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Krill-dependent indicator species populations trends in hardly accessible sites of South Shetlands - UAV potential

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In order to increase the efficiency and accuracy of the monitoring of krill-dependent indicator species, a long range, fixed-wing, auto-piloted Unmanned Aerial Vehicle (UAV) specially adapted for operations in polar regions was used to study fauna species on hardly accessible sites on the South Shetlands (CCAMLR Statistical Subarea 48.1), particularly Penguin Island and Turret Point Oasis (King George Island). The use of a UAV equipped with digital camera allowed to collect a high-quality material applicable for a quantitative analysis of the Antarctic bird and pinniped populations. Beyond Visual Line of Sight (BVLS) flight was performed on December 1st 2016, according to breeding chronology of investigated species. On the obtained RGB images (<7cm ground sample distance), breeding sites of four species of marine birds, including two species of Pygoscelid penguins, as well as pinnipeds resting sites were identified. A comparison with available historical data for investigated areas suggests a decrease in breeding populations of Adélie and chinstrap penguins as well as the southern giant petrel. A slight increase in breeding pairs of the Antarctic shag was recorded. In the last decade, sporadically performed observations showed that the southern elephant seal population remained stable. Compilation of presented data together with the existing information from other breeding areas (monitored frequently) will give a broader picture of the distribution and the size of fauna populations in the South Shetland region. Such data is essential to parameterize models that estimate the biomass of food consumption by penguins, which are needed to regulate krill fishery. Additionally, the proposed UAV based method reduces the environmental stress and was proven to be time efficient and costs effective.