Figures and figure supplements

Birds migrate longitudinally in response to the resultant Asian monsoons of the Qinghai-Tibet Plateau uplift

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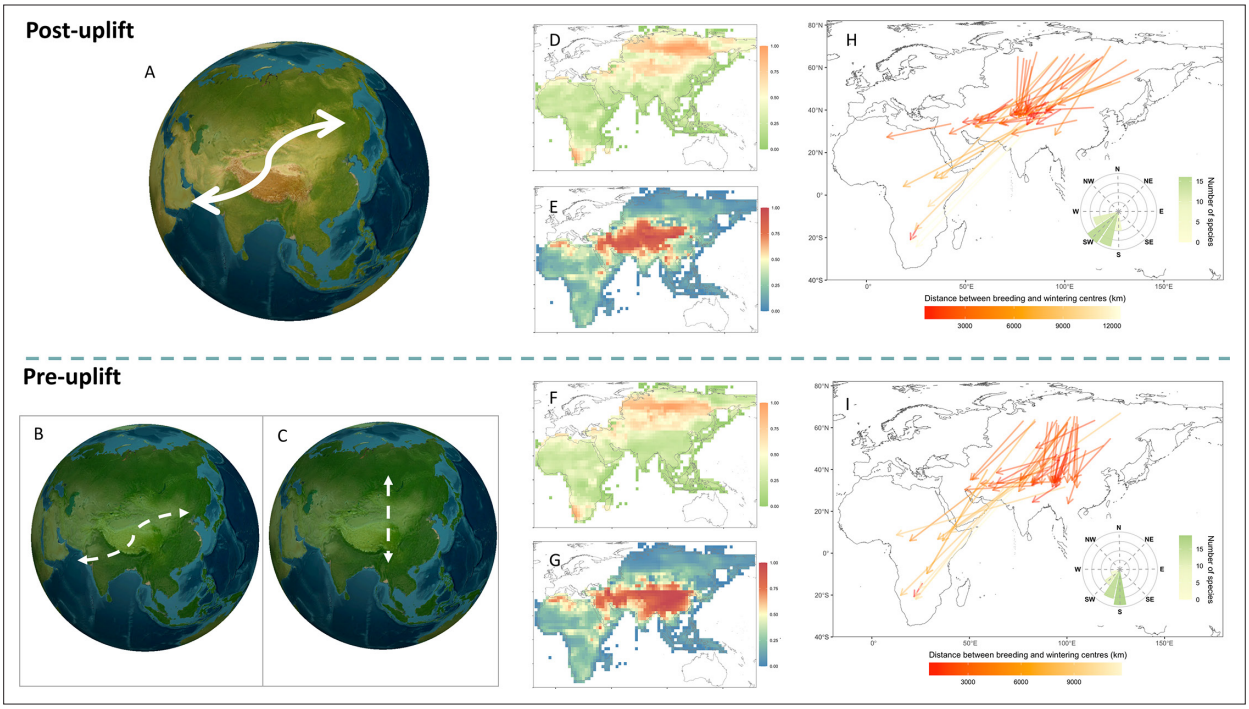

Figure 1. Influence of the Qinghai-Tibet uplift on avian migration strategies. (**A**–**C**) Schematic example of the role of Qinghai-Tibet Plateau (QTP) uplift in distribution patterns of migratory birds. (**A**) Birds migrate with a large longitudinal range in modern environments. Before the QTP uplift, birds may maintain similar migratory patterns with large longitudinal changes (**B**) or migrate with few longitudinal changes between wintering and breeding areas (**C**). The occurrence probability of 50 migratory bird species under modern environments in breeding areas (**D**) and wintering areas (**E**). The occurrence probability of birds in breeding areas (**F**) and wintering areas (**G**) before the QTP uplift. Migratory directions are identified at present (**H**) and before the uplift (**I**). The direction and length of the arrow represent migratory direction (measured by the azimuth angle) and distance from centres of breeding to wintering areas for each species. The circular barplot of the inset panel denotes the summary of migratory directions from breeding to wintering areas for each bird species, where the height and colour of the bars represent the number of species.

