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Briedis, M., Beran, V., Adamík, P. and Hahn, S. 2020. Integrating light-level geolocation with ac-tivity tracking reveals unexpected nocturnal migration patterns of the tawny pipit. – J. Avian Biol. 2020: e02546.

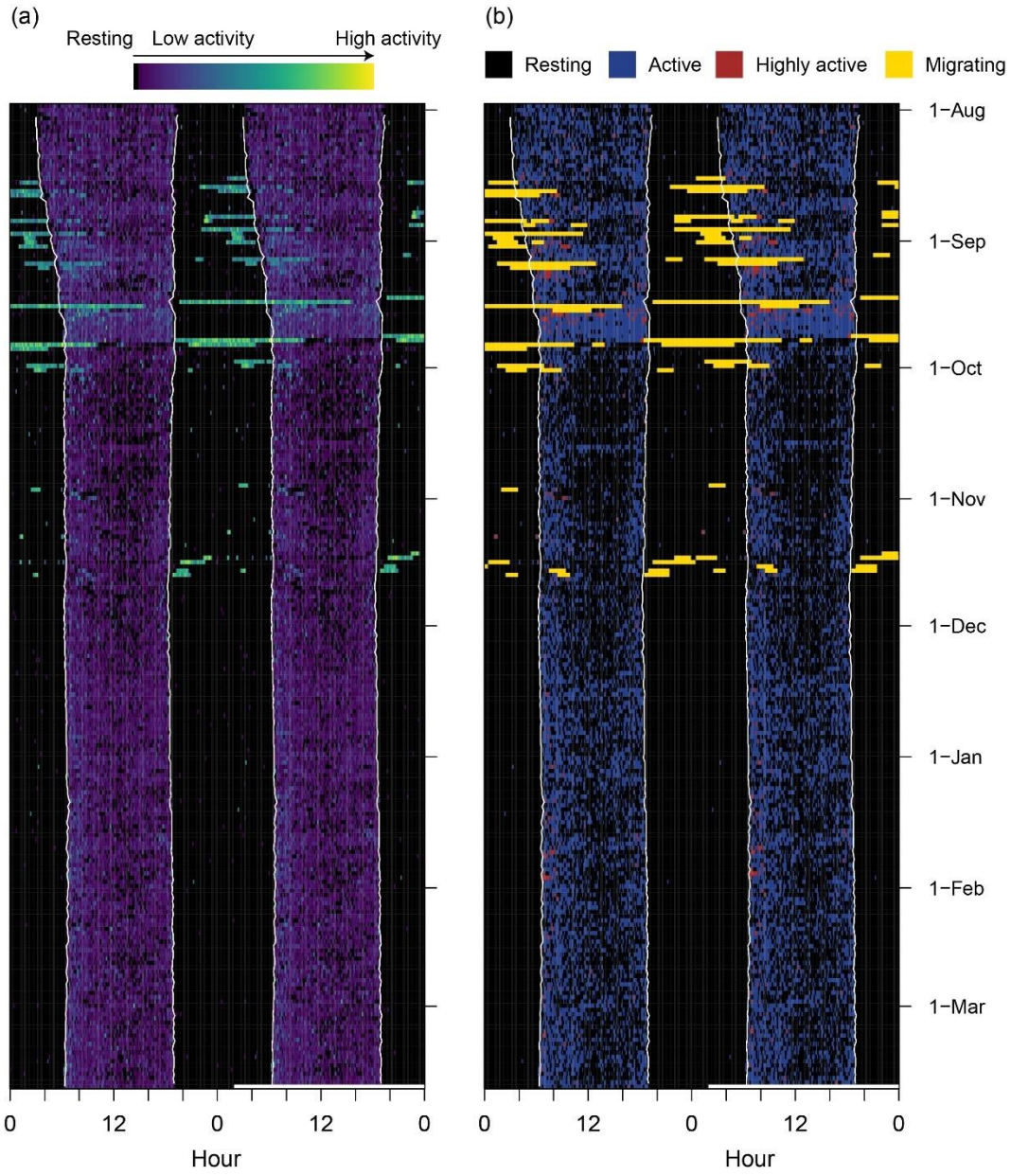
Supplementary material

Electronic Supplementary Material

Figure S1.

Actograms showing the annual activity pattern of four tawny pipit. (a) Raw accelerometer measures, (b) activity data classified into 4 categories – resting, active, highly active, and migrating. In both panels, each horizontal line represents the activity data of two consecutive days, where the second day is repeated as the first day on the next line. White lines in the actograms represents sunrise and sunset times as recorded by the geolocator's light sensor.

