

KEPLER Deliverable Report

Report on Deliverable D7.2

Deliverable name	Kick-off meeting report		
Scheduled delivery	month: 04	date:	April 2019
Actual delivery	month: 04	date:	April 2019
Report type	Internal report		
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Contributing authors

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Context of deliverable within Work Package

This deliverable is a report on the first meeting of the project, held in Oslo, Norway, 27-29th January 2019. This is the first of three annual meetings, where all project participants were represented. In addition, meetings of the Kepler Management Board and the external Project Advisory Board were held. Further meetings of these groups will be held during the year by video conferencing.

This report consists of the programme of the meeting with additional notes on key points made. Presentations of the meeting are available on the project Google Drive folder [here](#).

Explanation of delays

n/a

Report

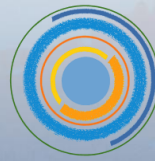
Please see attached.

References

n/a

Related Publications and Dissemination Output

n/a



KEPLER

Kick-Off Meeting Report

28th-30th January 2019



Summary of Meeting
Toppsenteret, Oslo, Norway



Co-funded by the Horizon 2020 programme
of the European Union





KEPLER Kick-off Meeting Report

Oslo, 28th - 30th January 2019

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Kick Off Meeting

Oslo 28th-30th January 2019

Overview

The Key Environmental monitoring for Polar Latitudes and European Readiness (KEPLER) project kicked off in Oslo, 28-30 January 2019. 44 attendees from 17 European institutes discussed plans for the project, which runs from January 2019 to March 2021. The KEPLER initiative is built around the operational European Ice Services and Copernicus information providers to prepare a roadmap for Copernicus to deliver an improved European capacity for monitoring and forecasting the Polar Regions.

KEPLER aims to raise awareness of the Copernicus programme, inform and educate users from the public and private sectors, and enable improved access to Copernicus data and information. As the climate of the Polar Regions is changing, so too are the challenges and opportunities. Because of these shifts the project includes two themes on identification of research gaps regarding integration/assimilation, and improved sea-ice mapping and forecasting. These are needed to provide opportunities for better understanding the environment, research opportunities, establishing new industry sectors and start ups, and importantly empowering citizens.

KEPLER aims to release the full potential of Polar Regions Earth Observation, including from ESA and EUMETSAT, by identifying and eliminating the barriers that impede the use of the tremendous resource that is Copernicus. This also brings together key European stakeholders and competent entities, and grows the Copernicus brand and user-base through providing enhanced scientific and technical support. A key objective of KEPLER is to provide a mechanism that enables the broad range of Polar Regions stakeholders to be equipped with the most accurate and relevant, environmental information so that they can seize the many benefits that Copernicus products generate for society and economy.

More information can be found on the project website at <http://kepler-polar.eu/> and via Twitter @KeplerEU.

Timetable

Monday 28th January: Introductions, presentations summarising WP1 &2

Tuesday 29th January: Presentations summarising WP3-7, KMB & PAB meeting.

Wednesday 30th January: WP discussion sessions, KMB meeting.

Programme

Copies of the presentations are available through [this link](#).

Monday 28th January

Lunch	13:00		
	14:00	Welcome from MET Norway	Roar Skålin
	14:10	Welcome and overview of KEPLER	Nick Hughes
	14:30	Perspectives from the EU Project Officer	Sally Taylor
	15:00	European Commission - DG-GROW	Ola Nordbeck
WP1	15:30	WP1 Stakeholder Needs and Network Coordination	Penelope Wagner
	15:45	T1.1 Maritime and Research Sector Needs	Penelope Wagner
Tea break	16:00		
	16:30	T1.2 Community-based Observing and Societal Needs	Kaisu Mustonen
	16:45	T1.3 Climate and Weather Forecasting Needs	Helge Goessling
	17:00	T1.4: Overall assessment of stakeholder needs	Penelope Wagner
WP2	17:15	WP2 - Polar Regions provision in Copernicus Services	Gilles Garric
	17:30	T2.1 Copernicus Land Monitoring Service (CLMS)	Marko Scholze
	17:45	T2.2 Copernicus Marine Environment Monitoring Service (CMEMS).	Corinne Derval
Dinner	19:00	Ekeberg Restaurant , Kongsveien 15, 0193 Oslo	See below for directions

Tuesday 29th January

Tea	08:40		
WP3	09:00	WP3 - Identification of research and capacity gaps	Carolina Gabarró
	09:15	T3.1 In situ observing systems.	Jeremy Wilkinson
	09:30	T3.2 New and novel in-situ and airborne observation sensors and techniques.	Nick Hughes
	09:45	T3.3 Space-based capability.	Carolina Gabarro
	10:00	T3.4 Integration and assimilation through Quantitative Network Design (QND).	Thomas Kaminski
Tea break	10:15		
WP4	10:45	WP4 - Improved sea-ice mapping and forecasting	Steffen Tietsche
	11:00	T4.1 Sea-ice mapping for maritime purposes.	Antti Kangas
	11:15	T4.2 Monitoring sea-ice as an essential climate variable (ECV).	Thomas Lavergne
	11:30	T4.3 Assess the scope for sea-ice forecast products.	Steffen Tietsche
WP5	11:45	WP5 - End-to-end operational system	Frank Kauker
	12:00	T5.1 Synthesis on the visions of the evolution of the Copernicus services.	Laurent Bertino
	12:15	T5.2 End-to-end operational system roadmap.	Frank Kauker
Photo	12:30		
Lunch	12:40		
WP6	14:00	WP6 - Dissemination, training and engagement	Nick Hughes