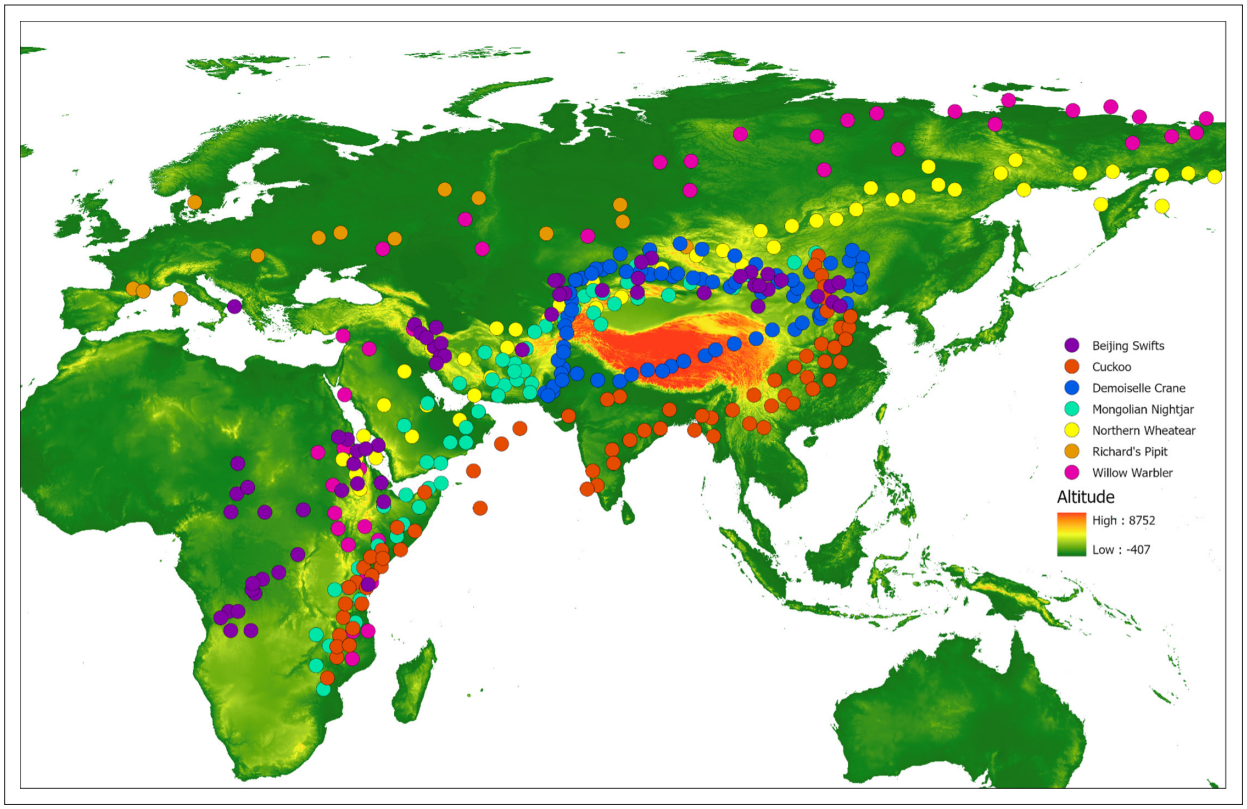

Figure 1—figure supplement 1. Birds migrate along with the vegetation gradient. Round points with different colours represent tracking records of multiple species that migrate across the Qinghai-Tibet Plateau.

