A new C3S Global Shipping Service

Authors: Sverre Dokken, Jacob Gruszka, Capt. Jorgen Grindevoll, Constantinios Pantelis, Waqas Qazi (OFFSHORE MONITORING LTD), Alessandro Amici, Maurizio Bottaccio, Aureliana Barghini, Vivien Mavel, Nicola Masotti (B-OPEN), Kris Lemmens (OFFSHORE NAVIGATION LTD), Capt. Reidulf Maalen, ChernFong Lee (GLOBAL MARITIME SERVICES), Federico Serva, Chiara Cagnazzo, Federico Falcini, Guglielmo Lacorata, Raffaele Corrado (CONSIGLIO NAZIONALE DELLE Ricerche), Leif Eriksson, Lars Jonasson, Wengang Mao (CHALMERS UNIVERSITY). Capt. Pär Brandholm (LAURIN MARITIME)

Why?
To develop a service for the commercial shipping industry, based on climate data and tools provided by the Climate Data Store (CDS), in order to facilitate:
• Operational decision-making and the planning process of shipping activities
• Strategical decision-making for shipping companies, investors in maritime activities and policy makers.

What is new?
Knowledge of climate conditions a season ahead may impact shipping planning at the global scale. No need to download data, products are calculated online on the CDS through the Toolbox. Timescales: Long-term Climatologies, Seasonal Predictions, Climate Projections.

How? → User may choose among a list of products:
1. Basic scientific indicators (winds, currents, waves, tropical storms, precipitation, pressure, sea ice, SST, SSS,...), tailored for specific applications, e.g.: The climatological map of user-defined extremes for significant wave height (Figure 1) or along a route. The probability of encountering such extremes in the next season in a basin or along a route (Figure 2).
2. Specific Operational Indicators, including: Ice limits for ship ice classes, Route cost fuel consumption (Figure 3), Route cost ETA, Cost and availability of Arctic Routes (based on climate scenarios, (Figure 4)), Probability of Iceberg encounter (Figure 5), Fuel consumption/Shaft Power along a route (Figure 6).

Challenge: Delivering the same indicator (“same” from the user perspective) at the different timescales.

Expected Benefits:
• Increase operational efficiency and economic return of shipping operations
• Increase operational safety and allow for timely and appropriate planning of safety measures
• Facilitate a better fleet management
• Improve maritime policy for sustainability of the shipping industry

Figure 1. Climatological probability of finding waves higher than user-defined threshold, in January (on ERA5)

Figure 2. Climatological significant wave height and seasonal forecast anomalies along a route estimated from the ECMWF System 5

Figure 3. Route optimization for evaluating Route Cost. The optimized route adjusts itself to avoid high waves for less resistance. Colors: significant wave height from ERA Interim.

Figure 4. Projected sea ice concentration along North East Passage

Figure 5. Probability of presence of icebergs for year 2015 based on icebergs drifting numerical simulations from 2013 to 2015.

Figure 6. Percentile distribution of the total required energy along a route: Bimini Island to Bishop Rock (Caribbean to North Atlantic) – velocity 15kt Ship: New Panamax container ship