	14:05	T6.1 Establish an integrated communication plan.	Elaina Ford
	14:10	T6.2 Communication tools	Elaina Ford
	14:20	T6.3 Dissemination and exploitation	Nick Hughes
	14:35	T6.4 Training	Fabrice Messal
	14:50	T6.5 Best practice guide for research vessels and stations.	Jeremy Wilkinson
Tea break	15:05		
WP7	15:30	WP7 - Management and coordination	Elaina Ford
	15:31	T7.1 Project set-up and resources	Elaina Ford
	15:40	T7.2 Project Reporting	Elaina Ford
	15:50	T7.3 Financial Management	Per Helmer Skaali
	16:05	T7.4 Programme Meeting Coordination	Elaina Ford
End	16:15	Project Advisory Board and Management Board	
PAB-KMB meeting	16:30-18:00	Project Advisory Board and Management Board	

Wednesday 30th January

Tea	08:40		
	09:00	ESA- Copernicus expansion status	Mark Drinkwater
	09:50	Discussion session: Stakeholder interactions – how to engage; previous studies	Nick Hughes
	10:20	WP 1-4 break out sessions	WP Leaders
Tea break	11:00		
	11:20	WP breakout feedback/summary of discussion (all)	WP Leaders
	12:00	WP5 synthesis discussion (all)	Frank Kauker
	12:15	Discussion session: Dissemination activities	Nick Hughes
		Conclusions, wrap up	Nick Hughes
Lunch	12:30		
	14:00 - 16:00	KEPLER Management Board meeting	Hesselberg room in the Talhall building at MET Norway.

Posters

The following posters were on display throughout the meeting.

Lead author	Title	Work Package
Elaina Ford (UKRI-BAS)	KEPLER roll banner, with logo and website info.	7

List of Attendees

External invited attendees:

Delegate Name	Affiliation
Sally Taylor	EU - REA

KEPLER partners:

First Name	Surname	Institute/organisation	Work Package involvement
Annette	Samuelsen	Nansen Center	WP2
Antti	Kangas	Finnish Meteorological Institute	WP1, WP4, WP6
Astrid	Bracher	Alfred Wegener Institute	WP3, WP5, WP6
Carolina	Gabarro	Institute of Marine Sciences, CSIC	WP3
Corinne	Derval	Mercator Ocean International	WP2
Eirik	Malnes	Norut	WP1, WP2, WP3, WP5, WP6
Elaina	Ford	British Antarctic Survey	WP6, WP7
Emma	Armitage	British Antarctic Survey	WP6, WP7
Fabrice	Messal	Mercator Ocean International	WP6
Frank	Kauker	OASys	WP3, WP5
Gilles	Garric	Mercator Ocean International	WP2
Hannele	Savela	University of Oulu, Thule Institute (representing GEOCRI in the KEPLER Advisory Board)	PAB
Helge	Goessling	Alfred Wegener Institute	WP1, WP4
Jaakko	Seppänen	Finnish Meteorological Institute	WP1, WP4, WP6
Janne	Valkonen	DNV GL	PAB
Jeremy	Wilkinson	British Antarctic Survey	WP1, WP3, WP5, WP6
Kaisu	Mustonen	Snowchange Cooperative	WP1, WP5
Keld	Qvistgaard	DMI	
Lars-Anders	Breivik	Norwegian Meteorological Institute	
Laurent	Bertino	Nansen Center	WP1, WP2, WP3, WP4, WP5, WP6
Leif Toudal	Pedersen	EOLab	WP3, WP5
Malte	Müller	Norwegian Meteorological Institute	WP1, WP4
Margareta	Johansson	Lund University/INTERACT	WP1, WP3

First Name	Surname	Institute/organisation	Work Package involvement
Mark	Drinkwater	ESA	PAB
Marko	Scholze	Lund University	WP2, WP3, WP5
Michael	Vossbeck	The Inversion Lab	WP3, WP5
Michael	Karcher	OASys	WP2, WP3, WP5
Nick	Hughes	MET Norway	WP1, WP3, WP4, WP5, WP6, WP7
Ola	Nordbeck	European Commission - DG-GROW	EC
Patrick	Eriksson	Finnish Meteorological Institute	WP1, WP4, WP6
Penelope	Wagner	MET Norway	WP1
Per Helmer	Skaali	MET Norway	Finance
Richard	Hall	Equinor	PAB
Shridhar	Jawak	Svalbard Integrated Arctic Earth Observing System (SIOS)	PAB
Steffen	Tietsche	ECMWF	WP4
Stein	Sandven	Nansen Center	PAB
Svetlana	Losa	Alfred Wegener Institute	WP1, WP3, WP4, WP5, WP6
Thomas	Lavergne	MET Norway	WP1, WP2, WP3, WP4
Thomas	Kaminski	The Inversion Lab	WP3, WP5
Thomas	Diehl	Joint Research Centre , EC	WP3, WP5
Verónica	González-Gambau	Institute of Marine Sciences, CSIC	WP3

Day 1 Summary

The first day of the kick off was focused on providing an overview and introduction to the various organisations involved in the KEPLER project/Polar region/Copernicus. Also to cover presentations from both Work Packages 1 & 2.