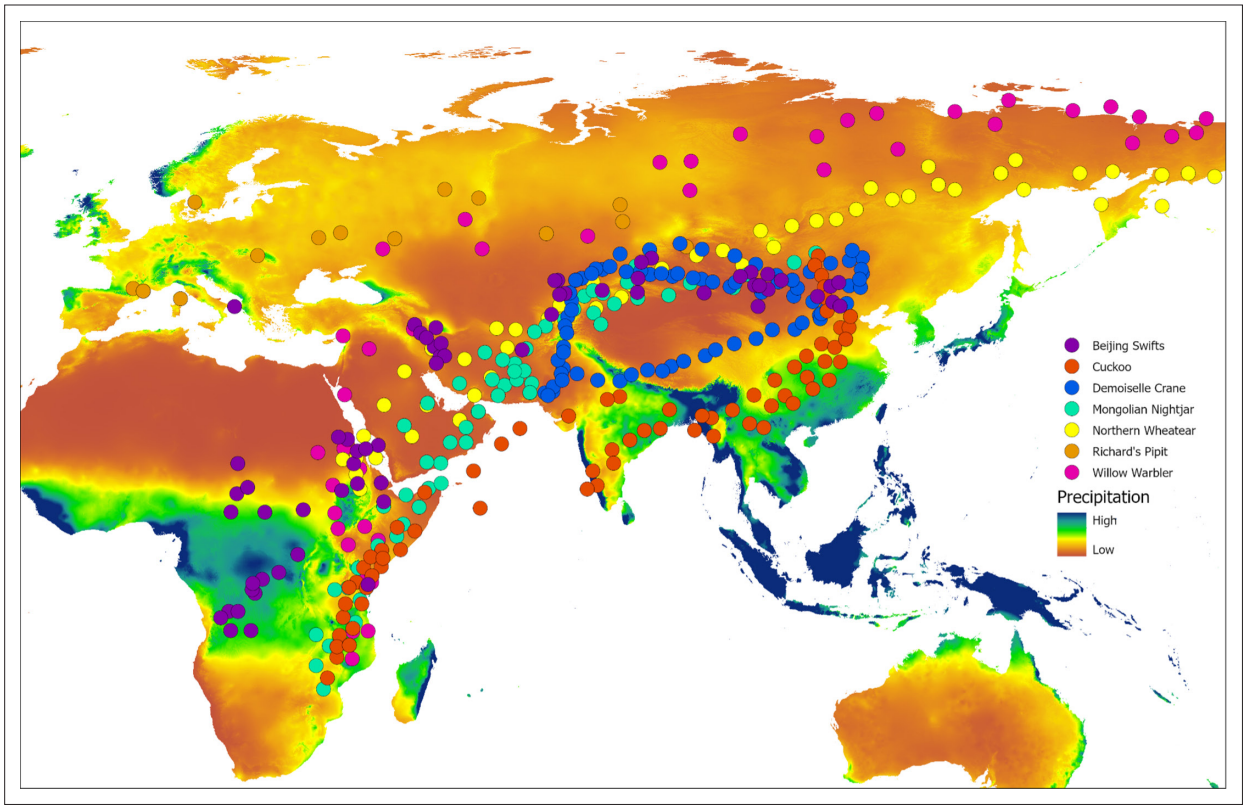

Figure 1—figure supplement 2. Birds migrate along with the precipitation gradient. Round points with different colours represent tracking records of multiple species that migrate across the Qinghai-Tibet Plateau.

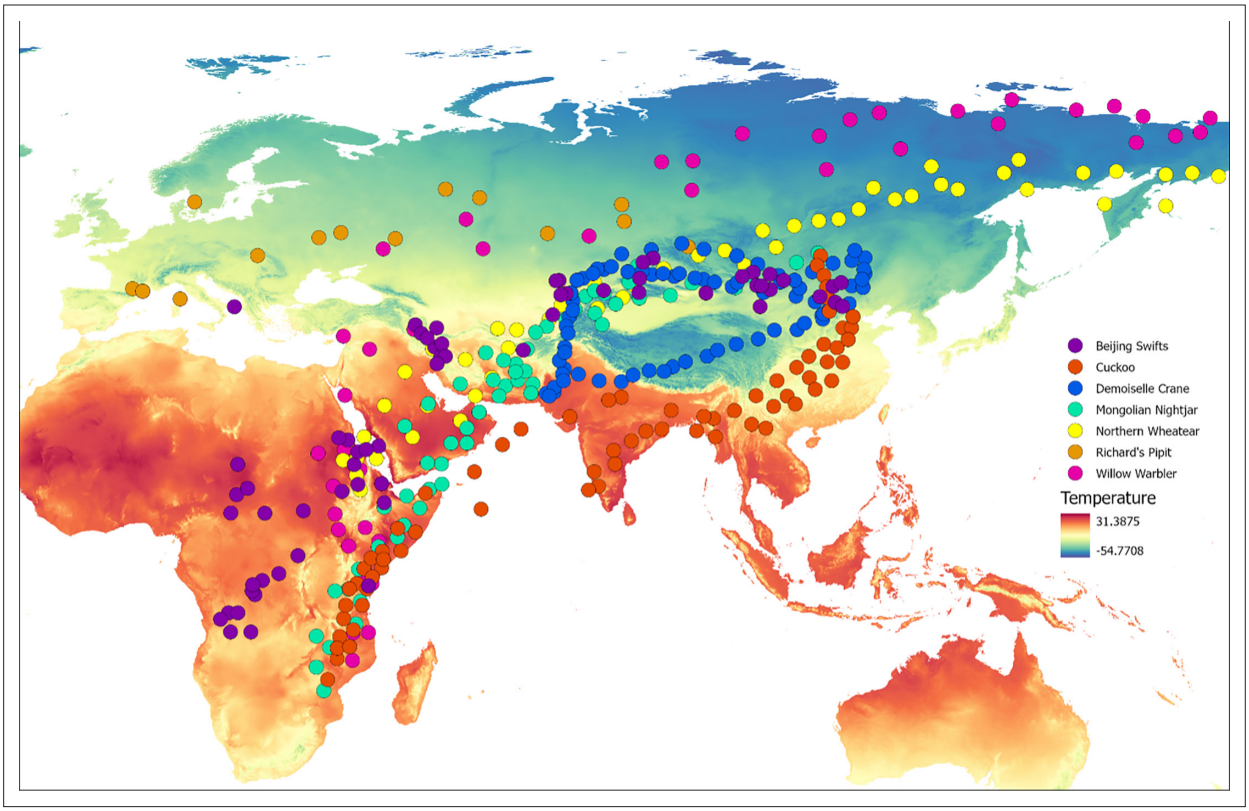

Figure 1—figure supplement 3. Birds migrate along with the gradient of annual temperature in the study area. Round points with different colours represent tracking records of the seven species that migrate across the Qinghai-Tibet Plateau.

