

US Navy Submarine Sea Trial of NASA developed Multi-Gas Monitor

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During a successful 2 year technology demonstration of the tunable diode laser spectroscopy (TDLS) based Multi-Gas Monitor (MGM) on the International Space Station (ISS), we began discussing with the US Navy the possibility of conducting a sea trial of an MGM on a submarine. The sea trial would also include a gas chromatography/differential mobility spectrometer based Air Quality Monitor (AQM), which is used operationally on ISS for select volatile organic compounds. AQM results will be the subject of a separate paper. The Navy's interest in testing NASA equipment is in a planned update to the environmental monitoring equipment used aboard submarines. NASA's goal is studying submarines as closed environment analogs to spacecraft. MGM's core technology was developed by Vista Photonics Inc using Small Business Innovation Research (SBIR) grants and expanded for various applications using NASA program funding. The MGM measures oxygen, carbon dioxide, ammonia and water vapor in ambient air, displays concentrations with temperature and pressure, and stores 30 second moving averages. The sea trial involves colocating the instrument with the Central Air Monitor (CAM) and connecting it to rack power prior to departure, and letting it run during the entire sea trial of a few months duration. All data stored is inside MGM, with no connection to the vessel data bus. Crew intervention is limited to checking MGM periodically to see that it is working and power cycling if the display is OFF. After the trial is over, the unit with its data will be retrieved. Post sea trial calibration check and data analysis are planned and results will be compared with both CAM data and results from MGM's ISS technology demonstration.