Co-ordinator's Welcome and Overview of KEPLER - Nick Hughes

Welcome & Introduction from Nick Hughes (MET Norway.) The consortium is a group of 15 partners from 7 countries with various expertise. Participants were introduced to members of the Advisory Board. Nick provided information about METNo and an overview of the KEPLER project including the main objectives of KEPLER, and which work packages fulfil these objectives. This project directly aligns with the expected impacts of the Coordination & support action call. Also noted were the workshops & round-table events that will contribute towards the project.

H2020 Project implantation guidelines - Sally Taylor

Sally Taylor from the Research Executive Agency (REA) Introduced the European Commission and its involvement in the project, and a reminder of our obligations. Project implementation guidelines are as follows:

Reporting & Reviews

1. Interim review (month 15)

- Will include submission of deliverables due by review stage
- This is a progress/ tech review (no designated template but can follow periodic report)
- The EC will bring in an external reviewer and respond with review meeting results.

2. Final review (within 60 days after end of project)

- Will include finance reports & submission of costs in order for the EC make final payment.
- Presentation of work carried out and achievements which an external reviewer will assist in final review.

Note: New funding and tenders opportunities portal.

Avoiding financial errors

Participants were informed of the requirements/ stipulations for eligible and ineligible costs as well as common errors to be aware of i.e.: correct timesheets- signed/ backed up by HR, following company procedure for travel and the restrictions on consultancy and third party work.

Dissemination & Communication

It is expected that the project will provide a statement on money received used and create a targeted plan towards public/media.

Perspectives from DG-GROW on the Kepler project – Ola Nordbeck

Participants were provided with an overview of the Copernicus programme, which is defined by EU regulation No. 377/2014 until 2021- Monitoring earth & preparing citizens for crises, security risks, disaster.

Copernicus is a full, free, & open tool for economic development and a driver for digital economy. It utilises Sentinels and need data from contributing missions and In situ components. Arctic services are spread across Copernicus, the Polar Regions are covered by: Climate, Security, Marine, Land Service, Atmosphere and Emergency Management. Changes are coming- Overview of EU Arctic Policy & EU space policy 2021-2027 New MFF, & EU Arctic Policy Assessment process 2017-19. The key objectives for next gen are that Copernicus will remain a public service but driven by the needs of policy and public administrations, this will be a user driven programme.

Ola covered the background on work carried by the Polar Expert Group, and Phase 1 & Phase 2 in relation to Copernicus/ Arctic/ KEPLER project. The space component of Copernicus is focused on Sentinel expansion- to 2030, and Current and expansion missions will be replaced by Next Generation from 2030-32. Phase 2 will be expanded to include space experts re: PMR, RA, SP-InSAR, 3 ESA MAGs. PMR is 1st priority, L-band SAR replaces SP-InSAR.

The Dialogue Seminar 2018-11-2 identified 4 main issues: Climate change, transport, fisheries, and connectivity. These included the questions of; how to prevent an unregulated high seas fishery in the central Arctic Ocean, and changes to biodiversity beyond national jurisdiction (BBNJ) related to climate change, improvements to connectivity to make data available to the wide range of users in Arctic areas, synergies between *in situ* monitoring programmes, for example with Canada, Russia and the USA, and linkages to Sustainable Development Goals (SDGs), especially those identified by the United Nations Resolution 70/1.

Questions/points raised:

- Where to source content for user workshops? Copernicus website?
- CSA RCM February launch.
- Process for reporting user requirements and uptake and process within Copernicus to fulfil these?
- What is the timeline for reporting user requirements? How far forward do we look, and what is a realistic time frame?

WORK PACKAGE 1: Stakeholder Needs and Network Coordination - Penelope Wagner

The core of this work package is to collate and assess user needs. This will inform WP2, WP3, WP4 which then feed into WPs 5 & 6.

This assessment must form a cohesive document so users understand what the products are, and also allow us to build products valuable to the user. Look at recommendations that will impact multiple groups of users at once. Consider the three different types of users: Climate & Weather, Maritime and Communities.

T1.1 Maritime and Research Sector Needs - Penelope Wagner

This task will be led by European Ice services, and participants were given an overview of the challenges we may encounter, identifying the needs for spatial and temporal scales. Different scales will depend on user and scenarios. Consider the different types of users:

- users who want to avoid ice
- users near/or in Marginal Ice Zone
- users who want to operate in/under continuous sea ice cover.

As information specific data will be required by various users, we will need ask how we incorporate this into a routine product. Participants should utilise feedback from previous projects, looking at user requirement studies, and collate information to get a more comprehensive understanding of our focus points. This WP will be informed by online surveys, physical involvement in meetings, experience and seeking innovative participation methods.

