



Some Oil and Gas Industry Requirements in the Arctic

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Outline

- Arctic Oil and Gas: Context
- O&G Arctic Space-Related Requirements
- Some challenges in relation to O&G



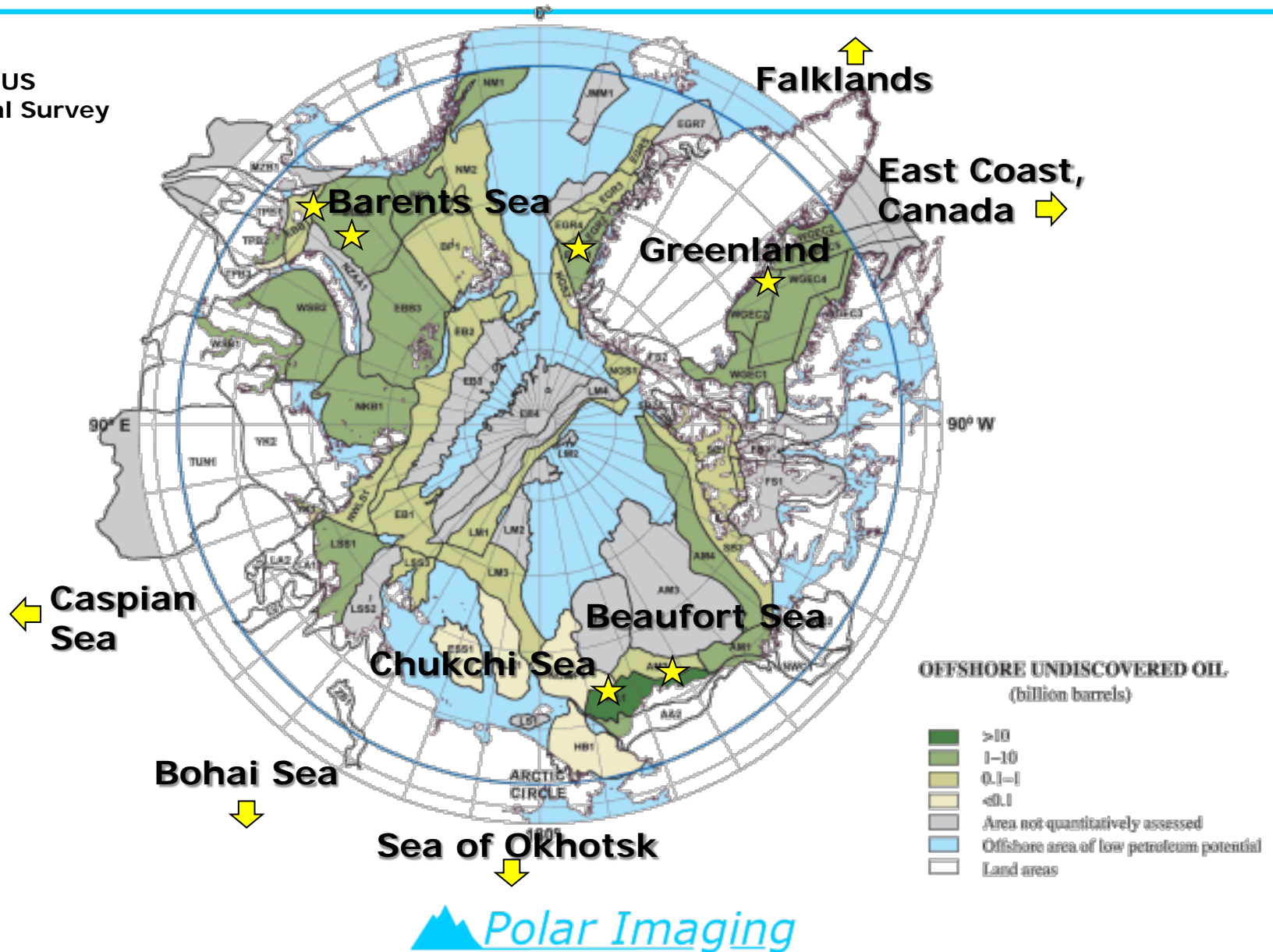
Alaska Pipeline © BP p.l.c.



