Deepen ecological behaviour of birds in post-breeding migration through the Alps using a multi-isotopic approach (C, N, S, H, O)

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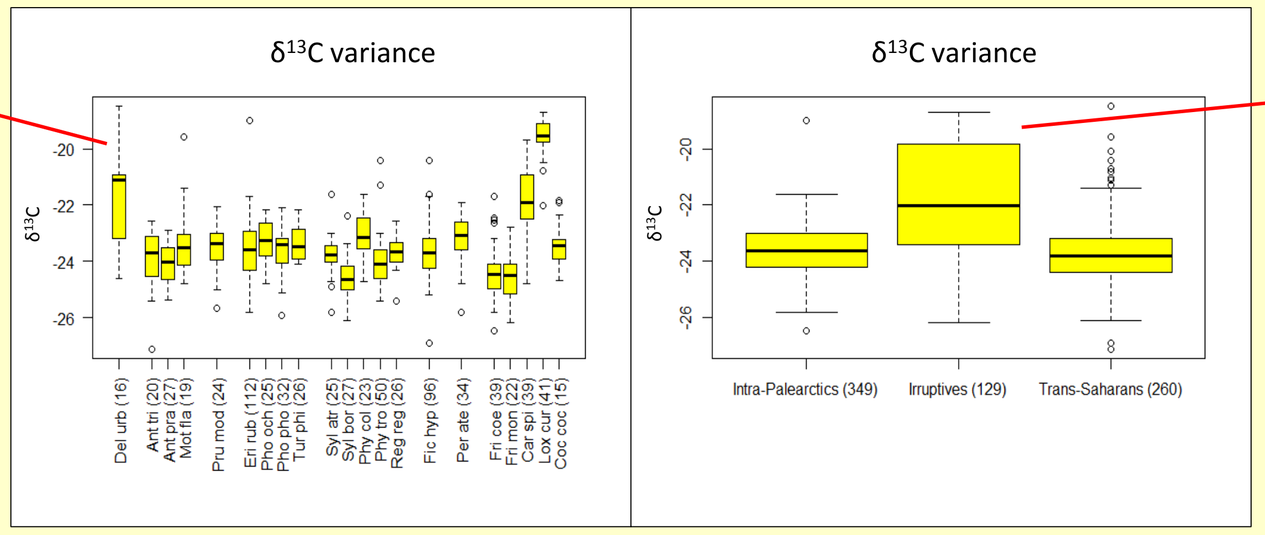
Study context

This work essays to lay the groundwork for a purposeful discussion about the opportunity to develop isotopic maps related to European Passerines. For the first time all together, the analyses of the SIRs of carbon, nitrogen, oxygen, hydrogen and sulfur ($\delta^{13}C$, $\delta^{15}N$, $\delta^{18}O$, $\delta^{2}H$, $\delta^{34}S$) were carried out on collected feathers of 21 migratory species (n=738).

Aim of the study

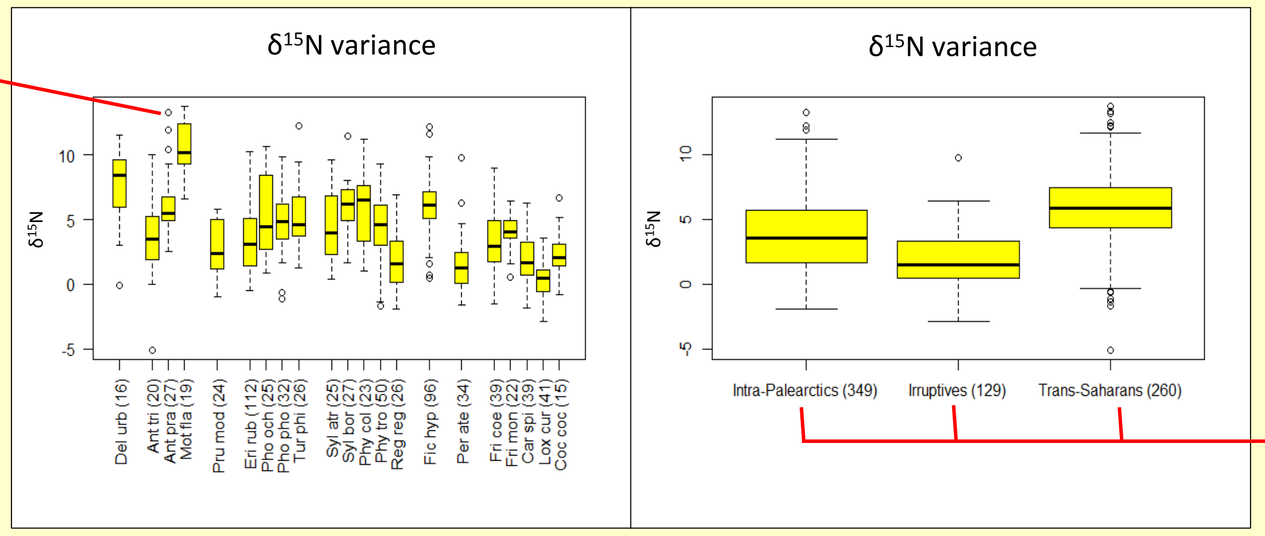
We aimed to deepen into ecological habits of different European Passerine species, captured during post-breeding migration on central Italian Alps, trying to clarify if it could be possible to group different species on an ecological basis, considering inter and intra-specific isotopic variability, breeding seasonality and feeding habits.

