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Censusing Animal Populations from Space in the Southern Ocean

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Quantifying the population trends of higher order predators provides an especially informative and tractable indicator of ecosystem health. Therefore, regular censuses are fundamental for the management of animal populations but are logistically challenging for species living in the Southern Ocean. High-resolution satellite images of Earth, which are increasingly available for civilian applications, can discern individual large animals and permit, for the first time, the possibility of estimating populations on regional to continental scales. Pack ice seals are an important component of the Southern Ocean ecosystem, yet are notoriously difficult to census as they are sparsely distributed over large regions and haul out onto the ice unpredictably. Accordingly, historically population estimates have been derived through a combination of counts and models to accommodate the detection rate of animals, both of which are constrained when surveys are limited in spatial and temporal coverage. We will use counts derived from satellite imagery to estimate abundance of pack ice seals and to, ultimately, quantify population trends in this important group. In the Southern Ocean, estimates of seal abundance are needed to set precautionary catch limits for the burgeoning fisheries in that region. This study will define a pathway for satellite imagery and remote sensing techniques to be used for inaccessible species of wildlife in other management frameworks worldwide.