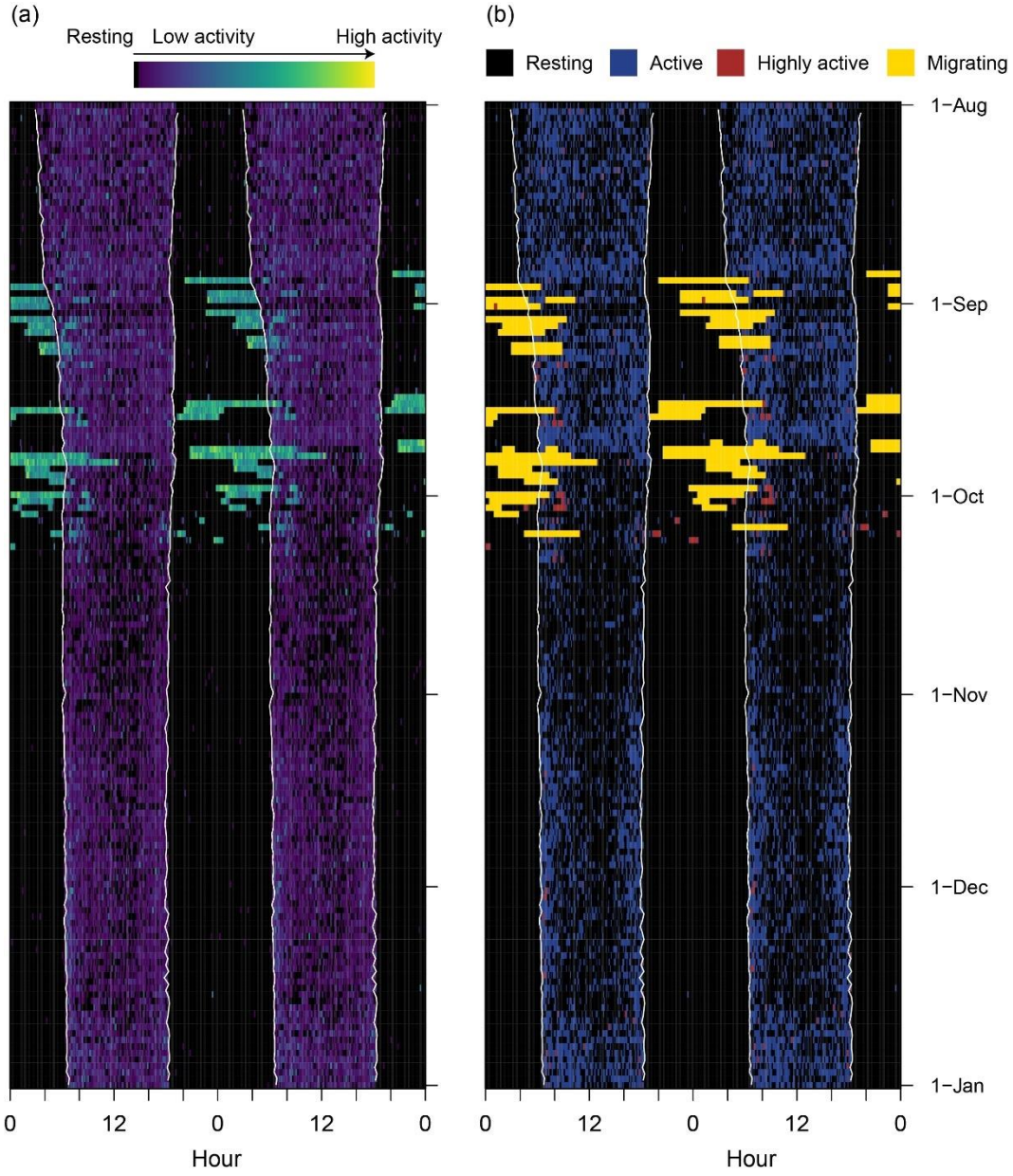
Bird ID: 20NT



Electronic Supplementary Material

Figure S1 continued

Bird ID: 22AU



