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Little did we know about the whopping headaches that lay ahead when we started preparing for this project. The Norröna was the third commercially operated vessel to be instrumented with an acoustic Doppler current profiler. Her route was exceptionally strategic, operating out of the Faroes to Denmark and to Iceland, she crosses all warm water entering the Nordic Seas. We, Charlie Flagg and I, had previously instrumented the Oleander and Nuka Arctica, both container vessels, to measure poleward flow by the Gulf Stream system between New Jersey and Bermuda, and farther north by the North Atlantic Current between Greenland and Scotland. The Iceland-Faroe-Scotland choke point was an obvious next step. We had barely left the dock in Hamburg when the problems arose.

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It was easy to worry that something was wrong about the installation. The Norröna is a 35,000 ton high-seas ferry with over a mile of lanes for cars and trucks! Installing the cable that connects the ADCP in the hull with the deck box, computer, and navigation equipment up topside was a huge challenge. On research vessels wires and cables are visible everywhere - no big deal, but on the Norröna it had to be a tidy installation: the 100 m long cable had to be strung through decks, corridors and firewalls hidden from sight, a major undertaking the Blohm und Voss shipyard in Hamburg managed to complete on a very tight schedule. It didn’t take long before we realized it wasn’t the equipment but air bubbles drawn underneath the ship blocking the acoustics that was the problem. This came as a quite a shock, unlike anything we had experienced on the other two vessels. And not one readily rectified.

To Charlie’s everlasting credit, he persuaded the vessel operators to allow us to put a fairing around the face of the ADCP; the idea being that it would deflect the bubbles away from the acoustic beams. It was a lightweight aluminum rather frangible structure that didn’t last long, but long enough to prove that a fairing would help. Based on this we sought permission from the Smyril Line, the owners of the Norröna, to install a permanent fairing. This was approved and the installation led to significant improvement in data returns. Captain Jógvan i Dávastovu deserves our unending thanks for his sustained interest and support in this effort.

The bubbles come from the two huge bow thruster openings. These sweep down volumes of air each time they breach the surface which happens as soon as there is any swell. Even on calm days there was often swell between the Faroes and Iceland resulting in poor data returns along that route.

We contracted with the ship designers a hydrodynamic study of flow around the hull to identify, if possible, a better location for the ADCP. They suggested two sites, one near the bow, ahead of the bow thruster openings, and the other in the skeg between the propellors. Charlie and I explored the bow but couldn’t find a level flat spot for the ADCP. The alternative was to build a blister, a flat spot that would protrude from the hull. That seemed risky, and costly so we opted for the skeg instead. We were a bit nervous that being close to the propellors would cause other problems, but in fact the move to the skeg improved performance noticeably – albeit not as much as hoped for. After more than 12 years of operation the ADCP failed. Technical issues and a lengthy covid interrupt led to terminating the program. But we learned a lot, more on this later.

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Charlie’s website provides a lot of information on the challenges we faced. I recommend it highly, it’s a good read about all aspects of the Norröna operation: http://po.msrc.sunysb.edu/Norrona/