SCAR Sub-Group	**Remote Sensing**
SG	PS/LS
Person Responsible:	HU Peter & O Mustafa

SCAR Executive Committee Meeting 2019

Plovdiv, Bulgaria, 29-31 July 2019

SCAR Remote Sensing Action Group:

"Development of a satellite-based, Antarctic-wide, remote sensing approach to monitor bird and animal populations

2018-19 Report

Report Authors: Hans-Ulrich Peter and Osama Mustafa (Germany)

Summary paragraph

- Organizing an Action Group Meeting during the Polar2018 Conference in Davos with following discussions:
  - Hans-Ulrich Peter & Osama Mustafa: Introduction
  - Colin Harris & Fritz Hertel: Developing Environmental Guidelines for Remotely Piloted Aircraft Systems RPAS) in Antarctica
  - Roger Colominas: Behavioural and physiological responses to unmanned aerial vehicles (UAV): Experimental flights of drones over Antarctic penguins.
  - Christian Pfeifer: Latest technological developments with relevance to satellite-based wildlife monitoring.
  - Heather Lynch: Pan-Antarctic biological mapping-new project ICEBERG
  - Heather Lynch: Developments of MAPPPD
  - Fabian Reiser: Sea-ice surface feature recognition in satellite images
- Publication of the outcomes of the workshop "Drones in Polar Biology" during SCAR Biology Symposium 2017 regarding the impact of drones to wildlife in Polar Biology (see Mustafa et al. 2018)
- Providing input for the Information Paper 10 of XLII ATCM (Prague 2019) "An update to the state of knowledge of wildlife responses to unmanned aerial vehicles" (submitted by Germany, Portugal, Spain, SCAR)
- Communication with the European Space Agency (ESA) since 2016 resulted in a regular coverage of Antarctic coastline by Sentinel-2 every 10 days from September 2018 to April 2019 (see https://sentinel.esa.int/web/sentinel/user-guides/sentinel-2-msi/revisit-coverage).

- Consultancy for National Scientific Antarctic Center of the Ukraine on the establishment of a drone based monitoring program of Penguin colonies and vegetation at Argentine Islands. This includes a workshop during IX International Antarctic Conference in Kiev, 12 – 16 May 2019.

Remote Sensing Updates

- Publication of State of knowledge on Antarctic wildlife response to unmanned aerial systems.
- Input for IP10 at XLII ATCM Regular coverage of Antarctic coastline by Sentinel-2.
- Consultancy for National Scientific Antarctic Center of the Ukraine.

What Lies Ahead

- Planning of a Workshop at SCAR OS 2020 in Hobart, Australia.

Budget

Changes to planned use of funds for 2019 and 2020

Year (YYYY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2019	participation of a young scientist in **9th SCAR Open Science Conference** in Hobart	1000	Hans-Ulrich Peter	bpe@uni-jena.d
2020	participation of a young scientist in **9th SCAR Open Science Conference** in Hobart	1000	Hans-Ulrich Peter	bpe@uni-jena.de
Total		**2000**		

SCAR Fellowship Reviewers

First Name	Last Name	E-mail	Principal Expertise
Hans-Ulrich	Peter	bpe@uni-jena.de	Antarctic birds
Osama	Mustafa	osama.mustafa@think-jena.de	Drones and satellites

Optional additional information

Outreach, communication and capacity-building activities

See opening Summary

Notable Papers

Borwicz, A., McDowall, P., Youngflesh, C., Sayre-McCord, T., Clucas, G., Herman, R., Forrest, S., Rider, M., Schwaller, M., Hart, T., Jenouvrier, S., Polito, M.J., Singh, H., Lynch, H.J., 2018. Multi-modal survey of Adélie penguin mega-colonies reveals the Danger Islands as a seabird hotspot. Sci Rep 8, 3926. https://doi.org/10.1038/s41598-018-22313-w