The Molikpaq platform, February 2009,
Sakhalin-2 project, courtesy Sakhalin Energy

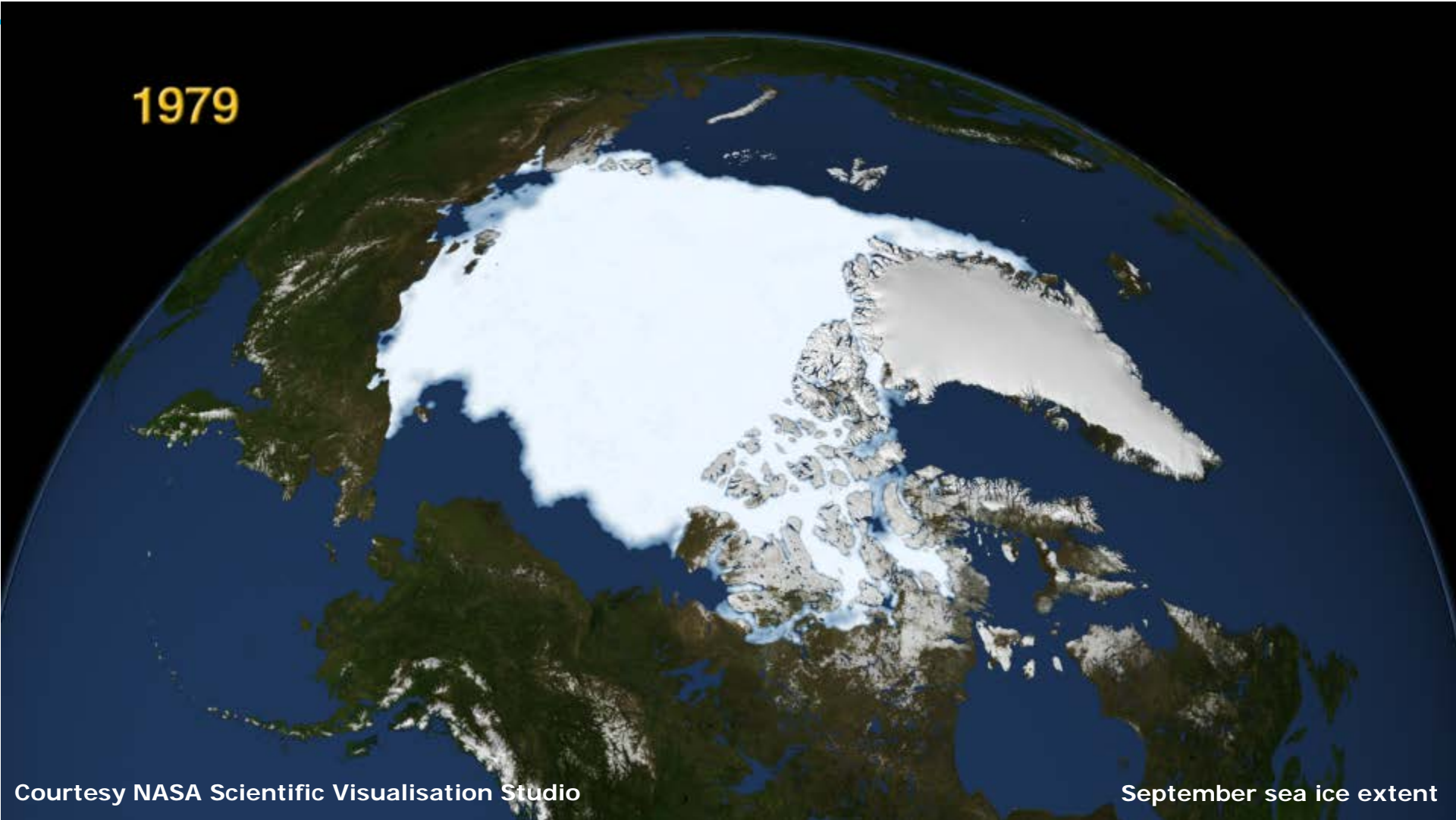
Context: Arctic O&G resources

Courtesy US Geological Survey



Context: Arctic sea ice reduction

1979



Courtesy NASA Scientific Visualisation Studio

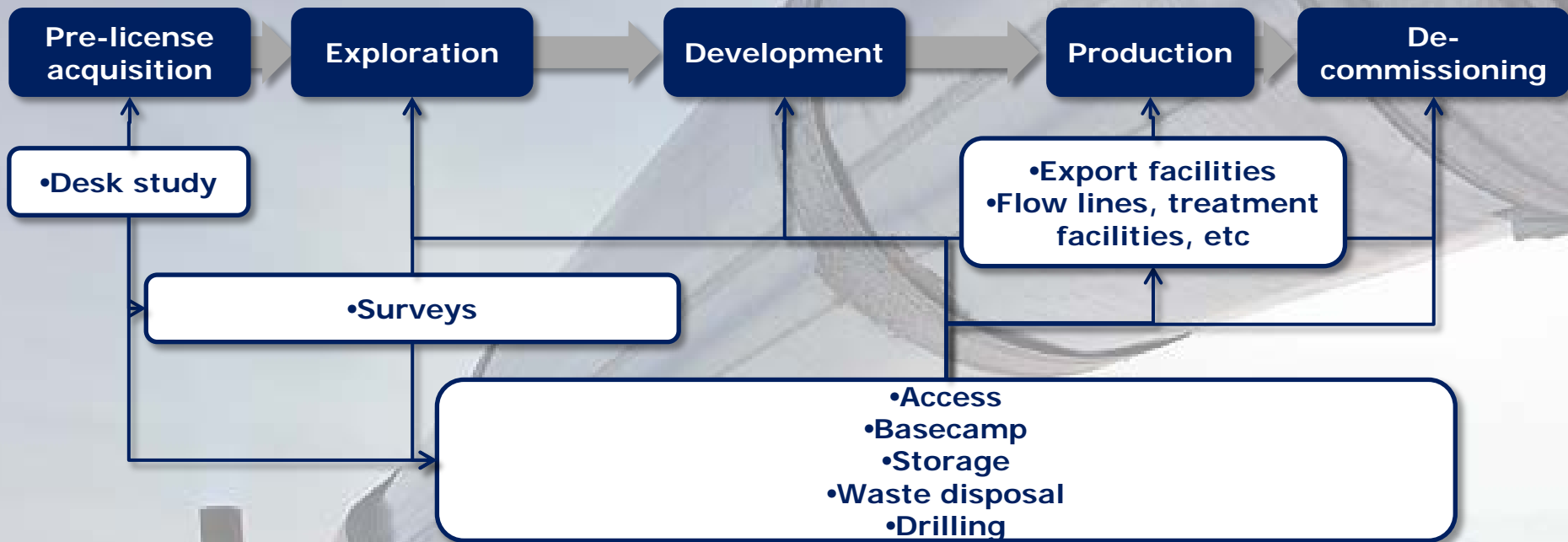
September sea ice extent

Context: Legislation and Standards

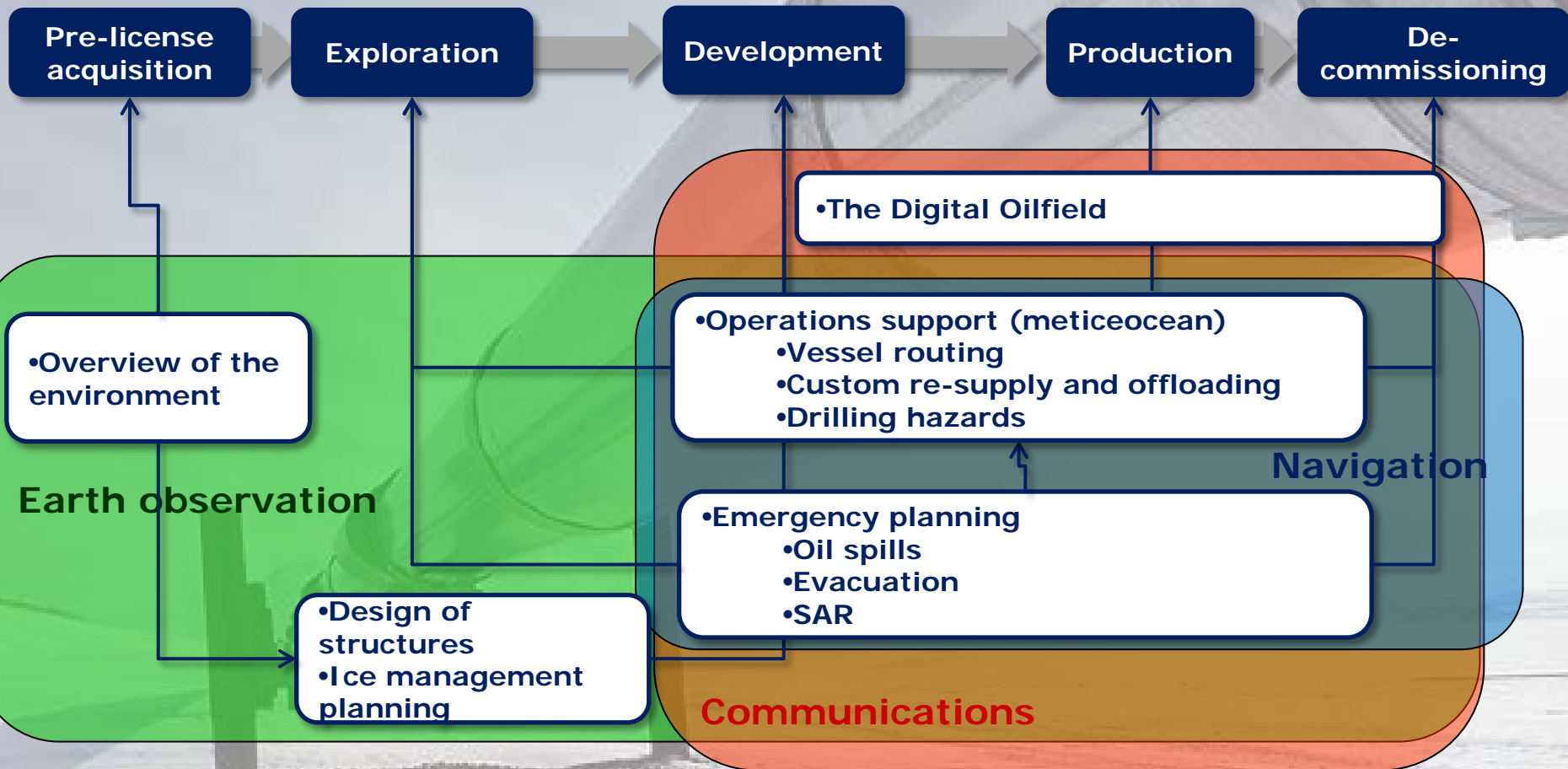
- International maritime agreements including:
 - United Nations Convention on the Law of the Sea;
 - the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78);
 - The London Convention 1972
- National and regional requirements
 - Indigenous populations
- O&G industry standards
 - e.g. ISO 19906
- Non-binding Arctic O&G guidelines
 - E.g. Arctic Council



The O&G lifecycle



The (Arctic) O&G lifecycle



Arctic O&G: design

Satellite data application to descriptive overview of ice environment

Ice environment for the development location

Structural design concept
Fixed or floating facility

Define ice action scenarios

For each scenario

Estimation of expected number of ice-structure interaction events and their duration

Determination of action values

Employ extremal analysis to assign probability distribution to ice actions on the structure

Provide representative actions for design

ISO 19906 ice design methodology

Satellite data application to probability functions for number of ice-structure interactions

Ice conditions

Operational conditions ice management and disconnection capabilities

Ice properties and strength

Ice morphology

Environmental driving forces

Satellite data application to probability functions relating to determination of action values



