Analysis of vessel status information of past research cruises and prediction of downtime for future cruise

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Japan Agency for Marine-Earth Science and Technology (JAMSTEC) owns several research vessels and is responsible for the operation of the research cruise by these vessels. The ship time of research vessels belonging to JAMSTEC has declined over the last 10 years due to decrease in the number of vessels and the budget for research cruises. On the other hand, the occurrence of trench type large earthquake, global warming, and seabed resource exploration have increased the importance of the oceanic observation. Under these circumstances, it is indispensable to plan the most optimal research cruises to carry out the necessary oceanic observations. At present, JAMSTEC has to plan all research cruises for next fiscal year one year before. In order to perform the most effective research cruises, our project aims to provide useful information when planning future research cruise. Our project started in FY 2016. We first started to investigate the efficiency of the past research cruises. We have compiled time-sequence data of vessel status and performed observations in the past cruise, and estimated downtime for each cruise, which is a period when the observation or cruise is interrupted due to rough weather, machine trouble, etc. The downtime is one of the indicators for the efficiency of the research cruise. We also have developed database system to store the time-sequence data and information of each research cruises including downtime. The time-sequence data has been compiled based on E-mail sent from vessel to ground management office in the cruise. In E-mail, the information is written in text, ie in natural language. Therefore, the time-sequence data should be compiled by manually, it takes a lot of time to digitize it. Currently, we are also developing an application that automatically create the time-sequence data of vessel status and performed observation. Next, we have analyzed the downtime and the information of the past research cruises and searched for important factors that affect the downtime. And then, we have developed an application to predict the downtime of future cruises by using machine learning. In this study, we will introduce the analysis results of the downtime and the progress of the application development. Acknowledgments: we are grateful to Mr. Morisaki and Ms. Sada for their supports to make data stored into the database system.