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Capabilities and Applications of MACS Aerial Camera Systems for Environmental Research

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High resolution remote sensing under harsh environmental condition on special carriers requires instruments which are more flexible and more ruggedized than devices off the shelf. Particularly addressing environmental research in polar and high alpine regions, a family of cameras developed by the DLR is presented. The MACS systems are specifically made for the use on airborne platforms. Due to scalability, small sensors like single sensors on rugged fixed-wing UAVs can be realized. The configuration can be extended to RGB/NIR/TIR oblique viewing rigs with up to 5 coordinated cameras on manned aircraft. By processing such images, photogrammetric products like change detection, classification, elevation models and mapping mosaics are derived for regional areas. Further applications are the evaluation of algorithms in the field of AI for spaceborne imagery or the investigation of acquiring a particular combination of spectral bands.

These systems are able to deal with extreme illumination conditions and flight envelopes. Based on recent projects, the presentation shows examples and experiences, such as acquisition of the world's highest glacier in Nepal, thermal infrared permafrost mapping of Ny Ålesund / Svalbard and sea ice measurements with a ground resolution of 3cm in the Fram Strait. Ideas for future sensors are indicated such as an UAV-based system with instant image transmission and a lightweight, high resolution sensor for stratospheric platforms.