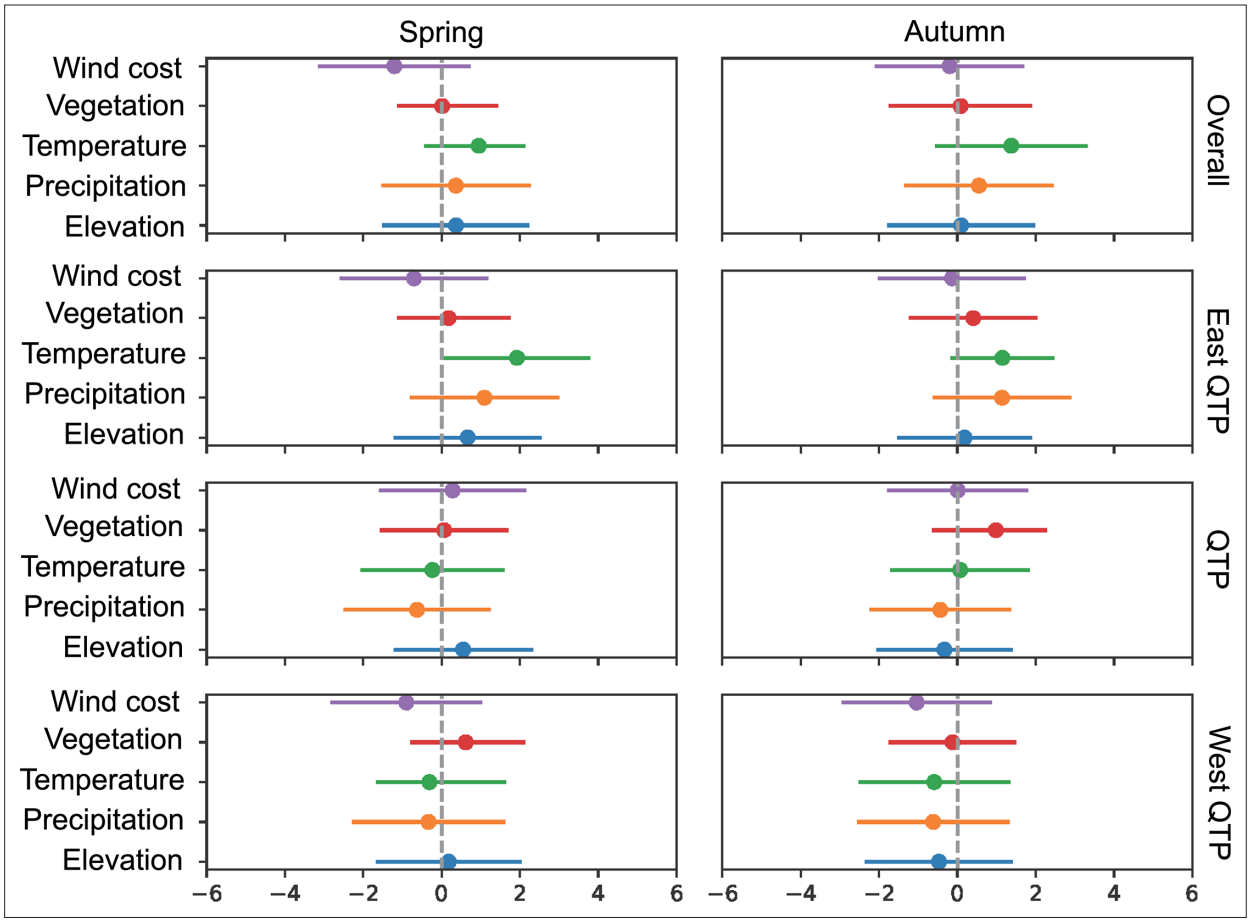

Figure 2. The influence of environmental factors on the direction of avian migration. Migratory directions are calculated based on the azimuths between each adjacent stopover, breeding and wintering areas for each species. We employ multivariate linear regression models under the Bayesian framework to measure the correlation between environmental factors and avian migratory directions. Wind represents the wind cost calculated by wind connectivity. Vegetation is measured by the proportion of average vegetation cover in each pixel (~1.9° in latitude by 2.5° in longitude). Temperature is the average annual temperature. Precipitation is the average yearly precipitation. All environmental layers are obtained using the Community Earth System Model. West QTP, Central QTP, and East QTP denote areas in the areas west (longitude <73°E), central (73°E ≤ longitude < 105°E), and east of (longitude ≥ 105°E) the QTP, respectively. QTP, Qinghai-Tibet Plateau.