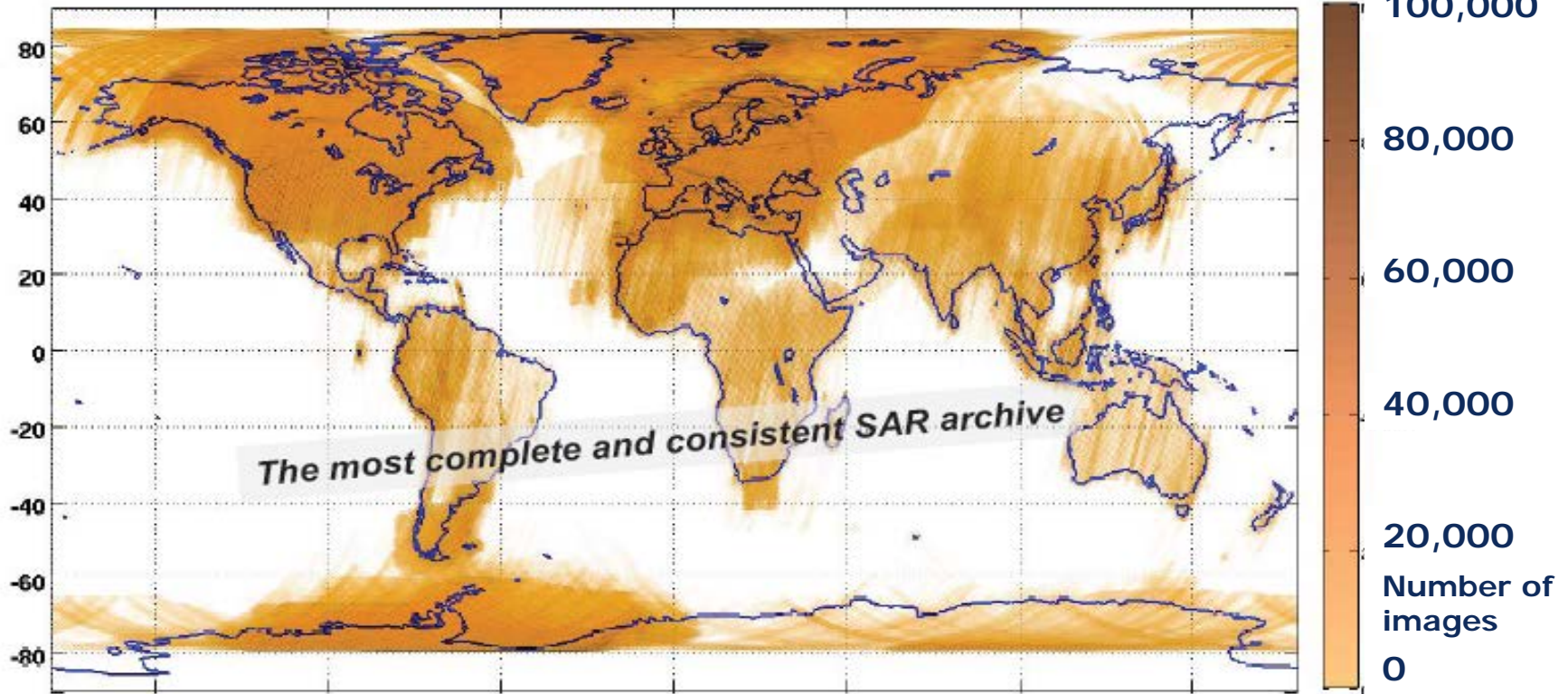
The Molikpaq platform, February 2009, Sakhalin-2 project, courtesy Sakhalin Energy