A dominated C_4 plant environment such as corn fields might enrich $\delta^{13}C$ values in feathers of consumers [1], [2].



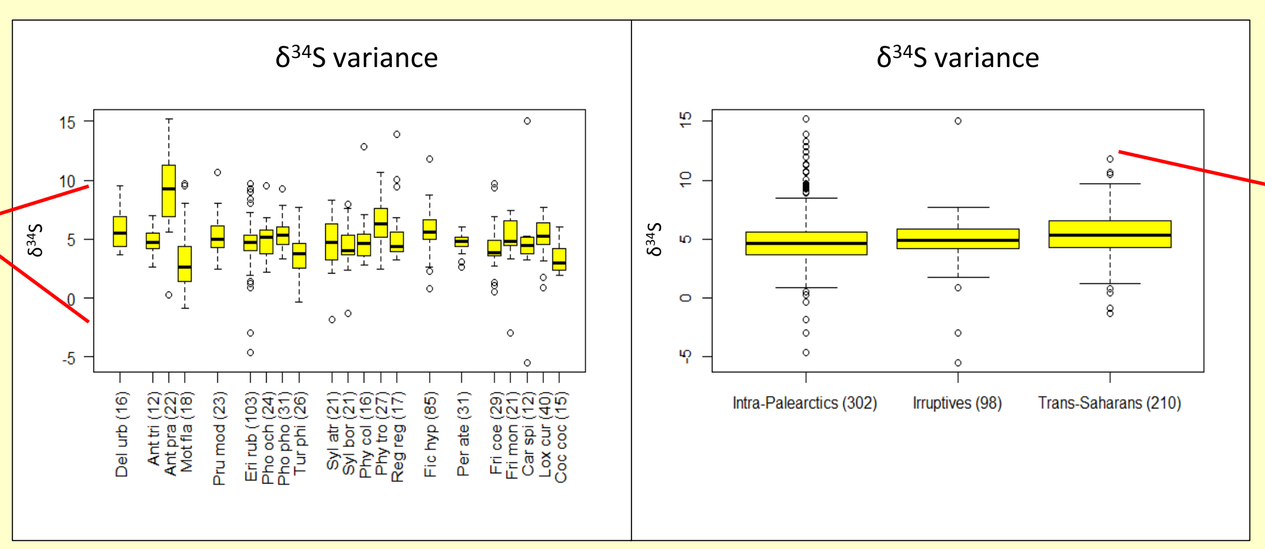
Carbonates ingested with grit might enrich $\delta^{13}C$ values [3], [4].

Species that use to breed in agricultural environments should show enriched $\delta^{15}N$ values due to fertilizers [5], [6].

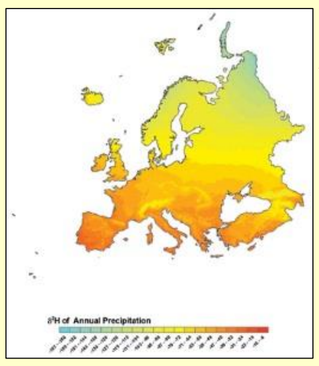


$\delta^{15}N$ is a predictor of trophic level. Species could be split by diet type: mainly adult insects, mainly larvae and detritivores, mainly vegetarian (cone seeds) [7].