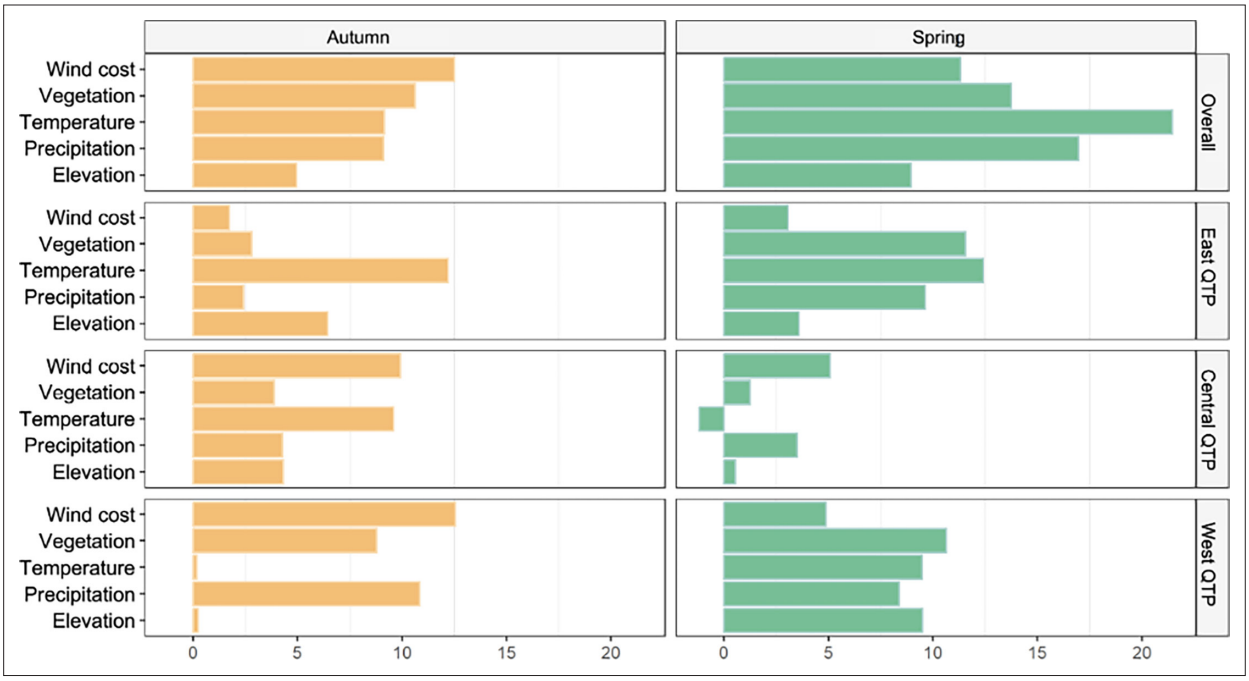

Figure 2—figure supplement 1. Environmental factors that influence avian migratory strategies in the west, central, and east of the Qinghai-Tibet Plateau (QTP). Using Random Forest to model the correlation between environmental factors and migratory strategies (migration direction) along different stages of migration, the bar shows how model performance is reduced by removing the corresponding factor. Wind represents the wind cost calculated by wind connectivity. Vegetation is measured by the proportion of average vegetation cover in each pixel. Temperature is the average annual temperature. Precipitation is the average annual precipitation. West QTP, Central QTP, and East QTP denote areas west (longitude < 73°E), central (73°E ≤ longitude < 105°E), and east of (longitude ≥ 105°E) the QTP, respectively.