Arctic O&G: Design

18 years of ERS-1/2 SAR data in the archive



ERS SAR Polarization: VV until mid 2009



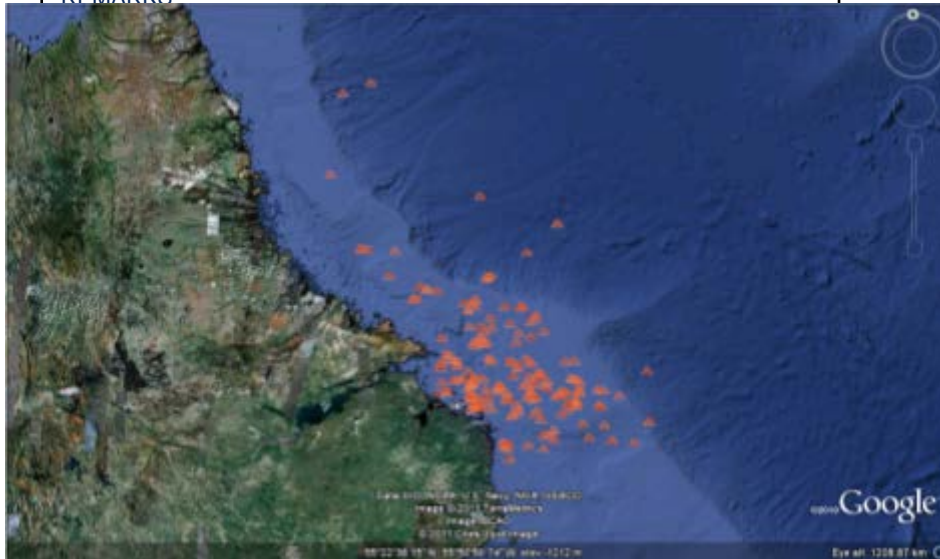
Reproduced courtesy of ESA

Arctic O&G: Ice Management

C-CORE Iceberg Monitoring

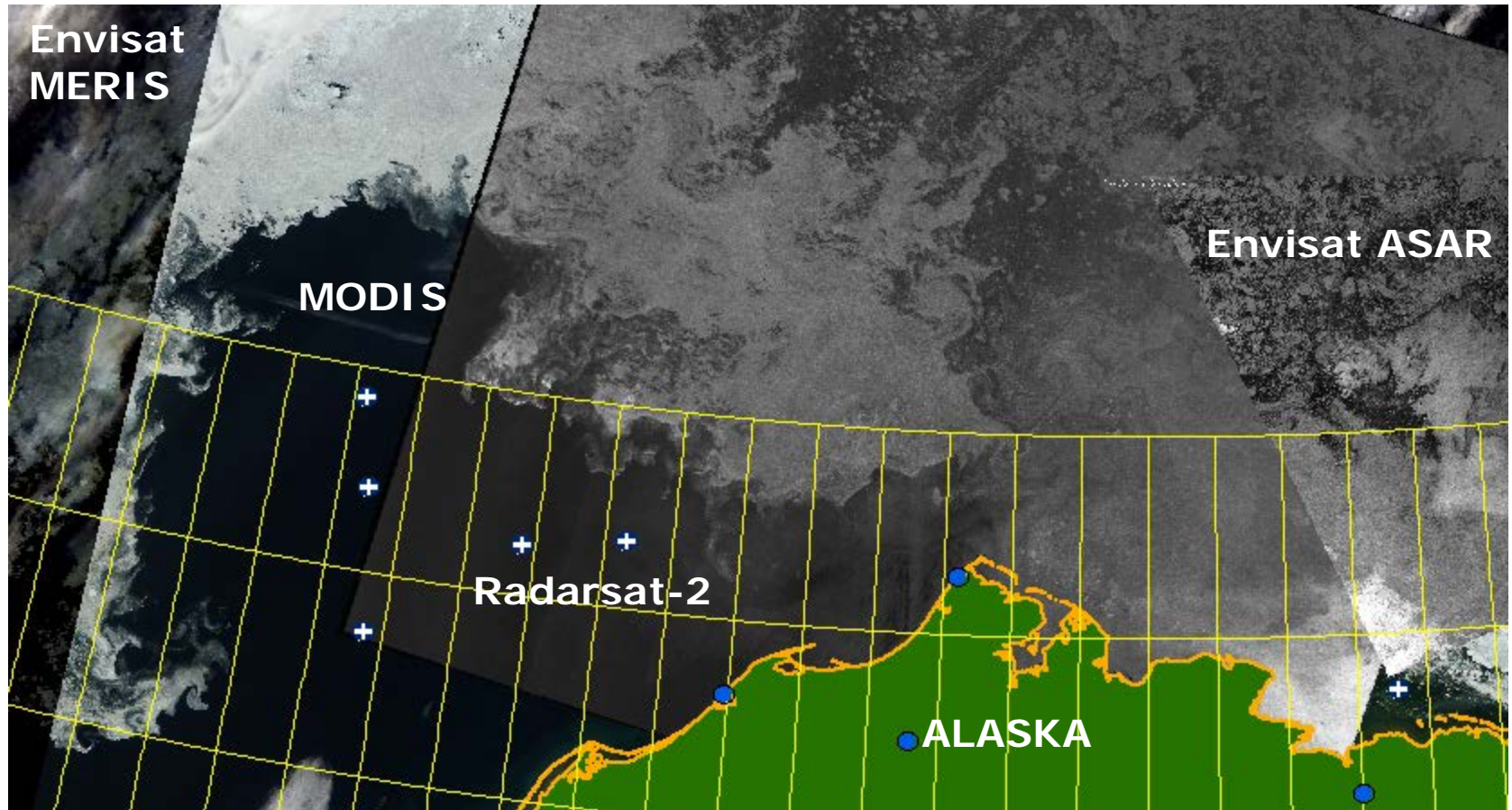
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REMARKS

