Into the Arctic onboard the James Clark Ross

In August 2012, the ice strengthened research ship James Clark Ross left Iceland and set course northwards, preparing to go into the Arctic ice. MARIN was present to monitor and learn about the sea ice conditions and their impact on the ship's course and station keeping capabilities.

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The Arctic region is known for its highly dynamic character induced by currents, winds and the presence of land. Due to the behaviour of the ice, many different types of ice are encountered and these are mixed up throughout an ice field. Categorisation of the ice type is often based on age; younger ice is thinner and still contains a lot of salt, while older ice (surviving at least one summer's thaw) can be metres thick and is stronger because the salt has leached out.
But now: from theory to practice. As the ship heads into the ice, the variance of ice types is noticeable. Some ice particles are apparently effortlessly shifted aside or broken, where others are so strong that after climbing on top of it, the ship smoothly slips off back into the water without the slightest fracture in the ice sheet. No matter what the control measures of the navigator, the ship.chooses the most convenient course herself. The older and stronger ice can be identified by its colour and it is vital that the beautiful turquoise shaded ice should be avoided as much as possible.

Charts On a larger scale, the sailing direction is chosen by following open water leads. If it is possible to sail around the ice, then sail around it. It will always be the faster track and save a lot of time and energy. Next to continuous staring through binoculars, ice charts supplied by various meteorological institutions can be of help when determining which course to set. Not only will these charts indicate the concentration of the ice but also the types of ice in the field.

The link between these ice charts, planning the course regarding them and the actual ice conditions encountered, is the main interest for us. The ice charts give a description of the ice with only a few parameters but they are still detailed enough to make it possible to decide on which routes to sail. When thinking about modelling the variance of ice features within an ice field, this method can serve as inspiration. Here as well, the amount of input parameters should be limited but the results sufficiently realistic.

We encountered a whole range of ice conditions, from the mildest with only a few ice particles, to thick sheets of ice of over a metre thick that had to be broken by the ship and these sometimes included ridges (extremely thick ice features embedded in ice sheets). All of these situations require careful handling of the ship. It was fascinating to observe the crew expertly steer and manoeuvre the ship. Additionally, these observations will contribute to getting a better idea of the required skills and techniques needed for a safe passage and operations in ice and how these can be applied to simulator training.

Knowledge and experience The engineers provided lots of information about the equipment onboard and a number of systems were installed especially adjusted for cold regions. Examples are the water intake system, which is designed to avoid the inlet being clogged by ice, and the active ballast system that is able to induce a roll motion known as the "duck-walk". But – as the captain stresses – this last system is only a last resort to get out of the ice. All the technology, knowledge and experience aboard were very comforting and it was fascinating to observe the daily occupations of the crew.

At the bow, the noise from the ice breaking below was incredible. But all of a sudden it was quiet: the ship had stopped. After pushing for a while the ice would still not break, so the only option left was to back out and gain forward speed for another attempt. This was a success so fortunately there was time to enjoy the beautiful sunrise at around 0300 hours in the morning at a position of 78°N!

Solange van der Werff onboard the James Clark Ross: from theory to practice