Harris, C et al.: Environmental guidelines for operation of Remotely Piloted Aircraft Systems (RPAS): Experience from Antarctica. Biological Conservation. (in press)

Firla, M., Mustafa, O., Pfeifer, C., Senf, M., Hese, S., 2019. Intraseasonal variability of guano stains in a remotely sensed penguin colony using UAV and satellite. ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci. IV-2/W5, 111–118. https://doi.org/10.5194/isprs-annals-IV-2-W5-111-2019

Korczak-Abshire, M., Zmarz, A., Rodzewicz, M., Kycko, M., Karsznia, I., Chwedorzewska, K.J., 2019. Study of fauna population changes on Penguin Island and Turret Point Oasis (King George Island, Antarctica) using an unmanned aerial vehicle. Polar Biology 42, 217–224. https://doi.org/10.1007/s00300-018-2379-1

Larue, M., Iles, D., Labrousse, S., Salas, L., Ballard, G., Ainley, D., Saenz, B., 2019. A possible Adélie penguin sub-colony on fast ice by Cape Crozier, Antarctica. Antarctic Science 1–6. https://doi.org/10.1017/S095410201900018X

Mustafa, O., Barbosa, A., Krause, D.J., Peter, H.-U., Vieira, G., Rümmler, M.-C., 2018. State of knowledge: Antarctic wildlife response to unmanned aerial systems. Polar Biology 41, 2387–2398. https://doi.org/10.1007/s00300-018-2363-9

Mustafa, O., Braun, C., Esefeld, J., Knetsch, S., Maercker, J., Pfeifer, C., Rümmler, M.-C., 2019. Detecting Antarctic seals and flying seabirds by UAV. ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci. IV-2/W5, 141–148. https://doi.org/10.5194/isprs-annals-IV-2-W5-141-2019

Pfeifer, C., Barbosa, A., Mustafa, O., Peter, H.-U., Rümmler, M.-C., Brenning, A., 2019. Using Fixed-Wing UAV for Detecting and Mapping the Distribution and Abundance of Penguins on the South Shetlands Islands, Antarctica. Drones 3, 39. https://doi.org/10.3390/drones3020039

Rodzewicz, M., Goraj, Z., Tomaszewski, A., 2018. Design and testing of three tailless unmanned aerial vehicle configurations built for surveillance in Antarctic environment. Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering 232, 2598–2614. https://doi.org/10.1177/0954410018797855

Rümmler, M.-C., Mustafa, O., Maercker, J., Peter, H.-U., Esefeld, J., 2018. Sensitivity of Adélie and Gentoo penguins to various flight activities of a micro UAV. Polar Biology 41, 2481–2493. https://doi.org/10.1007/s00300-018-2385-3

Schwaller, M.R., Lynch, H.J., Tarroux, A., Prehn, B., 2018. A continent-wide search for Antarctic petrel breeding sites with satellite remote sensing. Remote Sensing of Environment 210, 444–451.

https://doi.org/10.1016/j.rse.2018.02.071

Weimerskirch, H., Prudor, A., Schull, Q., 2018. Flights of drones over sub-Antarctic seabirds show species- and status-specific behavioural and physiological responses. Polar Biol 41, 259–266. https://doi.org/10.1007/s00300-017-2187-z

Zmarz, A., Rodzewicz, M., Dąbski, M., Karsznia, I., Korczak-Abshire, M., Chwedorzewska, K.J., 2018. Application of UAV BVLOS remote sensing data for multi-faceted analysis of Antarctic ecosystem. Remote Sensing of Environment 217, 375–388. https://doi.org/10.1016/j.rse.2018.08.031

Direct support from outside organisations received for your activities
None

Major collaborations your Science Group has with other SCAR groups and with organisations/groups beyond SCAR

Within SCAR

1. Physical Sciences,
2. EGBAMM, CAPS and SOOS

Outside SCAR

1. ATCM
2. National Scientific Antarctic Center of the Ukraine