Questions/points raised:

- How do we structure the content of the final report so that the information gets digested by various stakeholders – who all have different needs and interests?
- How do we package KEPLER to be relevant to multiple parties- both stakeholder and end user?
- There is a need to define the terms ‘stakeholder’ and ‘end users’ for clear consistent reports.

T1.2 Community-based Observing and Societal Needs - Kaisu Mustonen

SNOWCHANGE have three co-ordinators working with local communities, undertaking surveys into their remote sensing & satellite data. We to develop communication strategies that convey the different services available and identify those that can be developed. There will need to be some investigation and innovation into what we can do improve the current information flow, as well as find emerging needs for satellite data.

Questions/points raised:

- How do we translate materials- Do we call for tenders?
- How should we introduce satellite/ remote sensing capabilities and products- provide training or activities to the local community?

T1.3 Climate and Weather Forecasting Needs - Helge Goessling

Introduced the various participants for this task no, and scope for observation and simulation data assimilation. A three pillar system is envisaged to get suggestions from improvements:

- Open surveys
- Solicited expert group statements
- Side event/round table at IICWG-DA WS (June)

Guiding questions have been drafted and they have assessed the attributes necessary to create open surveys that will extract the relevant information from users. The initial draft identification of key expert groups has focused around NWP centres, Ice services, Polar climate research centres, Copernicus services and other relevant projects and organisations, correlating with previous studies.

Questions/points raised:

- How inclusive do we need to be? Who should we target, who are the key persons and groups? This task will have clear coordination with 1.1 and will need to narrow down the list of other relevant projects and organisations
- How will survey results be analysed? Find the method used to analysis EU Polar Net survey results as an example.

T1.4: Overall assessment of stakeholder needs - Penelope Wagner

There is a need to define who the user groups are. Regarding survey and expert group reports- we need to collate what has been asked previously and compare it what is currently needed. We should be aiming to have International involvement and be inclusive of areas such as the Baltic and Antarctic needs. Think about the data format- user friendly access for data. Will talk about this further on Wednesday morning.

Questions/points raised:

- Interlinking WPS- how will each work package utilise the information that we get?
- Have we put ourselves in the shoes of the users?

WORK PACKAGE 2: Polar Regions provision in Copernicus Services - Gilles Garric

Work package 2 will focus on reviewing current Copernicus data access from the 2014-2020 operational phase. There is a need to recognise that there is a data access challenge ahead utilising 'big data' and opening up access to new communities. This includes links to the five Data and Information Access Services (DIAS); Creodias, Mundi, ONDA, Sobloo, and WEKEO.

The objective will be to give a status of current activities and present a vision for complimenting and expanding upon these to create a targeted product list that will both add to the Copernicus portfolio and meet user requirements. There are 7 partners working on WP2, which will take information from WP1 and feed into WP3, WP5 & WP6.

Questions/points raised:

- Just 2 services mentioned here- when do we integrate other services?
- What about Marine surveillance, fisheries monitoring?
- How to augment existing Sentinels for Polar services?

T2.1 Copernicus Land Monitoring Service (CLMS) - Marko Scholze

Participants were introduced to the CLMS, which currently has four components; Land cover and land use mapping, hot-spot (coastal, riparian and urban area) monitoring, biophysical parameters, and imagery, in situ and reference data. A fifth component, ground motion, is planned. The biophysical parameters component has some products relevant to the Polar Regions including lake ice extent, snow cover, and snow water equivalent (SWE).

The CLMS user requirement document for this lists permafrost as a high priority topic on the 'wish list' for products.

Questions/points raised:

- Round table meeting at the Arctic Frontier is too late to inform this work package.

T2.2 Copernicus Marine Environment Monitoring Service (CMEMS) - Corinne Derval

Participants were introduced to the CMEMS, detailing the 15 providers and showed how to access the catalogue of ocean data and information on the Copernicus website. This also included an example of using a sea ice product for Arctic region, and gave examples of the EVOLUTIONS products for 2019/20 under ARC MFC and New satellite ice products- Shape file. The statistics of Arctic products showed there are 734 users for all Arctic products and feedback has already pointed towards: France, Norway, UK, Public sector and Universities.

The CMEMS user uptake program has already undertaken 27 demonstrations, these can be found on the Copernicus website under: 'use'- 'case' –'demos'. These cases detail the data use/function and CMEMS data required to provide this service, and the potential use for public and private sectors.

Questions/points raised:

- Are sea ice edge and type information available in the product catalogue?

Day 2 Summary

Day 2 of the kick off meeting was devoted to presentations covering Work Packages 3- 7. Followed by a KMB and PAB meeting at the close of day.

WORK PACKAGE 3: Identification of research and capacity gap - Carolina Gabarró

Participants were WP3 and its objective, the main focus is to improve Copernicus services. WP3 links between the other work packages, and other projects including: OSISAF, WMO, H2020, MOSAIC.