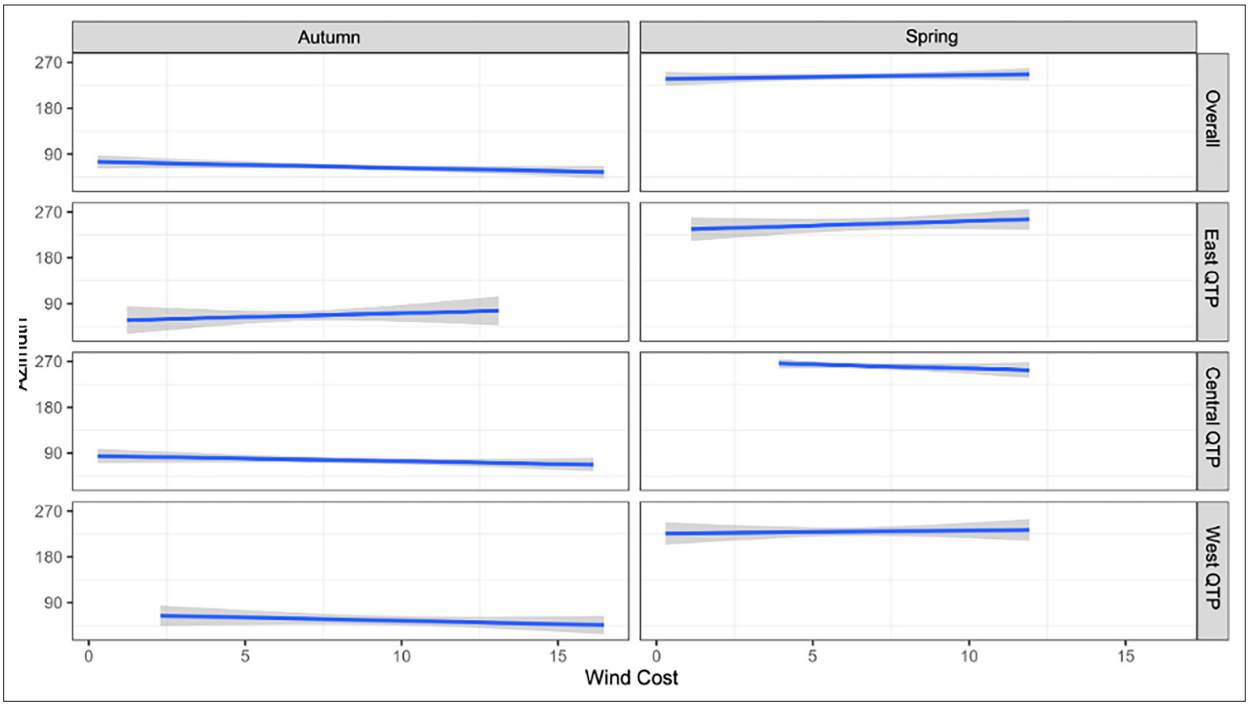

Figure 2—figure supplement 2. Migration azimuth changes with wind cost in the area west, central, and east of the Qinghai-Tibet Plateau (QTP) during studied avian migration periods. Wind represents the wind cost calculated by wind connectivity. West QP, Central QTP, and East QTP denote areas west (longitude < 73°E), central (73°E ≤ longitude < 105°E), and east (longitude ≥ 105°E) of the QTP, respectively.

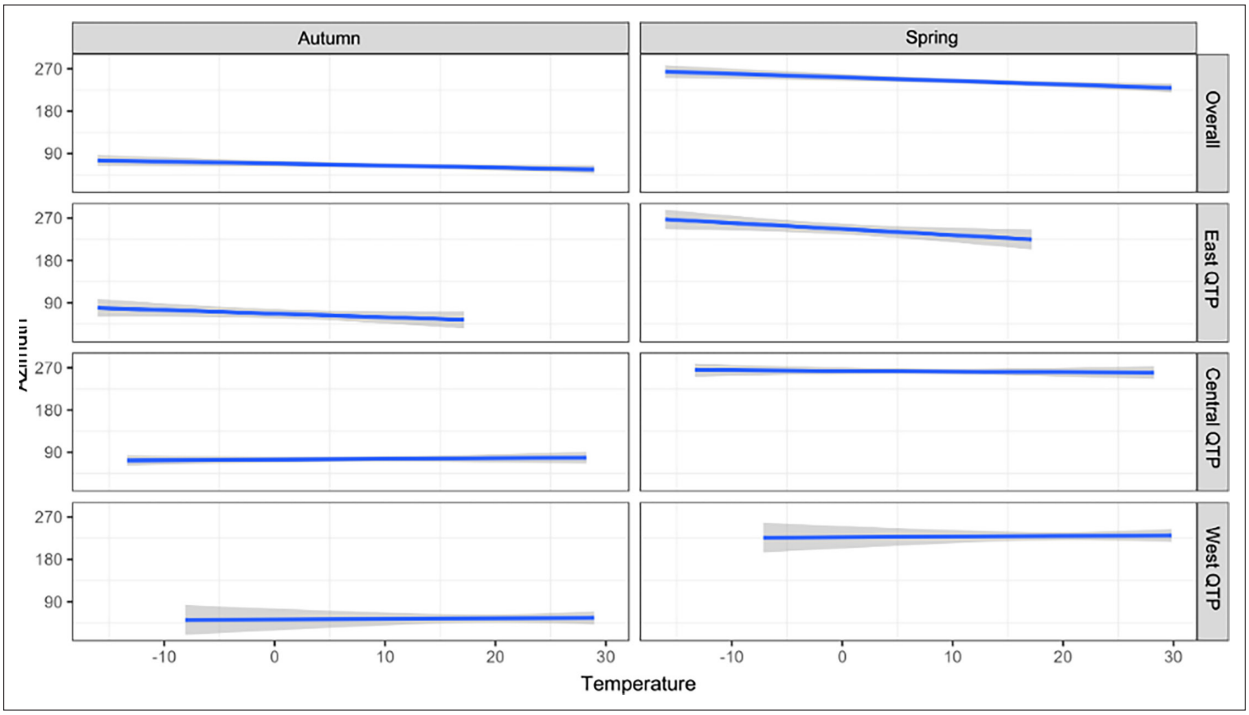

Figure 2—figure supplement 3. Migration azimuth changes with average annual temperature in the area west, central, and east of the Qinghai-Tibet Plateau (QTP) during studied avian migration periods. West QTP, Central QTP, and East QTP denote areas west (longitude < 73°E), central (73°E ≤ longitude < 105°E), and east (longitude ≥ 105°E) of the QTP, respectively.

