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Polar Space Task Group
SAR Coordination Working Group

World Meteorological Organization
Avenue de la Paix, CP No. 2300
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Switzerland

Subject: **Request for MOSAiC** August 21st 2018

Dear Members of Task Group,

We, the MOSAiC consortium, wish to submit this request for synthetic aperture radar (SAR) imagery of the Arctic Ocean over the duration of the MOSAiC research program; the acquired data set will be used to support of the science objectives of this international effort.

As you know, the primary science objective of MOSAiC is to collect the measurements needed to develop a better understanding of the important coupled-system processes in the Arctic Ocean so they can be more accurately represented in regional- and global-scale models. Our current plan is to deploy the yearlong MOSAiC central observatory and its associated network of sensors in September of 2019. Prior to that, there will be a MOSAiC pre-study program (SPOT) that will take place starting in March 2019.

While field observations made by MOSAiC will provide focused measurements dedicated to understand the important processes at their characteristic time and space scales, remote sensing serves a critical role in bridging the spatial and temporal scales for linking the detailed MOSAiC observations with larger scale regional and global processes through high - resolution process/coupled models.

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Specifically, for MOSAiC, an uninterrupted sequence of cloud-free SAR imagery is crucial for producing: 1) a time history of backscatter for understanding the time-varying response of the surface in different forcing environments (ocean and atmosphere); and, more importantly, 2) a record of the large- and small-scale ice drift (dynamics) that allows for addressing advective dynamics as well as resolving sub-daily ice drift in the vicinity of the central observatory.

In consultation with the science teams within MOSAiC, and in consideration of the spaceborne assets that will be available during and prior to MOSAiC, we would like to request the routine coverage of an area around the central observatory and the Arctic Basin as a whole. The SAR imagery will be used for planning, operations, science and outreach. We propose a plan that will cover three periods: before, during, and after the MOSAiC drift –nine months before (to include the MOSAiC pre-study period) and three months after, using a nested approach in temporal and spatial sampling:

1. High-resolution coverage four times daily in the vicinity (100 km radius) of the drifting central observatory: this will be used to understand sub daily ice drift and deformation, which will be linked to the buoy array deployed around the camp as well as to basin-scale deformation derived below.
2. Moderate-resolution coverage twice a day within the Arctic basin (i.e., >80N in the eastern Arctic, inside the Bering Strait in the west) for understanding large-scale deformation and advection of the ice cover.

To address the proposed plan, we are aware that this will require the tasking, targeting and coordination of multiple orbiting SAR platforms, and the employment of different SAR imaging modes. We have been in contact with some PSTG members. We, however, believe that support and coordination of the whole PSTG is needed to achieve the goals stated above. The MOSAiC Science Team will be happy to work with the PSTG in planning the best possible coverage with the most efficient use of available spaceborne assets.

We believe that the acquired data set will represent an unprecedented use of available international SAR imaging resources for addressing the changing Arctic, and will produce a legacy data set that will benefit not only MOSAiC but also the broader international science community.

We look forward to your reply.

Sincerely,

Markus Rex
MOSAiC Coordinator

Ronald Kwok and Gunnar Spreen
Coordinators of Team Remote Sensing