T3.1 In situ observing systems - Jeremy Wilkinson

Stressed the importance of combining In-situ observations and having access to remote sensing data, and having those two communities collaborate. This task will focus on two main streams of Copernicus Marine and Land, although will feed into all six. Noting the various partners involved in the WP and the potential of collaborating with these institutions. By bringing in- situ and Copernicus together we can identify the gaps, and know the availability and limitations that face us. There is a need to develop links between other industries and highlight that data accessibility benefits everyone, - including local people,

who we can build trust with and use their resource/knowledge. Use ARICE as an example, and the Arctic marine environment has icebreaker vessels that we can utilise to improve monitoring.

We should use 'Citizen Science success stories'- as an exciting part of the project. We can feed the successful components from these stories into developing tools/Copernicus services.

The possibilities of new (readily accessible) tech means we can share knowledge, demo the services and make training more accessible to users.

Questions/points raised:

- Possible consultation workshop- SWEDEN SEPT 2019?
- How do we make better use of Copernicus in-situ service and see that develop?
- The navigation of the Copernicus system needs to improve and be more user friendly.
- Consider consultation events, we need to get the right people to the consultation and assess what has already been done, and build on that. No one benefits from duplication of work.
- A formal mechanism of feeding the results of KEPLER into the Copernicus system needs to be developed early on so we don't lose the information possibilities?

T3.2 New and novel in-situ and airborne observation sensors and techniques - Nick Hughes

Potential new platforms that we can use include mobile airborne, shipboard and underwater systems, buoys, and coastal stations. New techniques for utilising existing sensors, or technologies that can be adapted for monitoring in the polar regions, will be investigated. In particular, Remotely Piloted Airborne Systems (RPAS), are becoming increasingly used to supplement satellite-based monitoring.

Questions/points raised:

- POAC'19 in July will be a good opportunity to find out about new techniques and sensors from the engineering perspective.
- HAPS4ESA meeting as ESTEC, 12-14 February will cover the evaluation of 2 different High Altitude Pseudo Satellite (HAPS) systems.

T3.3 Space-based capability - Carolina Gabarró

Examples of already identified gaps have been highlighted at the following events:

- Sea ice workshop science and end user meeting in Norway Sep 2018 Wolfgang Dierking.
- Copernicus and Polar Regions industry workshop held in Brussels in Nov 2018.

Questions/points raised:

- The Copernicus Programmes goal is to have final stable mission requirements by July. Version 1 can be distributed now, but with a caveat that version 2 is in progress. The user/obs requirement has been defined in the document and will be used to inform what the mission plan is.
- Concerns about the polar gap & monitoring tool capability, is it possible to use the Copernicus expansion missions to do this in the future? Polar hole 90N or S - for example use of elliptical orbit or left-looking SAR. The MOSAiC field campaign will demonstrate feasibility. C3S may require data over the whole region because of its contiguous data requirement.

- Consider Synergies, the statistics of people needing that information and build products based on highest needs of users. Think ahead 10-20 years for preparedness for future.
- Nanosats. For the Polar Regions these include SAR satellites launched by the Finnish ICEye company, and the constellation planned by Capella Space in the USA.
- For passive microwave radiometer sensors, the term “high resolution” is frequently misused. At best, for example AMSR2 or the proposed Copernicus Imaging Microwave Radiometer (CIMR), these have a resolution of around 3 kilometres. This is not comparable to high resolution from AR or optical satellites with resolutions better than 100 metres.
- Connectivity. This is a frequent issue for users, and information providers, wanting larger volumes of data at high latitudes. Beyond 80° North or South, only the Iridium system is available. The latest version of this, Iridium NEXT, provides greater bandwidth but is expensive. Other providers, for example Space Norway AS, plan Highly Elliptical Orbit (HEO) satellite systems, and there may also be the possibility of transmission through GPS and Galileo satellite links.
- Helge G advised that we need to optimise on surveys, as there have been a number of these already and more are planned within the project WP1.

T3.4 Integration and assimilation through Quantitative Network Design (QND) - Thomas Kaminski

Summarising the work package, there is already a prototype of this system set up and is being used to test theoretical observations. This is funded by ESAs support to science element. Using ARCTic Mission Benefit Analysis (ArcMBA) the assessment in this task will offer a quantitative integrated sea ice/ocean/land perspective on the benefits expected from respective observational scenarios in both EO and in-situ capabilities. This work will lead into WP5 - delivering a road map.

Two internal meetings are planned – in Hamburg, Germany & Lund, Sweden.

WORK PACKAGE 4: Improved sea-ice mapping and forecasting - Steffen Tietsche

Implications of sea ice melt in the Arctic, and the work plan for WP4. WP1&3 will feed into this work package, which will then supplement WP5 and WP6. External links include the European Ice services, NWP centre & Space agencies for operational day to day experience. Research institutes & Research projects can be used to advise on ongoing research activities, and undertake user surveys.

T4.1 Sea-ice mapping for maritime purposes - Antti Kangas

Covered the objectives of task 4.1, the team working in this task include: FMI, METNo, DMI & SMHI. Various activities are happening in the maritime section and Arctic:

- Oil & gas
- Transport (definitely expanding due to opening up of NW passage)
- Fishery/tourism- increased on European borders
- Science- interested in getting into the ice- (need feedback from this important user group)
- SAR/ Coast guard activities.