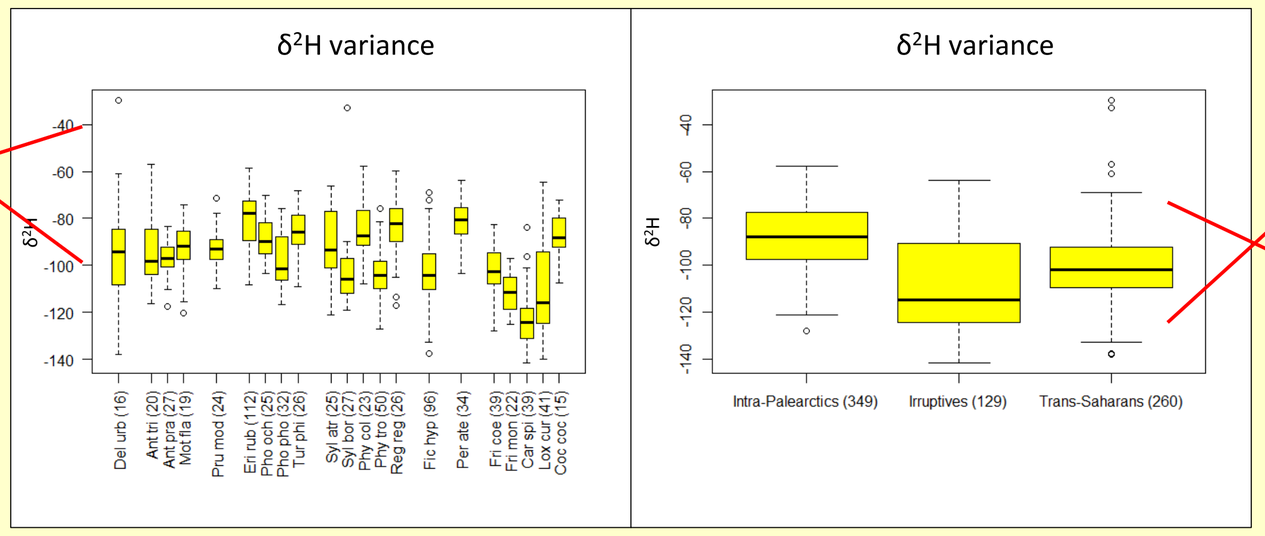
Values of $\delta^{34}S$ becomes more enriched in proximity of seashore. Contrariwise, volcanic soils or pollutants could cause negative values [8].

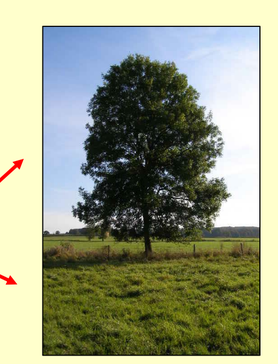


Enriched values of $\delta^{34}S$ might be related also to wetlands [6].



Values of $\delta^{2}H$ of feathers are strongly related to $\delta^{2}H$ of precipitation water continental gradient [9].





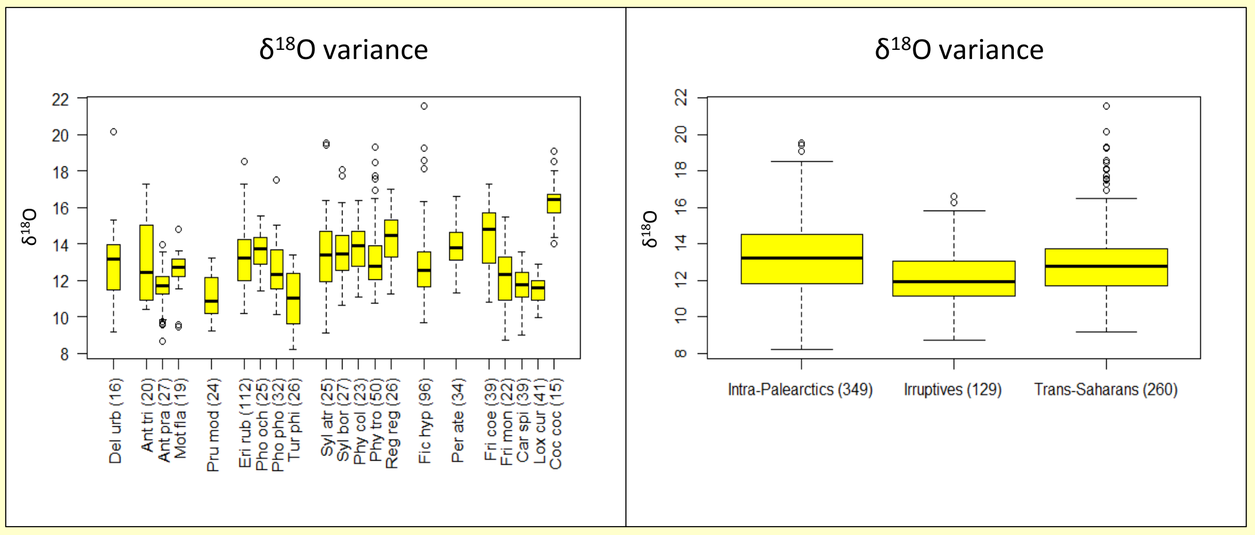
Canopy feeders
Lower $\delta^{2}H$

Ground feeders
Higher $\delta^{2}H$

Water isotopes signatures ($\delta^{2}H$ and $\delta^{18}O$) in animal tissues depend also from foraging strategies [11].

Species that can breed in cold seasons could show lower values of $\delta^{2}H$ [10].

$\delta^{18}O$ could provide important additional information on source environmental waters, diets, and climatic conditions during and prior to growth [12].



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