Electronic Supplementary Material

Figure S1 continued

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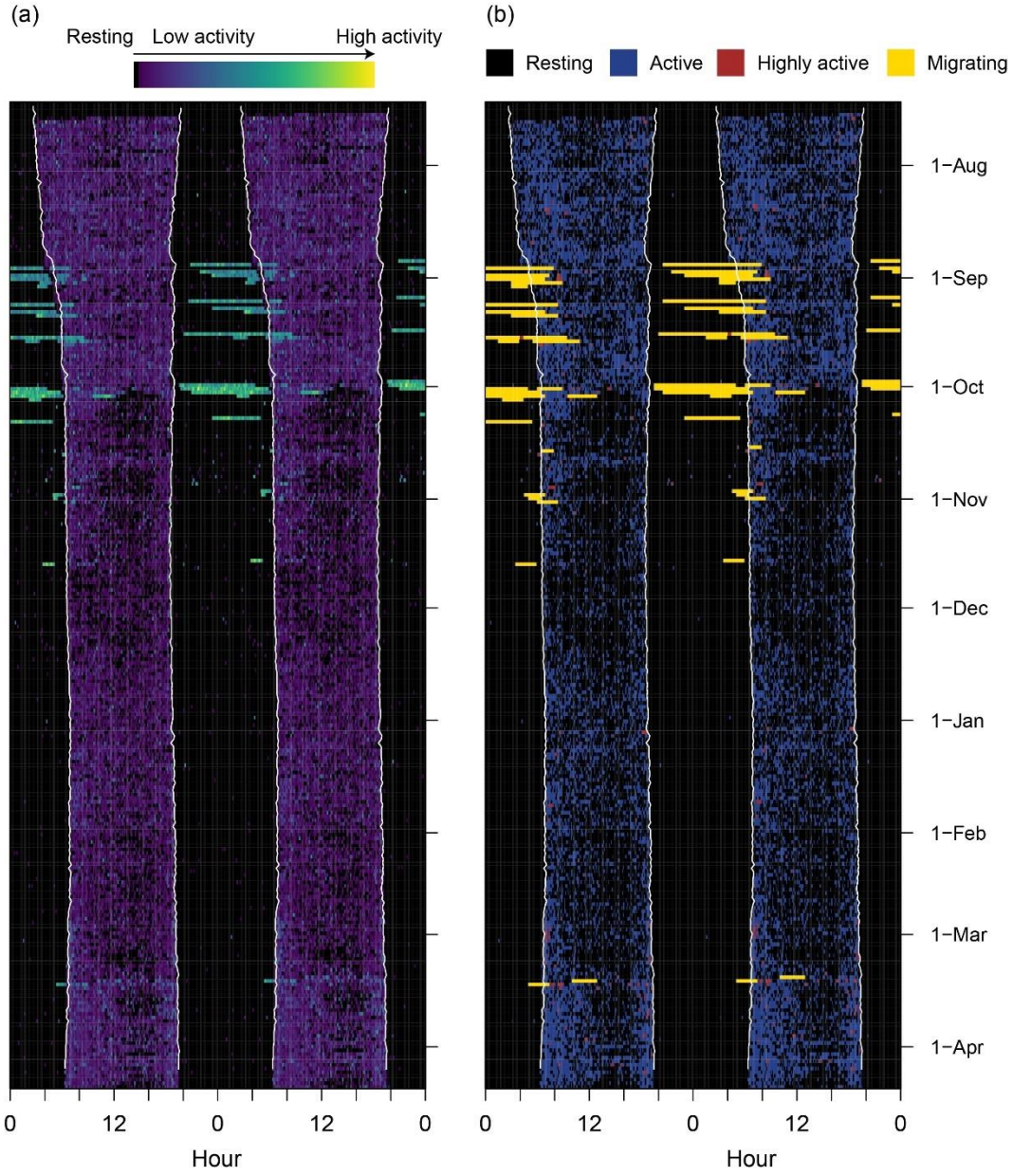