Questions/points raised:

- Will this include commercial operators?
- CMEMS services, producers and users can be used to inform this task. The International Ice Charting working group can also be utilised to think about how to provide better services to users.
- The WMO expert team on sea ice could help determine whether it's possible to harmonise products for pan Arctic products.

T4.2 Monitoring sea-ice as an essential climate variable (ECV) - Thomas Lavergne

Focus on thinking about a long term series of sea ice observation. The sea ice ECV is defined by GCOS, GOOS and WCRP and has to be relevant for monitoring the climate, visible and cost effective. GCOS provides regular requirement records/reports to inform implementation plans and drive what happens next.

Questions/points raised:

- The space agencies are well organised and aware of gaps although earlier raw data is hard to obtain. In order to do a good sea ice record we need good raw data to work from.
- Does Copernicus have the fundamental climate data records needed to do an ECV? When it comes to users cross ECV consistency. Make sure that experts in each community have the tools/ mechanisms to talk to one another. Copernicus producing 'big' data, the challenges of this.
- Re: the definition of sea ice ECV- Volume is the ECV. Need to further decline in future GCOS documents.
- Resolutions and accuracy are low, for example 5km for ice edge. C3S could also require sea ice edge and type information.
- Helge G - Extent and edge are often confused? There needs to be better consistency between records. To improve resolution, to 1 km or better with the ice edge, SAR needs to be brought in. However the need for this level of detail will depend on the type of user. Parameters are intercorrelated, but observations are not.

- Definition of uncertainty. What is it?

T4.3 Assess the scope for sea-ice forecast products - Steffen Tietsche

Stress focus on the value chain, we are not just delivering data but think about the economical and societal impact of delivering the data. Forecasting producers must be aware of the users, and provide sharp reliable relevant data- What skills are there? What products can we produce?

Questions/points raised:

- Scope for sea ice thickness products
- Long- range forecasts- PARCOF-2. How useful are they to real-world users?

WORK PACKAGE 5: End-to-end operational system - Frank Kauker

Need to develop concept and definition. Turn observations into final products.

T5.1 Synthesis on the visions of the evolution of the Copernicus services - Laurent Bertino

Questions/points raised:

- Consider meeting at Arctic Frontiers: Jan-Feb 2020
- Products are not CMEMS if they don't include pan-Arctic.
- The next Copernicus Programme phase 2021 will have a pan-Arctic hindcast analysis.

T5.2 End-to-end operational system roadmap - Frank Kauker

This will include internal workshops and project workshops in months 14 and 21. Components will include observing In-Situ gaps, data frequency, design and data handling capabilities. The roadmap will be designed to both fulfil climate monitoring and safe ice navigation but also environmental factors, such as waste/pollution management and assist in a global shift towards a low carbon economy. Further discussion tomorrow for WP5 details.

Questions/points raised:

- Concerns about where is the outlet for the data, where will recommendations go? Something to discuss in the PAB and come up with some ideas for the consortium.
- We can provide a forecast that is as good as we can justify, but we need verification on if we are using ours or user relevant metrics.
- EC- Consider users that are intermediaries- those that will then produce systems from this data? (i.e. Navitor)
- The first year will define stakeholders and companies that will be involved.
- The roadmap document should define an end to end system.

WORK PACKAGE 6: Dissemination, training and engagement- Nick Hughes

There are 5 subtasks in WP6 - Elaina Ford will lead the communications plan and tools, dissemination and exploitation will be led by Nick Hughes, training will be led by Fabrice Messal, and the best practice guide will be led by Jeremy Wilkinson.

T6.1 Establish an integrated communication plan & T6.2 Communication tools

This will correlate the work/goals of participants and work packages and convey the correct message. It will feature both internal and external communication plans. D6.1 due in first three months.

T6.3 Dissemination and exploitation

We will utilise the comms teams of all partners and an impact assessment at the end of this task will be necessary make sure people have heard of us.

Questions/points raised:

- Need to identify upcoming round table events.
- Need to speak to Stefan for forecasting needs.
- Need to strategize as to how to utilise social media and investigate potential communications avenues, and figure out how to measure the growth of the KEPLER project awareness.

T6.4 Training

Propose an adapted content of training, starting with an inventory of existing materials and identify any gaps to create/adapt contents so they are available and accessible for all users and communities.

Questions/points raised:

- Copernicus marine service website has a lot of tutorials online- can we link this to our website?
- How to best access and use sea ice products?
- Should be further discussion between Mercator and EIS.
- Planned CMEMS events:
 - Baltic Sea 9-12 Sept Gothenburg
 - Arctic Q4 Helsinki, EU Space Weather Week
 - Sally advised - Keep CMEMS and KEPLER separate.
 - 50 attendees per session, 1.5 days
 - Link to APECS?

T6.5 Best practice guide for research vessels and stations - Jeremy Wilkinson

BAS will concentrate on the marine aspects and ULUND will investigate via the INTERACT community for terrestrial aspects for the research stations. There is scope for third parties to expand their user bases. Communications: the challenge is to overcome communication limits above 75N. Access to information in real time is critical for operations and science, and people must understand how to access and how to use it. There is a limited amount of person months to feed into the best practice guides. The format for this guide is currently open but considering using case studies to inform it. There is huge potential

for expanding the user base through this project. To make this have the greatest impact we need to know which areas to tailor the guide to.