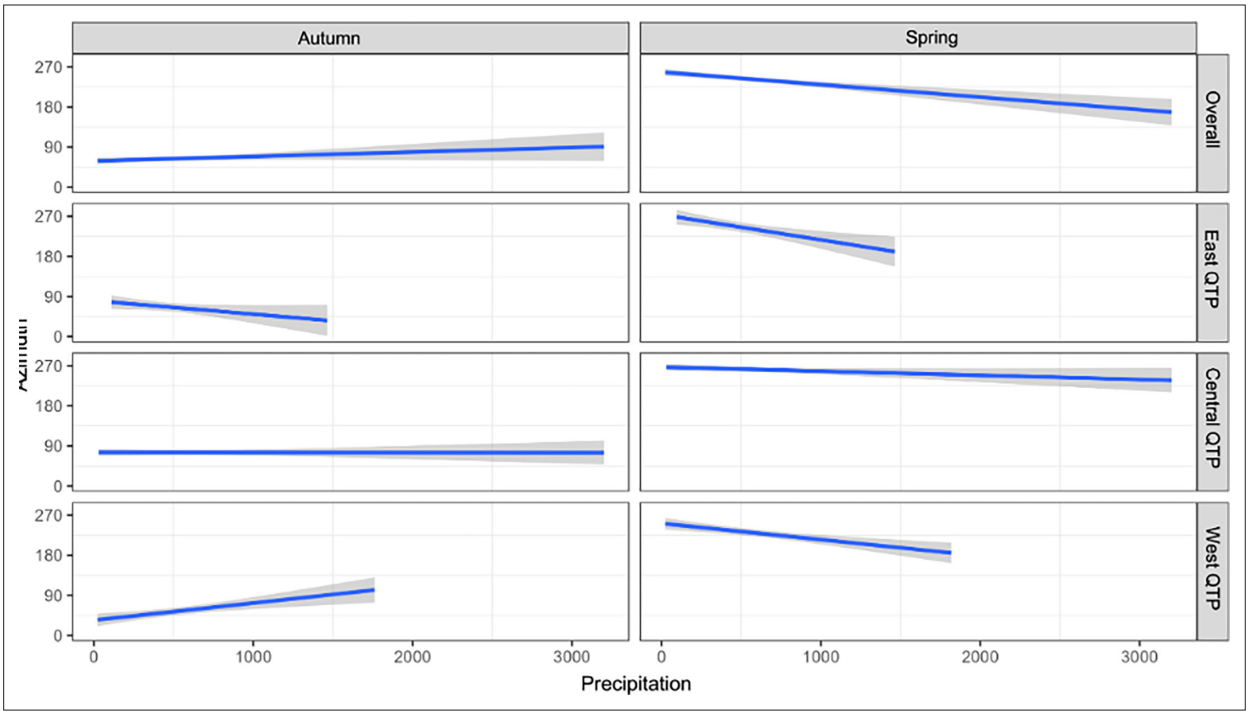

Figure 2—figure supplement 4. Migration azimuth changes with average annual precipitation in the area west, central, and east of the Qinghai-Tibet Plateau (QTP) during studied avian migration periods. West QTP, Central QTP, and East QTP denote areas west (longitude < 73°E), central (73°E ≤ longitude < 105°E), and east (longitude ≥ 105°E) of the QTP, respectively.

