One complete migration cycle of an adult Griffon Vulture: from southern Spain to Senegambia as revealed by high-resolution GPS tracking technology

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Introduction

Bird migration has long held great interest in naturalists since the time of Aristotle, although at that time it was not perceived as a regular return movement between separate breeding and wintering areas. This interest not only has been maintained but is even increasing at the present time, when tracking technologies facilitate the fundamental understanding of movement ecology and behaviour. Although the Griffon Vulture (*Gyps fulvus*) has long been considered a sedentary or partially migratory raptor, it was demonstrated that the majority of juveniles leave their breeding colonies during their first autumn of life, many of them crossing the Strait of Gibraltar, where a regular passage has been confirmed during the last years. The recovery in Andalusia and northern Morocco of some Griffon Vultures ringed in northern Spain, in the late 1970's, demonstrated the dispersion of juveniles to the south. A decade later some ringed birds were recovered in Mauritania, Niger and Senegal, although the destination of the Griffons in Africa remains quite unclear, as well as the time of their return to Spain. We firstly describe here the migration routes and wintering area in Africa of an adult Griffon Vulture, from southwestern Europe, by means of GPS loggers.

Methods

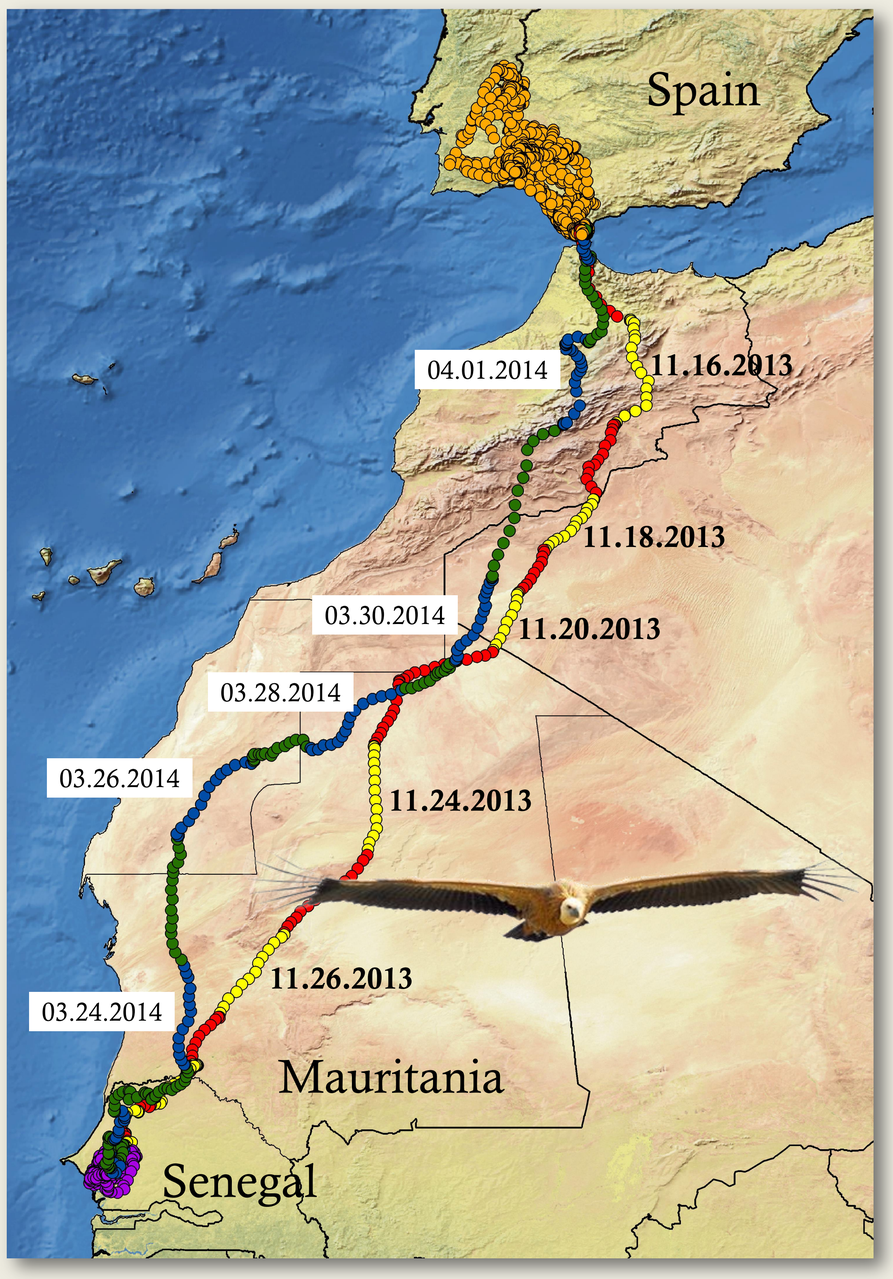
Griffon Vultures (juveniles, immature and adults) were caught close to nest sites in southern Spain using Bal-chatri traps (n=12), between September 2010 and November 2013. We attached the GPS loggers (Bird Tracking System-UvA BiTS, with a total weight of 61 g) using a tubular Teflon Ribbon chest harness. Using this system the data were downloaded in the breeding area, where the birds were captured, through a ground-based antenna network, so we needed our birds to return home to get the information.

Capture technique (Bal-chatri trap where monofilament nooses were tied to the ground, surrounding a carcass) and detail of the toe.

Tagged adult Griffon Vulture (GPS logger and wingtag).

Strait of Gibraltar from southern Spain.

Results



Only one of the tagged Griffon Vultures crossed to Africa, and successfully returned to the breeding colony, downloading the information related to the migration route and the wintering area (a total of 22,762 locations between 26 May 2013 and 10 April 2014). After crossing the Strait of Gibraltar the distances covered in autumn and spring varied between 2,682 and 3,021 km, respectively. The duration of both movements was similar (13 days from Spain to Senegal and 14 days the return journey). The Griffon flew fastest on its spring migration, with a daily average of 216 km/day (206 km/day in autumn). The maximum distance covered in one day varied between 446 km in spring and 323 km during autumn. The average speed varied between 37 and 45 km/h, with a maximum of 65.5 km/h.

Some conclusions

Spain holds more than 80% of the European population of Griffon Vultures, with a sharp increase during the last three decades (from 3,200 breeding pairs in 1979 to more than 28,000 in 2008). This spectacular increase may favour the migration of a proportion of the population to northwestern Africa, as appears to be confirmed by the increase in the number of Griffon Vultures crossing the Strait of Gibraltar year after year. As a species that migrate in big groups the information provided by "our" Griffon may provide arguments to understand and interpret the migratory behaviour of the species. Once in the golden era to study animal movement we face the challenge to scale-up from individual fine-scale movements to population-level dynamics.

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