WORK PACKAGE 7: Management and coordination

T7.1 Project set-up and resources Elaina Ford

Management and coordination of the project were introduced to participants, UKRI-BAS will be providing administration to keep things running smoothly and act as a quality control before work goes to the EC. Google drive folders are being used to handle file sharing throughout the project and manage resources across teams. Whilst BAS manage the day to day running of the project, MET Norway as coordinator have overall responsibility.

Participants were reminded to consider gender balance when it comes to stakeholders and users you approach, and bring into meetings.

The risk register is available at on the google drive folder under Project Tools.

The Project Handbook is a work in progress, the first draft was distributed during the kick-off meeting and participants will be asked to give information and feedback on the draft document. This will be submitted to the EC has a deliverable but remains a living document and will be updated to show progress to deliverables and project meetings, etc.

T7.2 Project Reporting - Elaina Ford

UKRI-BAS will be providing templates/tables for the Periodic Report, and the Final Report that will be submitted at the end of the project. The Publishable Summary that will also be submitted to feature on the EC website.

As there is only one reporting period for this project, an Interim Report will also be completed, that will be the same format as the Periodic Report. This will be for the period to end of 2019, and to be completed by March 2020. This will be sent to the EC and reviewers for the Review, to be held by May 2020.

In addition to Periodic and Final reports, Continuous Reporting is also required. Deliverables are to be completed by the end of the month before they are due, to allow time for WP leads, the Project Office, and the KMB to review before submission, to allow time for comments to be incorporated, before submission on time by the end of the month. Note should be taken of holiday periods with time planned in advance. The Deliverables and Milestones due dates are in the Handbook - listed by WP and by date.

Questions/points raised:

- Google drive access- Will there be a file available for the PAB to view? (PAB folder set up)
- Comms by skype/webex - BAS can arrange
- Will need to provide information on PMS at midterm review

T7.3 Financial Management - Per Helmer Skaali

The prefinancing will be transferred to partners on 17.01.2019. The final payment will be paid after the EU has accepted financial and scientific report and Met Norway has received the funds.

A financial report will be required after 15 months as part of midterm reports to keep track of costs. Participants were reminded to keep all evidence i.e. signed papers, receipts, boarding cards etc. for five years after the project for auditing purposes (and keep an electronic copy for themselves.) Timesheets must be completed for all staff claiming time on the project.

Participants were reminded to follow national rules and ask permission before spending against the project. If participants are unsure if something is illegible they can contact Per Helmer or Elaina.

Questions/points raised:

- Can clarification on reimbursement of travel costs for the PAB be addressed? New admin from METNo should assist with processing these.
- Elaina from UKRI-BAS will chase/email to get people to complete Forms C but Per Helmer and Nick from METNo will complete the final submission.
- Timesheets should be completed as per institutes standard practices, or templates are available on the AMGA or the google drive folder.
- Costs must match work done and claimed - for example meetings and conferences must be described in the Periodic Report.

T7.4 Programme Meeting Coordination

Thanks to participants for attending the kick off meeting, one of the first deliverables completed. Ideas and a location for the mid-point and final meeting were discussed.

- KEPLER reports will be sent around for comment before submission.
- Potential to use RCN Brussels for review meeting venue.
- EC - Think about the timing of the review - the review meeting is to discuss the deliverables, so they need to be in before the meeting in order to complete a proper review meeting

Project Advisory Board and Management Board Meeting

The meeting document for the PAB & KMB meeting on 29/01/2019 can be found here:

https://drive.google.com/open?id=13AzT3Vjio1DAyJPenoHtkK_8yUiPvsMM

Specific work package meetings:

Day 3 Summary

Day 3 was primarily for break out discussion sessions for participants in work packages 1-4. WP1 in the main room, WP3&4 in meeting rooms and WP2 in the lounge. These sessions were led by the WPLs and allowed participants to discuss upcoming work.

ESA-Mark Drinkwater via webex

Participants were given an overview of current ESA missions, and future expansion priorities. The EU Arctic Policy is driving high priority for progressing capacity of polar Copernicus missions. ESA provides 30% funding.

The 6 High Priority Candidate Missions (HPCMs) proposed by ESA were introduced. These include:

- CO2
- High resolution thermal infrared (TIR)
- Hyperspectral
- Passive Microwave radiometer (PMR) (CIMR)
- Radar altimetry (CRISTAL)
- L-band SAR (ROSE-L)

The last 3 of these have particular relevance to the monitoring of polar regions. The high-resolution thermal option does not include visible, although this was identified as a priority for polar users in the ESA Polaris study.

The Long Term Scenario (LTS) for the Copernicus Space Component (CSC) aims to a) increase the quality and quantity of observations, and b) employ the latest technologies for maximum efficiency. Sea ice and SST were described as also being of interest for “situational awareness,” not just climate.

