Fig. S1 Autumn and spring (a) routes and (b) timing of 13 Eleonora’s falcons that were GPS-tracked across at least two migration cycles each. To ensure readability we highlight a random subset of 5 individuals in colour; 3 females (B1011, B1014, B2400) and 2 males (B2051, B2453). Grey tracks in background show repeated journeys of the remaining eight falcons. (a) Red cross shows the position of the breeding colony on Alegranza islet, with dashed grey curves showing distance to the colony at 1000km intervals. Biomes are coloured such as to highlight ecological barriers that falcons are known to avoid or to cross relatively fast (i.e. desert, seas/lakes, and tropical humid forest), while grey areas predominantly consist of grass-, shrub- and woodland savannahs that may offer feeding opportunities to falcons. (b) Background shading corresponds to biome colours on the map, and is based on the mean distance to the colony at which falcons started and ended each of the major barrier-crossings in each season. (a,b) Note that the size of stop-over points is proportional to the duration of stop-overs on maps, but not on timing plots.
Stationary events and movements within Northwest Africa at the start of autumn migration and during the relatively long pre-breeding stage (~1-2 months) in spring. Dots indicate periods during which falcons were stationary (daily distance < 100km), with dot size being proportional to the duration of the ‘stop’. For readability we highlight the same five individuals that were highlighted in Fig.S1. We note that, (a) after their last visit to the colony in autumn, a minority of falcons in some years spent some stationary days at coastal sites in NW Africa. (b) After arriving to NW Africa in spring, all falcons spent a lot of stationary time at sites along the Atlantic coast and along the western slopes of the Atlas range, with occasional, brief excursions to the colony, or short movements between stationary sites.

Fig.S2
**Fig. S3** Demonstration of the route-averaging approach for quantifying (a) within-individual and (b) between-individual variation in migratory route choice. (a) Coloured tracks show repeat trips of B2048 (narrow coloured tracks with small black dots) that were resampled to the first fix at which this bird first crossed every 100km interval from/to the colony (black dots). We then averaged the longitude and latitude at every 100km interval between resampled trips to obtain the individual-mean migration route (thick track without small black dots) of B2048 for each season. Within-individual route variation (colour legend) as the average distance between the resampled routes to the individual-mean route at every 100km interval. Large dots and segments connect matching fixes along the resampled routes and the individual-mean route at every 1000km threshold. (b) Analogously, we calculated between-individual route variation (colour legend) as the average distance of the individual-mean routes (thin coloured routes with black dots) to the population-mean route (thicker coloured route without black dots) at every 100km interval in each season. In order not to clutter the image we only show individual-mean routes for two individuals. - Calculations of (i) population-level, (ii) between-sex, and (iii) sex-specific between-individual route variation are not shown here, but were achieved through analogous methods, respectively (i) averaging the distance from the resampled tracks to the population-mean route, (ii) from the sex-mean routes to the population-mean route, and (iii) from the individual-mean routes to the mean routes of their corresponding sex. See Fig. 1 for details on background maps.
Fig. S4 Demonstration of the route-averaging approach for quantifying (a) within-individual and (b) between-individual variation in migration timing. (a) Coloured tracks show repeat trips of B2048 (narrow coloured routes with black dots) that were resampled to the first fix at which this bird first crossed every 100km interval from/to the colony (black dots) during each autumn/spring trip. We then averaged the date (DOY) at every 100km interval between resampled trips to obtain the individual-mean schedule (thick track without black dots) of B2048 for each season. Finally, we calculated within-individual timing variation (colour legend) as the average absolute time difference [days] from the resampled trips to the individual-mean schedule at every 100km interval. Large dots and segments connect matching fixes along the resampled trips and the individual-mean schedule at every 1000km threshold. Resampled trips of other individuals are shown in background in grey to illustrate the overall seasonal migration periods. (b) Analogously, we calculated between-individual timing variation (colour legend) as the absolute time difference between individual-mean schedules and the population-mean schedule at every 100km interval in each season. To avoid cluttering this image we only show individual-mean schedules of two individuals (thin coloured routes with black dots), with the 11 remaining individual-mean schedules shown in background in grey. -- Calculations of (i) population-level, (ii) between-sex, and (iii) sex-specific between-individual timing variation are not explicitly shown here, but were achieved through analogous methods, respectively: averaging the time difference (i) between the resampled tracks and the population-mean schedule, (ii) between the sex-mean schedule to the population-mean schedule, and (iii) from the individual-mean schedules to the corresponding sex-mean schedule. See Fig. 1 for further plot details.
Fig. S5 Route variation throughout the flyway (a) within individuals, (b) between individuals, (c) between individuals per sex (i.e. between males and between females respectively) and (d) between sexes, during autumn (left) and spring (right). Grey routes show the (a) resampled trips, (b,c) individual-mean routes and (d) sex-mean routes. We average the distances of those routes to the coloured (a) individual-mean routes, (b,d) population-mean route and (c) sex-mean routes to obtain a measure for route variation at every 100km distance to the colony.
