Phylogeography and taxonomy of the Snow Petrel (*Pagodroma nivea s.l.*)

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Having undergone historic climatic changes, the Snow Petrel (*Pagodroma nivea s.l.*), a circumpolar Antarctic and Subantarctic seabird, is a well suited model organism to predict future scenarios resulting from future global changes. Nowadays, the taxonomic status of the Snow Petrel remains the subject of considerable controversy (Shirihai, 2007; del Hoyo & Collar, 2014), the current consensus treating it as two distinct subspecies (del Hoyo & Collar, 2014), the lesser and the greater Snow Petrel (respectively P. nivea nivea and P. n. major). Few "pure" parapatic populations of both "subspecies" are known whereas most colonies consist of hybrid morphotypes. The evolutionary history of the species is still uncertain and the existence of the two "subspecies" could be the result of different glacial refugia with the establishment of post glacial hybridization zones (Fraser et al., 2012). As one of the target species of the RECTO project (funded by BELSPO) we will assess the genetic diversity of the Snow Petrel to attempt to reconstruct its evolutionary history and phylogeography in order to link population histories and refugia to past climate changes. Biometrical variation (bill, tarsus, wing and tail length) will be measured and used to assess morphological variance among populations. For this purpose, we will obtain specimens from various locations of the Antarctic and the Scotia Arc, to be collected during field campaigns and from museum specimens. Levels of morphological variation will be compared to molecular diversity of highly variable mitochondrial regions (control region) and whole mitogenomes. The latter data will also be used to detect potential cryptic species. while the development of large numbers of single-nucleotide polymorphism (SNP's) from RAD sequencing techniques or microsatellites will provide suitable tools to untangle the complex genetic structures of these birds. Coalescent analysis of SNP's (or microsats) will reveal population expansion, bottlenecks and connectivity and Bayesian analysis will also reconstruct the phylogeography of the two "subspecies" present today.
Current global changes are quickly affecting our planet, and parts of Antarctica are among the fastest warming regions (Turner et al., 2009; Bromwich et al., 2013) while the Southern Ocean is also further endangered by ocean acidification. Future distributions of the Snow Petrel and its prey will be predicted under different scenarios by integrating spatial and trait distribution models based on physiological limits and ecological niches with state-of-the art models for ocean dynamics (Luyten, 2011), sea ice (Vancoppenolle et al., 2009) and Lagrangian particle models (Dulière et al., 2013).

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