For Copernicus 2.0, there is an intention to expand the CSC. Phase A/B1 studies are ongoing, and will deliver initial results by the middle of this year, with final reports expected by Q1 2020. This also includes studies for the 2nd generation of Sentinel satellites (Next Generation, Sentinel-NG). This has already identified a need for PMR, driven by continuation of salinity and soil moisture monitoring [PMR interferometry at L-band]. For the Polar Regions thin sea-ice thickness monitoring is also seen as a parameter that can be delivered.

The current Sentinels are to operate to around 2030, and then be replaced by Sentinel-NG satellites that are expected to operate through to 2045. The Expansion (HPCM) and NG missions will be launched in the second half of the 2020s.

The updated LTS is to be sent to ESA member states the week after next (February), and a decision by the member states is expected later this year.

WP breakout feedback/summary of discussions- WP Leaders

WP 1:

Matters arising:

- Identify any gaps and overlaps between other work packages
- 1.1 Utilise the information available already. Solicit information from EU Polar Net
- 1.2 Land use is going to take more effort and will need involvement from communities. Is it possible to do a comprehensive survey that includes everything, if not where do we focus?
- 1.3 Will integrate WP2 & 3 develop a summary to describe the aim, using responses from 20 or so questions targeting what KEPLER is doing for Copernicus.
- Tap the intermediate provider's frequent groups and ask how to cater for their needs
- Ask how do you think these needs will develop over the next 10 years?
- Overall: This is not going to be science based, it is about user feedback needs.

WP 2:

Matters arising:

- WP2 requires two deliverables in one year. Draft report in month 12.
- To hold a teleconference meeting with Marko in May
- Interim report for the ESA HPCM missions expected in July
- Mark ESA - in the middle of the year there should be some more publicly available information on Copernicus Long Term Scenario (LTS) development in the mid-year.

WP 3:

Matters arising:

- To hold teleconference meetings in the sub tasks every month
 - To hold teleconference between task leaders to organise the links between them
 - 3.1 Citizen science links?
 - 3.3 Create a table of what they should do, so we cover what we propose to do. Will add this to the Google Drive
 - 3.3 Requires input from WP 1
 - 3.3 Start with future missions- review the documentation of what we have from the Polar task group. Explore the synergies that they could do.
 - 3.4 Thomas Kaminski
- The sea ice model method for QND is working for now, and it is possible to analyse scenarios. Which parameters should we study using this method? Ones identified by the break-out group included:
- Sea Ice Concentration (SIC) from PMR
 - Brightness Temperature (TB) from PMR (L- and C-band)
 - Volume from Topography

- Biogeochemistry - S2/S3, versus hyperspectral uncertainty. June-September. Chlorophyll. Carbon. Polar Front location.
- Volume from L-band SAR
- In situ scenarios. Gliders. [Shipboard?]
- Airborne systems.

Questions/points raised:

- To hold teleconference meetings with WPLs once a month
- Meeting- Beginning of June, before 1-3
- T3.4 meetings Nov 2019, May 2020
- Hold scenarios in June 2019
- AWI 3 months in WP
- Richard- Shipping companies need information on the sea ice conditions for ice breaking.
- Clarify and simplify terminology for succinct comms: Data users= Information users , Derived data= Intermediate users- End users= Knowledge users

WP 4:

Matters arising:

Needing confirmation of the verification method of milestones for these work packages.

Questions/points raised:

- 4.1, 4.2, 4.3 – How do we collaborate/ link each task?
- 4.1 Antti - Take a look at automatic mapping products- could use them globally
- 4.1 know the next steps, can do it standalone but needs a connection with WP1- give them feedback within a month for users.
- Research gap- space based capabilities should be addressed in WP3
- WP4 will meet at workshops, and discuss via teleconference. Within the tasks they need to meet more often. WPL happy to organise meetings.
- Will consider creating a work package mailing list.
- Will use google docs to share information.
- 4.2 Thomas - Establish communication between 4.2 and Ice services in 1.1 and 4.1 for their requirements
- Interact with 1.3, to design the questionnaire. Will talk in June to WPL.
- Keen to establish some links between the global and regional scale monitoring for sea ice
- 4.2 The month after milestone, refine the draft and send out. Decide which users they are going to survey.
- 4.3 Refer to EU-PolarNet as a starting point. Which sea ice forecasting can we produce? Again this will be reliant on work package 1.3 feedback.
- Bring in two social scientists into 4.3 to use scenario workshops.

WP5 synthesis discussion - Frank Kauker

5.1 could be considered a subtask of 5.2. The end users are the same for both tasks. The question was raised if tasks could be merged as the end users are the same, however it was agreed the Tasks can work closely together but milestones and deadlines remain the same.

Discussion session: Dissemination activities

If participants undertake any dissemination activities, they are asked to inform the Project Manager, Coordinator or Administrator so it can be added to the work list.

Conclusions, wrap up

Thanks to all and calls for participants to engage in virtual dialogue as well as physical meetings. Thanks to the PAB for their welcome input and knowledge during this Kick-off meeting.

KEPLER Management Board meeting

The meeting document for the KMB meeting on 30/01/2019 can be found here:

https://drive.google.com/open?id=1PBcp-6PYEo_ih5EMR5eAtHWvyk11NoR0
