From basic research to application – technology transfer from AWI

E. J. Sauter[1], L. Rabenstein[2], B. Heim[3], & E. Precht[1]

[1] *Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Technology Transfer Office, Bremerhaven, Germany*;
[2] *Drift & Noise Polar Services GmbH, Bremen, Germany*;
[3] *Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research, Research Group Polar Terrestrial Environmental Systems, Potsdam, Germany*

For a responsible development of the Arctic, new remote sensing technologies and services are of great importance. Many of such innovations are based on scientific research. However, it is not trivial that they find their way into application. In order to ease this kind of transfer across the interface between academia and industry, the Alfred Wegener Institute has established a technology transfer office (TTO). The TTO takes up inventions and business ideas emerging from scientific research and supports innovators and entrepreneurs to progress them into the respective markets. The other way round, the TTO serves as the contact point for stakeholders from industry, governmental and non-governmental bodies to forward specific problems into the scientific community.

Here we present two examples to illustrate the AWI technology transfer approach:

1) Planned for 2022, the German hyperspectral earth observation satellite EnMAP (Environmental Mapping and Analysis Programme) will measure the reflected radiance from the earth's surface over a wide hyperspectral wavelength range (from visible to short wave infrared). In order to provide correct hyperspectral satellite products such as land cover (natural surfaces, urban), surface waters, surface mineralogy, hydrology (snow, moisture) etc. in a correct manner, it is necessary to normalize for the incidence and the reflection of light depending on the zenith and azimuth viewing geometries. This is performed by providing the bidirectional reflectance distribution function BRDF for different materials. Determination of BRDFs for terrestrial surfaces is very challenging especially for high latitudes due to the low solar altitude. For Arctic vegetation mapping, a specific satellite field goniometer was developed at AWI to perform such ground truthing [Buchhorn et al., 2013]. The goniometer allows for mobile ground-based measurements in order to determine the BRDF for different vegetation types. It consists of an azimuth angle adjustment module mounted on a tripod with a zenith arc with sensor sled equipped with two portable spectro-radiometers, a GPS receiver, an NC-Eye camera system and a white reference panel (Fig. 1a). The goniometer was prototyped, patented and licensed to a precision mechanics manufacturer. The commercial system in this case addresses the scientific community and specialized service providers.

2) Starting with geophysical ice thickness measurements on sea-ice and using air-borne electromagnetic measuring systems [Krumpen et al., 2011] a group of AWI scientists developed specific sea-ice related services for scientific, governmental and private sector customers operating in Arctic sea-ice. Subsequently the AWI spin-off Drift & Noise Polar Services was established in 2014. The new business was developed towards near real-time remote sensing ice information products and sea-ice consultancy for safer and faster navigation through ice-covered waters. Ice charts and weather information are generated from SAR and optical imagery (e.g. Sentinel 1 and 2). Since reliable broadband data transfer channels do not exist, particularly for high latitudes, the start-up also develops appropriate data compaction and transfer protocols combined with hand-held mobile systems (Fig. 1b) for nautical officers which allow for near real-time access to latest ice data onboard ship. Thus shipping companies are able to save time and fuel by adapting their route while increasing safety.

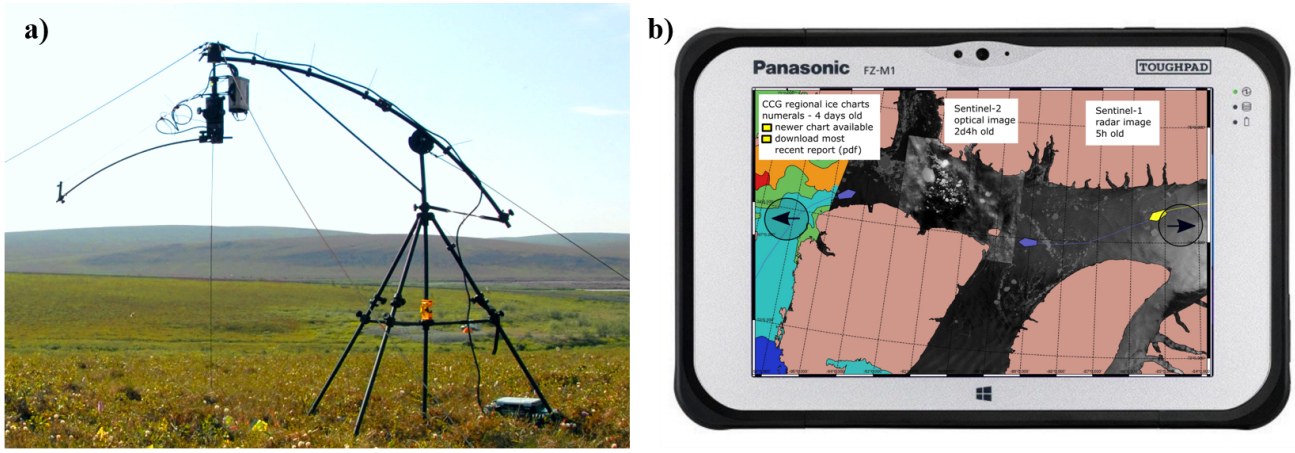

Figure 1: (a) Portable field spectro-goniometer for EnMAP ground truthing. **(b)** Hand-held sea-ice information system "Ice Pad"using merged optical and SAR imagery.

References

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