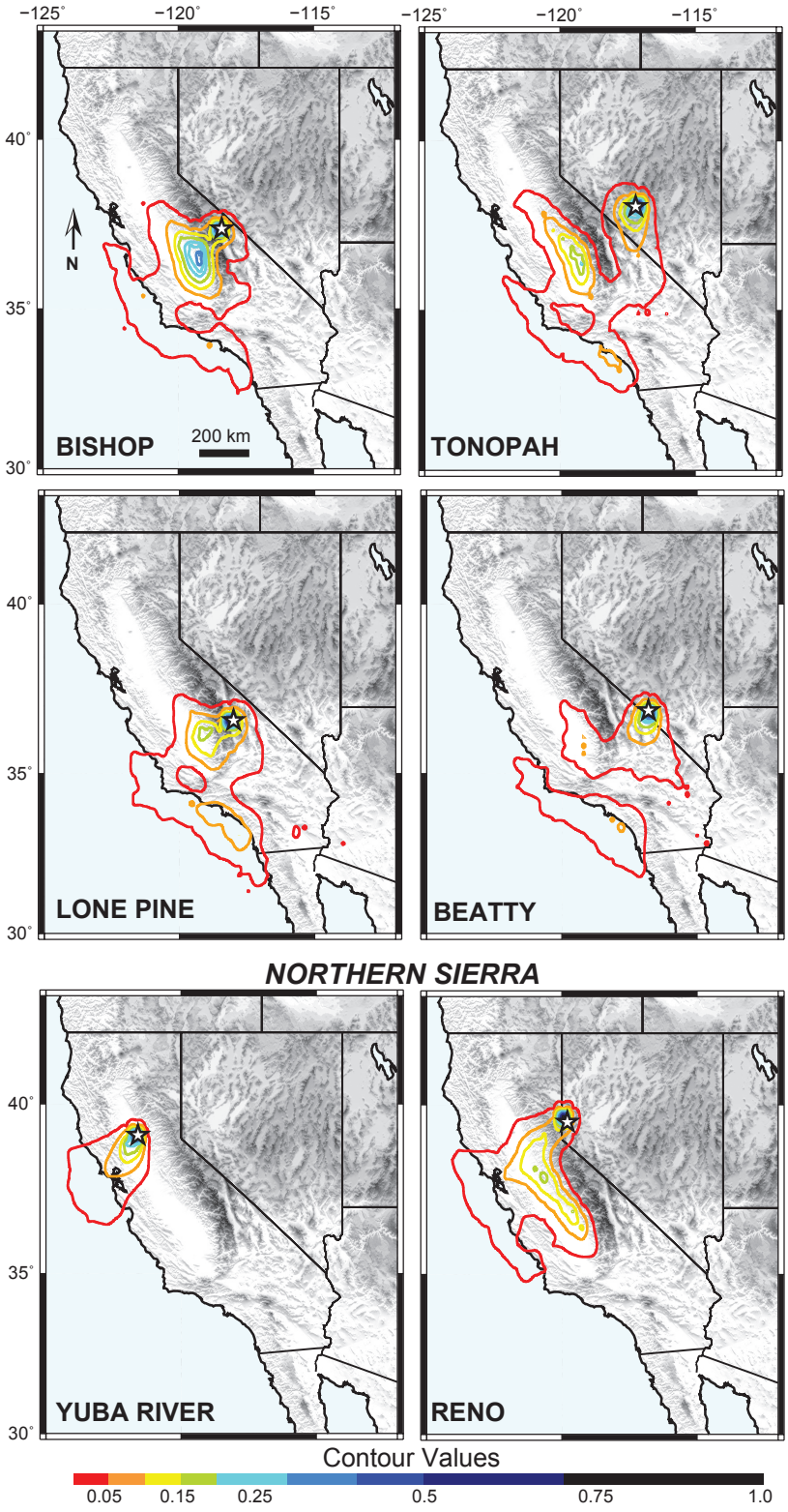
−125°
−120°
−115°
40°
35°
30°
N
BISHOP
200 km
TONOPAH
LONE PINE
BEATTY
NORTHERN SIERRA
YUBA RIVER
RENO
Contour Values
0.05
0.15
0.25
0.5
0.75
1.0

FIGURE DR3

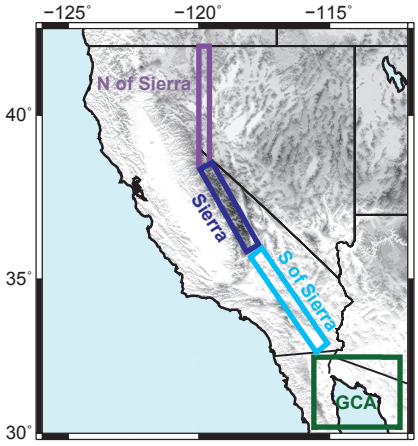

FIGURE DR4