Fig S6 Timing variation vs. distance to the colony as measured (a) within individuals, (b) between individuals, (c) between individuals per sex (i.e. between males and between females) and (d) between-sexes during autumn (left) and spring (right). Grey routes show the (a) resampled trips, (b,c) individual-mean schedules and (d) sex-mean schedules. We averaged the time difference between those schedules and the coloured (a) individual-mean schedules, (b,d) population-mean schedule and (c) sex-mean schedule to obtain a measure of timing variation at every 100km distance to the colony.
Fig. S7 Relative departure and arrival timing, detour extent, travel duration, and stop-over and travel days compared between all four combinations of sex and season, based on the first recorded trip of each individual. Labels indicate significant differences between groups according to a post-hoc Tukey analyses.
Fig S8 (a) Mean individual duration of stop-overs, (b) between-individual temporal overlap and (c) within-individual temporal overlap of seasonal stop-over periods in Northwest Africa, the western Sahel and East Africa, respectively. (a) Coloured labels “x(y/z)” indicate sample sizes, with “x” being the number of falcons that stopped-over during at least one migration (i.e. the sample size for between-individual overlap in b), “y” being the number of falcons that stopped-over during at least two migrations (i.e. the sample size for within-individual overlap in c), and “z” being the number of falcons that stopped-over on all of their recorded journeys as a useful metric for the regularity of stop-overs. Black labels are Tukey grouping factors, whereby distinct labels indicate significant differences (p < 0.05) in mean stop-over regularity or spatial overlap between the six seasonal stop-over regions.
Fig. S9 Use and spatial similarity in stop-overs by female falcons. (a) Individual use of stop-overs, and (b) between-individual spatial similarity and (c) within-individual spatial similarity of seasonal stop-overs in Northwest Africa, the western Sahel and East Africa, respectively. (a) Coloured labels “x(y/z)” indicate sample sizes, with “x” being the number of falcons that stopped-over during at least one migration (i.e. the sample size for between-individual comparisons in b), “y” being the number of falcons that stopped-over during at least two migrations (i.e. the sample size for within-individual comparisons in c), and “z” being the number of falcons that stopped-over on all of their recorded journeys. Black labels are Tukey grouping factors, whereby distinct labels indicate significant differences (p < 0.05) in mean stop-over regularity or spatial overlap between the six seasonal stop-over regions.
**Fig. S10** Use and spatial similarity in stop-overs by **male** falcons. (a) Individual use of stop-overs, and (b) between-individual spatial similarity and (c) within-individual spatial similarity of seasonal stop-overs in Northwest Africa, the western Sahel and East Africa, respectively. (a) Coloured labels “x(y/z)” indicate sample sizes, with “x” being the number of falcons that stopped-over during at least one migration (i.e. the sample size for between-individual comparisons in b), “y” being the number of falcons that stopped-over during at least two migrations (i.e. the sample size for within-individual comparisons in c), and “z” being the number of falcons that stopped-over on all of their recorded journeys. Black labels are Tukey grouping factors, whereby distinct labels indicate significant differences (p < 0.05) in mean stop-over regularity or spatial overlap between the six seasonal stop-over regions.
Fig.S11 Duration and temporal overlap in stop-overs by female falcons. (a) Mean individual duration of stop-overs, and (b) between-individual temporal overlap and (c) within-individual temporal overlap of seasonal stop-over periods in Northwest Africa, the western Sahel and East Africa, respectively. (a) Coloured labels “x(y/z)” indicate sample sizes, with “x” being the number of falcons that stopped-over during at least one migration (i.e. the sample size for between-individual overlap in b), “y” being the number of falcons that stopped-over during at least two migrations (i.e. the sample size for within-individual overlap in c), and “z” being the number of falcons that stopped-over on all of their recorded journeys as a useful metric for the regularity of stop-overs. Black labels are Tukey grouping factors, whereby distinct labels indicate significant differences (p < 0.05) in mean stop-over regularity or spatial overlap between the six seasonal stop-over regions.
Fig.S12 Duration and temporal overlap in stop-overs by male falcons. (a) Mean individual duration of stop-overs, and (b) between-individual temporal overlap and (c) within-individual temporal overlap of seasonal stop-over periods in Northwest Africa, the western Sahel and East Africa, respectively. (a) Coloured labels “x(y/z)” indicate sample sizes, with “x” being the number of falcons that stopped-over during at least one migration (i.e. the sample size for between-individual overlap in b), “y” being the number of falcons that stopped-over during at least two migrations (i.e. the sample size for within-individual overlap in c), and “z” being the number of falcons that stopped-over on all of their recorded journeys as a useful metric for the regularity of stop-overs. Black labels are Tukey grouping factors, whereby distinct labels indicate significant differences (p < 0.05) in mean stop-over regularity or spatial overlap between the six seasonal stop-over regions.