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Russian-German Cooperation: Expeditions to Siberia in 2019

Edited by
Matthias Fuchs, Dmitry Bolshiyarov, Mikhail Grigoriev,
Anne Morgenstern, Luidmila Pestryakova, Leonid Tsibizov,
and Antonia Dill

with contributions of the participants

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Herausgeber

Dr. Horst Bornemann

Redaktionelle Bearbeitung und Layout

Birgit Reimann

Alfred-Wegener-Institut
Helmholtz-Zentrum für Polar- und Meeresforschung
Am Handelshafen 12
27570 Bremerhaven
Germany

www.awi.de
www.reports.awi.de

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*Titel: Zwischenstopp auf der Straße von Yakutsk nach Nyurba, Zentraljakutien, Republik Sakha, Russland, um geeignete Standorte für die Untersuchung der Regeneration von Wäldern nach Waldbränden zu finden
(Foto: Elisabeth Dietze, AWI).*

*Cover: Stopping along the way from Yakutsk to Nyurba, Central Republic of Sakha, Russia, to search for suitable sites to explore post-fire forest recovery.
(Photo: Elisabeth Dietze, AWI).*

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Editor

Dr. Horst Bornemann

Editorial editing and layout

Birgit Reimann

Alfred-Wegener-Institut
Helmholtz-Zentrum für Polar- und Meeresforschung
Am Handelshafen 12
27570 Bremerhaven
Germany

www.awi.de
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3.7 Unmanned aerial imaging of Samoylov and Kurungnakh Islands in 2019

Aleksey N. Faguet^{1,2}, *Andrei A. Kartoziia*^{1,2,3}, *Vladimir V. Potapov*^{1,2}, *Aleksandr N. Sheyin*^{1,2},
Anastasiya V. Mishina^{1,2,3}, *Anton V. Vasil'ev*^{1,2,3}

¹ A.A. Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia

² Novosibirsk State University, Novosibirsk, Russia

³ V.S. Sobolev Institute of Geology and Mineralogy, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia

Fieldwork period and location

From August 03rd to August 15th, 2019 (on Samoylov Island and Kurungnakh Island).

Objectives

- Place markers at key points in the designated area.
- Acquire coordinates of these markers with geodetic-class GPS receiver.
- Perform an aerial imaging of the territory, acquire images in visible spectrum.
- Process the data and produce rectified orthoimagery maps.
- Produce digital elevation models.
- Make a preliminary comparison of aerial imaging data from 2016 and 2019.

Fieldwork summary

Survey area: 50 square kilometers

Equipment used:

1. Supercam S250 (Figure 3.7.1) unmanned aircraft (2.5 m wingspan, 12 kg weight) launched from the catapult (Figure 3.7.2)
2. JAVAD GPS receiver on the ground
3. Sony Alpha 6000 digital mirrorless camera with 20 and 28 mm lens

Flight altitude: 250 m

Flight duration on one battery set: 2-2.5 hours

Expected resolution of the orthoimagery: 0.05 m/pix

Expected vertical resolution of the DEM: 0.25 m

Horizontal DEM resolution: 0.5 m



Figure 3.7.1: Supercam S250 drone, preparation for launch (photo credit: Olaf Becker)

We made 5 flights in total. Two for Samoylov Island and three for Kurungnakh Island. Atmospheric conditions were different on four out of five flights. First flight on Samoylov: cloudy, no rain, soft light, slightly dim. First flight on Kurungnakh: sunny at first, slightly cloudy towards the end of the flight. Second and third flights on Kurungnakh: sunny days, but hazy due to forest fires in Yakutia (haziness mostly mitigated in postprocessing afterwards). Second flight on Samoylov: sunny day, no clouds, no fog, very good visibility, high contrast - deep shadows on the ground, clearly visible flares on the water and other reflective surfaces (see Figure 3.7.3 for details).



Figure 3.7.2: Supercam S250 drone, launching from the catapult (photo credit: Olaf Becker)

Preliminary results

Acquired data of desired resolution: 0.05 m/pix orthophotomaps and DEMs at 0.25 m vertical resolution. Coordinates precision for data: 0.02 cm. Preliminary comparison of DEMs and orthophotomaps show severe progression in valley erosion and river bank degradation. Slight subsidence in overall surface between 2016 and 2019 images of Samoylov and Kurungnakh. However, this result should be verified via comparison with interferometric synthetic aperture radar data.

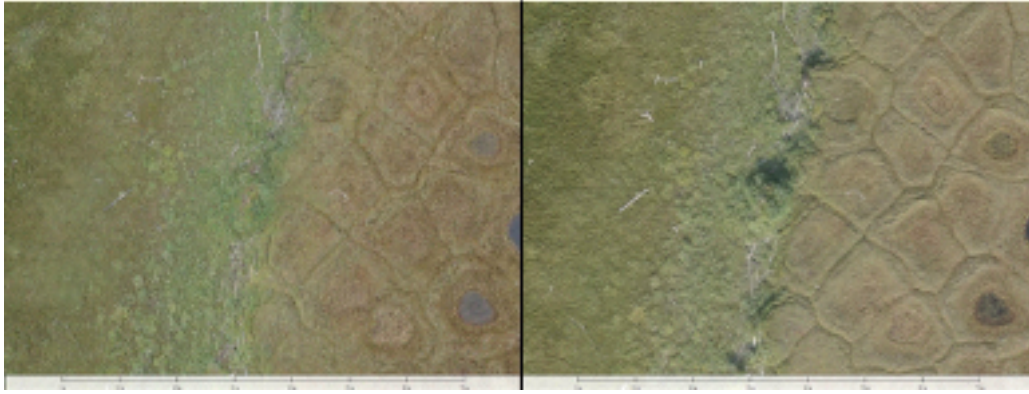


Figure 3.7.3: 2019 aerial imagery: Comparison of two regions on Samoylov pictured in different lighting conditions (cloudy - left image, sunny day - right image). Shadow difference for object with significant variations in vertical plane (high vegetation, cliffs) is well visible.