Supplement S1

The full training set included southern elephant seals (n=614), crabeater seals (n=464), Antarctic fur seals (n=533), harp seals (n=30), leopard seals (n=518), Ross seals (n=45), Weddell seals (n=743), an 'other' seal category (n=140) for those seals not captured by the previous categories, and a non-seal category for anything else (n=1174). While our focus was on Weddell seals, including classes for other species that are likely to be encountered in the imagery should improve the performance of our classifier. For example, including a harp seal class – a species found only in the northern hemisphere – seemed prudent given the possibility of mistaking Arctic and Antarctic regions. Even absent any of these seals in the data, this extra class provides the model with more certainty about how the species of Antarctic seal differ visually from other species. For example, other species of non-Antarctic seal are far more similar to Weddell seals than they are to the many different ways an image could be 'non-seal' (e.g., an iceberg).

The training set for building the CNN classification model comprised a mix of images provided from the authors' own collections as well as those collected from a Google Image search for Antarctic seals. Our intent was to capture roughly the types of photographs likely to be shared by visitors to Antarctica, including seals at different angles and distances and images of whales, landscapes, penguins, and other types of non-marine mammal seals, such as Navy SEALs or the singer Seal (Fig S1A). To validate our models, we retained a roughly similar number of randomly-selected images from all the above categories.

Figure S1A: Examples of images obtained from a web-crawler search for 'Antarctica+seal'. An Antarctic landscape, a Weddell seal tagged correctly, Robin Williams at the Happy Feet premier (a plot summary included the word 'seal'). Photographs courtesy Flickr users kthypryn (CC BY 2.0), Gregory Smith (CC BY-SA 2.0), Eva Rinaldi (CC BY-SA 2.0).