非繁殖期および産卵前期におけるウトウのペアの移動と着水行動

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Do seabirds mated for life synchronize their migration timing and at-sea activity outside the breeding period? Tracking movement and behavior of Rhinoceros auklet pairs during the non-breeding and pre-laying periods

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Long-term breeding partnerships are common in birds, and can last for life, particularly in long-lived species such as seabirds. In seabirds, which usually spend the non-breeding period at sea, it is poorly known whether pair bonds are maintained outside breeding season. This is because it is challenging to survey partners concomitantly over periods of months at sea. More specifically, how partners achieve gathering at the onset of the breeding period and start synchronizing their reproductive activities is generally unknown.

To answer to this question, we surveyed the at-sea movements and behavior of 7 rhinoceros auklet Cerorhinca monocerata pairs from Teuri Island, Japan Sea. Over 4 breeding seasons (2010-2011 to 2013-2014), we captured paired male and female auklets breeding at the colony and attached to each bird a miniaturized data logger recording ambient light levels (enabling geolocation), water temperature and immersion activity over one year. The loggers were retrieved at the start of the following breeding season. Data were downloaded, and at-sea migration and behavior of partners were reconstructed over the non-breeding and early breeding seasons. For each of the 7 pairs, we investigated spatial segregation of pair members during the non-breeding season and synchronization of their at-sea activity during the early-breeding season. All 7 pairs remained as pairs in the following breeding season.

Geolocation data showed that in most of the cases, the paired birds seemed to spend the non-breeding season over similar areas (Okhotsk Sea, then southern Japan Sea and/or Korean Peninsula). However, partners were generally not synchronous in their migration timing. During the non-breeding period, the geographic distance between partners averaged 411 ± 133 km and systematically reached considerable distances, temporarily (maximum per pair 815 – 1748 km). The relatively large differences in the seawater temperature recorded by both pair members (up to over 10℃) supported the inference that partners were not located in similar habitats concomitantly. Both spatial segregation and seawater temperature differences decreased, when the partners came back to the colony for breeding.

During the onset of the reproductive season or pre-laying period (between the date of first arrival on the colony in spring, to the egg laying date), pair members showed, at least temporarily, a high synchrony in their immersion records, suggesting a coordinated behavior at sea during this period, particularly acute in the morning, when birds commute from the colony to the sea.

Our study shows that in long-lived seabird species with high inter-annual fidelity to breeding partner, pair members may be segregated from each other (at least temporarily) over geographical distances at sea, during most of the year (>7 months). Hence, to explain how the paired birds achieve gathering at the colony for breeding, we can rule out the hypothesis of permanent contact of partners at sea over the non-breeding season. In contrast, the highly synchronized activity of the partners at sea after their first return to the colony may better explain how partners maintain the pair bonds from one year to the next. Further, from an evolutionary biology perspective this synchronized behavior may help the male diluting potential risks of extra-pair copulation at sea during the period of egg fertilization.