MANICE Text File



Courtesy C-CORE

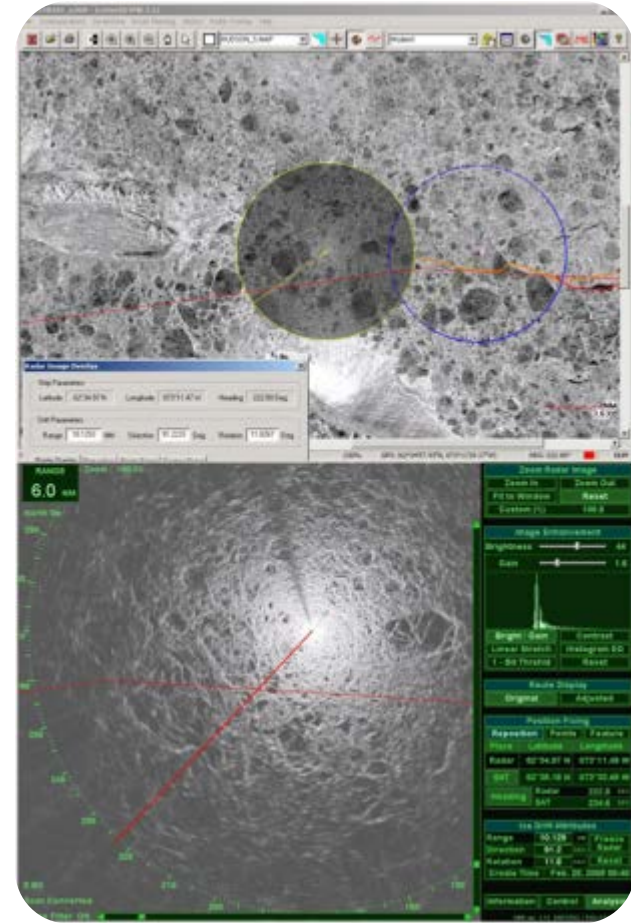
Arctic O&G: Navigation Support



Envisat © ESA 2010, Radarsat-2 © MDA 2010 and MODIS courtesy NASA

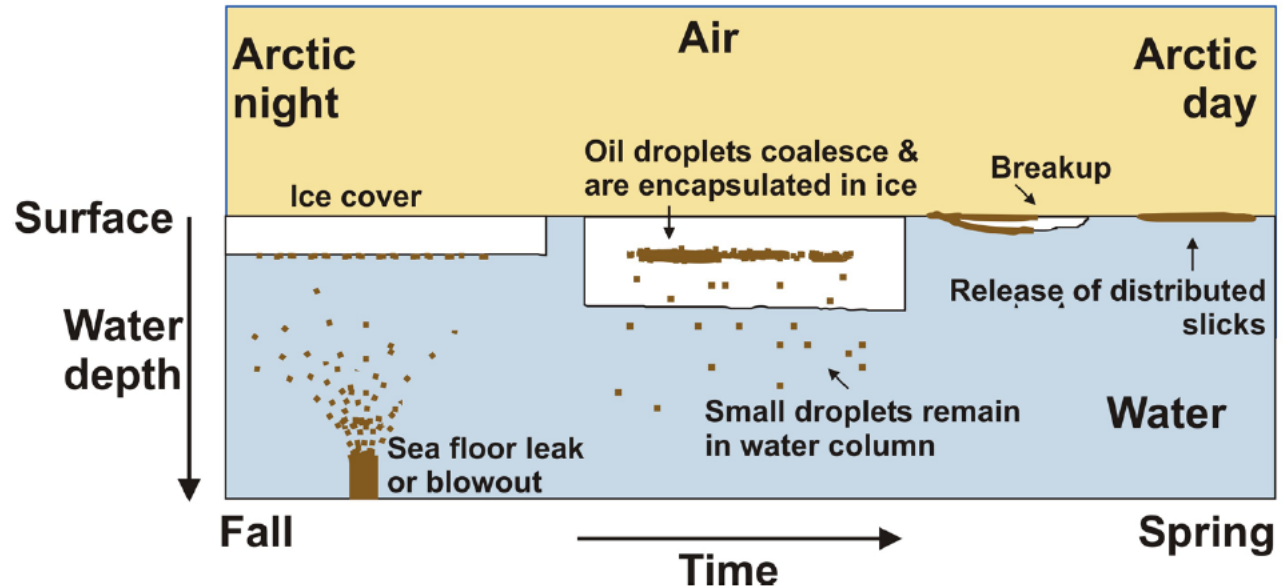
ESA TransIce Project

Arctic O&G: Navigation Support



IceNav system courtesy Enfotec

Arctic O&G: Emergencies

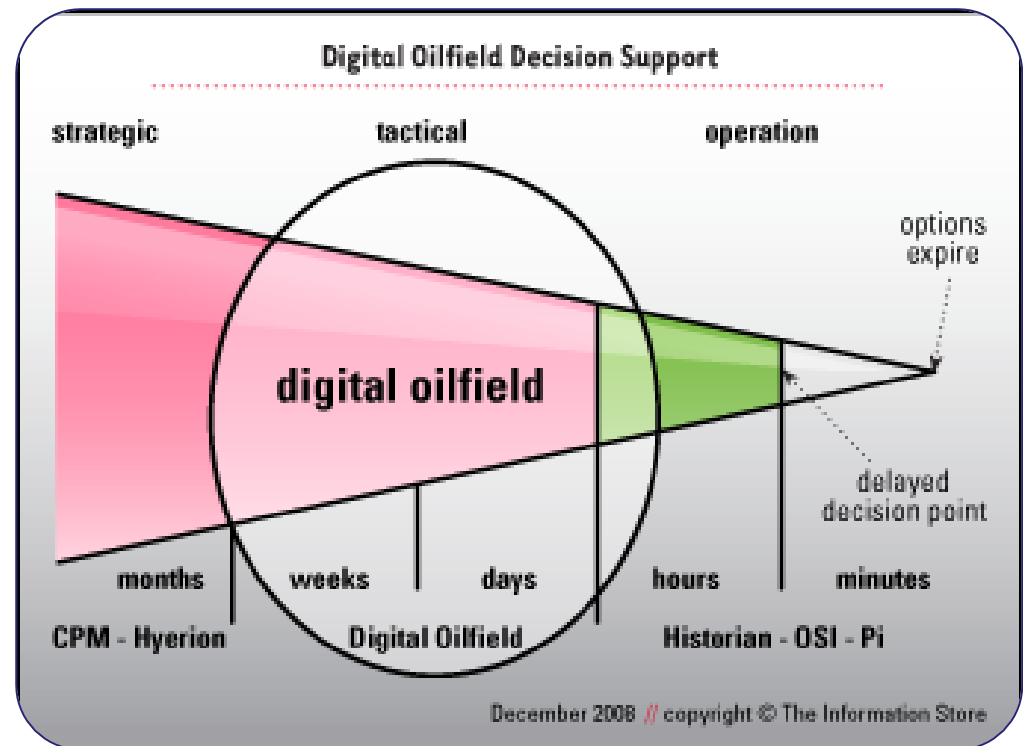


Courtesy NOAA

Arctic O&G: The Digital Oilfield

- Employee comfort, safety and health
- Global and remote access to expertise; data; decision-making
- Advanced and data-intensive remote instrumentation
- Data to be secure, scalable, cloud-hosted with software
- \$1Bn over next 5 yrs on digital oilfield technologies

Seamless linking of data between remote locations



Some Arctic O&G issues

- Communications
 - Doubling of bandwidth demands every 2.5 years for digital oilfield and growing EO needs
 - Communications need to be robust (redundancy)
 - Sufficient for emergencies
- Navigation
 - Poor nautical charts in many areas (outdated surveys)
 - Accurate positioning needed up to high latitudes
 - Use of submersibles, sub-sea operations
- Earth Observation
 - Effective access to archives for understanding the environment
 - Fully “operational”
 - Flexible and efficient planning of data
 - Rapid response and access
 - Effective matching of imagery to operational scenarios and emergencies
 - Technology challenge (training, support tools, etc.)

Final thoughts

- Any mismatch between O&G industry space infrastructure requirements vs. capabilities will depend on:
 - Stage in O&G lifecycle (exploration, production...)
 - Type of operating environment (i.e. nature of hazards),
 - Operating scenarios (ice management plans, type of drilling platforms, etc.)
 - Latitude of the lease region (impact on communications and navigation performance)
 - Operator standards and protocols
- Integrated applications will optimise use of existing space assets, e.g.
 - Reliable comms and navigation (ionospheric issues)
 - Improved integration of navigation planning with satellite image planning;
 - Improved communications for enhanced vessel access to satellite imagery.



Thank-you!

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