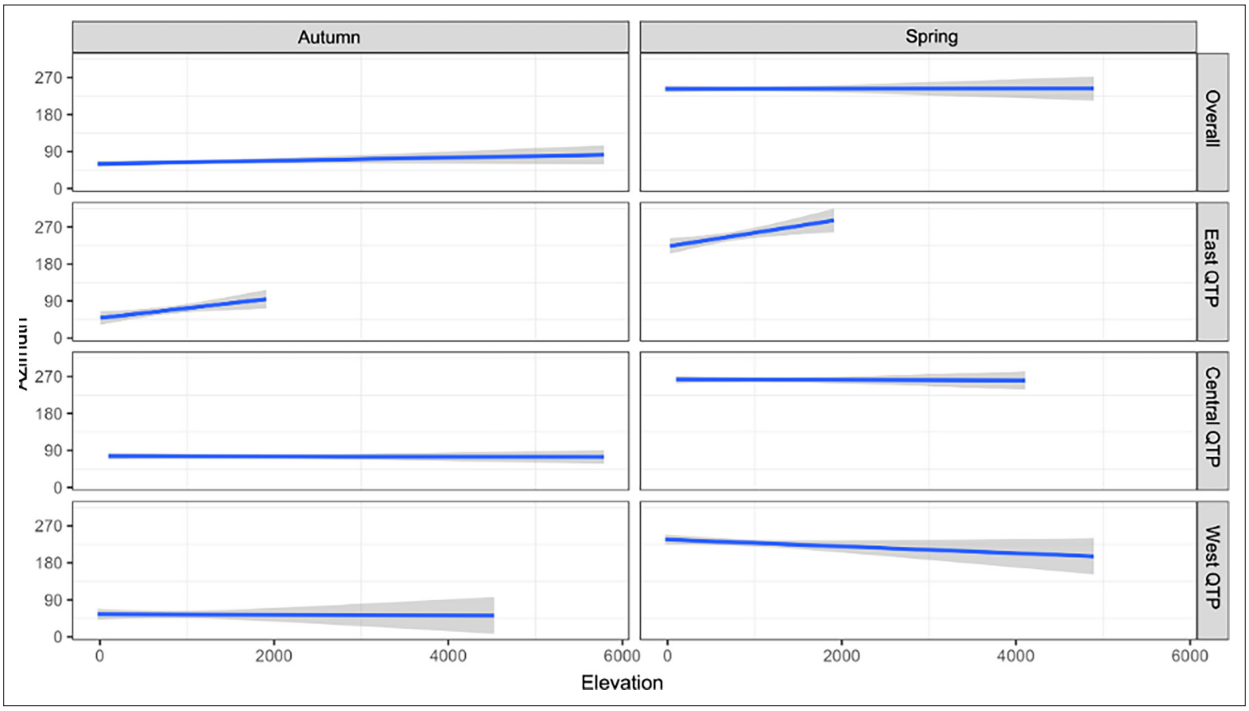

Figure 2—figure supplement 5. Migration azimuth changes with altitude in the west, central, and east of the Qinghai-Tibet Plateau (QTP) during studied avian migration periods. West QTP, Central QTP, and East QTP denote areas west (longitude < 73°E), central (73°E ≤ longitude < 105°E), and east (longitude ≥ 105°E) of the QTP, respectively.

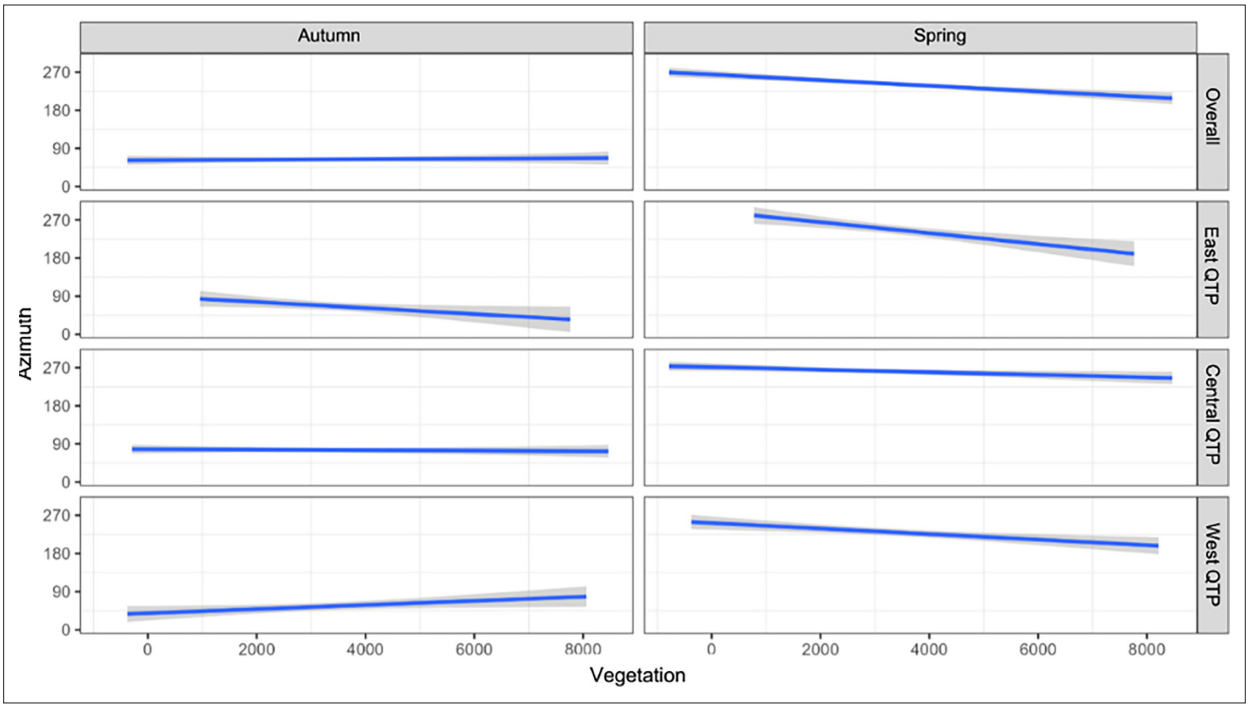

Figure 2—figure supplement 6. Migration azimuth changes with measured vegetation in the west, central, and east of the Qinghai-Tibet Plateau (QTP) during studied avian migration periods. Vegetation is measured by the proportion of average vegetation cover in each pixel. West QTP, Central QTP, and East QTP denote areas west (longitude < 73°E), central (73°E ≤ longitude < 105°E), and east (longitude ≥ 105°E) of the QTP, respectively.