Electronic Supplementary Material

Figure S1 continued

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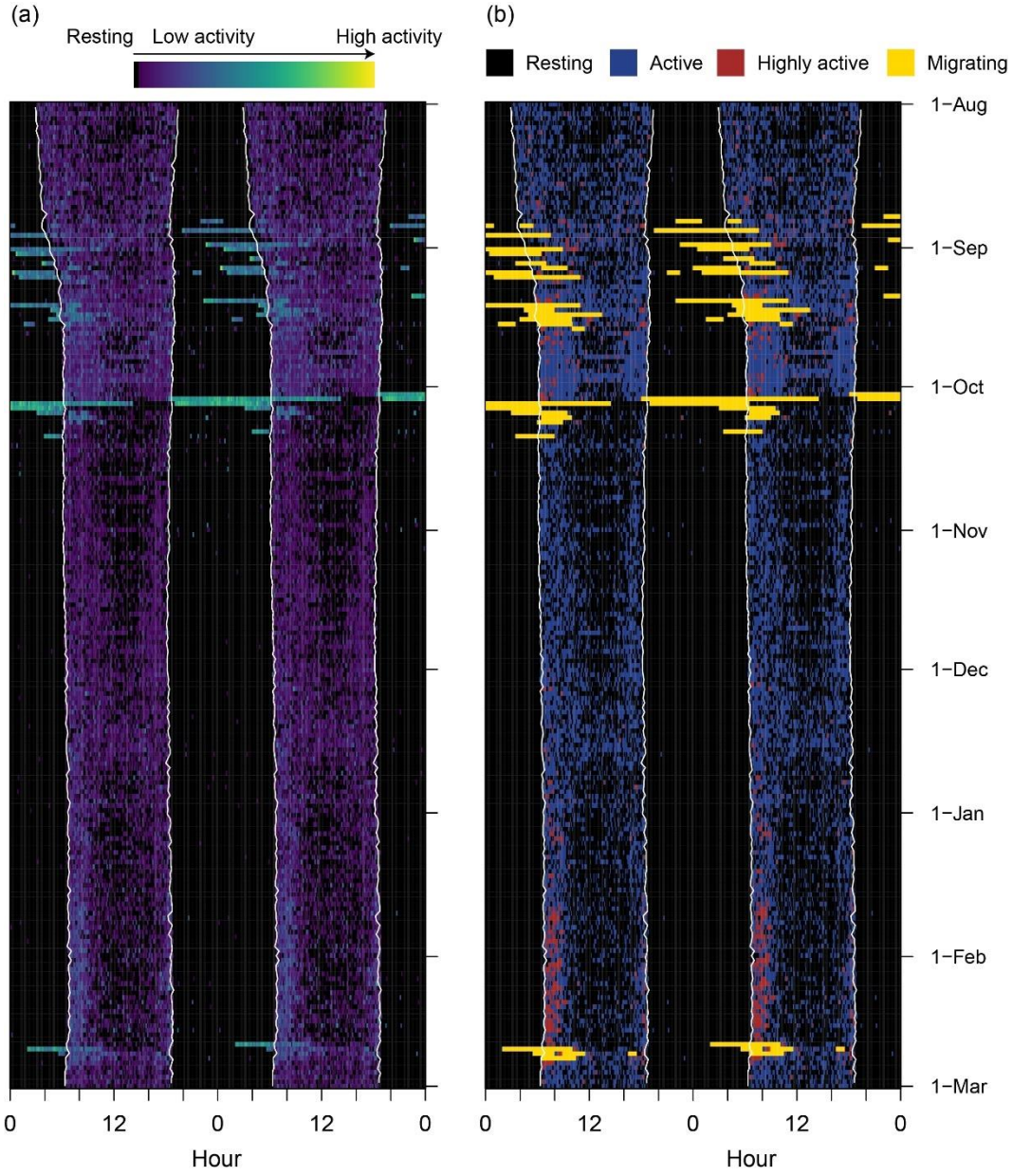

Electronic Supplementary Material

Figure S2.

Migration routes, stopovers and non-breeding sites of five geolocator-tracked tawny pipits. Here, data analyses were performed using only the light data (i.e., classical light-level geolocation) omitting extra information on flight behaviour as inferred from the acetometer and pressure sensor. Instead, stopover and movement periods were first distinguished with *invChanges* function (min stationary duration of 2 days) and then overlapping stopover sites were merged with *mergeGroups* function (threshold = 0.9) using the R-package GeoLight 2.01. For these analyses, we did not have information on the exact flight duration in hours for each movement phase, thus we did not define *dt* parameter in the *groupedThresholdModel* function and we adjusted the speed distribution for the movement model to shape = 6, scale = 0.2 with the highest probability of ground speeds between 15–45 km h−1 during the movement phase. The latter must be done because movement phase now includes not only flight, but also short stopovers of < 2 days and short stops when the bird is resting in-between consecutive flights. Other analyses steps, including calibration, were identical to the ones described in the methods section of the main text.

Shaded areas in the plots show 95% probability distributions of location estimates. For each bird, timing and duration of migration is shown alongside the map where coloured bars indicate stopovers longer than 24 h (stopovers longer than 3 days are marked with black borders) and white spaces between them indicate movement periods between the stopovers. Please note that bars indicating migration timing have variable scales. Panels a and b represent autumn and spring migration of the same individual. Intermediate non-breeding sites are marked in blue for one bird that showed non-breeding site itinerancy (panel c).

Electronic Supplementary Material

Figure S2 continued