IOOS Perspectives on AI

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IOOS | EYES ON THE OCEAN™

AI and Machine Learning Opportunities

Advancing oceanographic Monitoring & Analysis

Enhanced Observations and Data Analysis

- **AI/ML integration:** Enhanced IOOS RAs certification criteria improving data quality and monitoring.
- **Adaptive Sampling:** Efficient monitoring through optimal sensor placement and changing conditions.
- **Automated Quality Control:** Streamline anomaly detection, pattern recognition, and data trend identification (e.g. water level QC).

Exploitation & Analysis

- **Model Accuracy:** AI-driven insights to improve ocean model predictions using real-time data.
- **Feature Identification:** Faster, effective interpretation of complex oceanographic data (e.g. WebCOOS).
- **Hazard Forecasting:** AI for predicting specific hazards, like phytoplankton blooms, based on historical and current data.

Innovative Applications

- **AI-Driven Software Lifecycle:** GenAI tools support development, testing, security reviews, and other software-related tasks, increasing efficiency throughout the lifecycle.
- **Text Summarization:** GenAI accelerates summarization from models and applications, streamlining communication of complex findings.

AI and Machine Learning Challenges

Key Obstacles in Oceanographic AI implementation

Integration with IOOS Infrastructure

- **Complex integration** of AI models with diverse, legacy systems and real-time data feeds across IOOS.
- **Technical challenges** in ensuring AI solutions fit seamlessly into existing infrastructure.

Stakeholder Coordination

- **Aligning** federal, state, university, and private sector stakeholders to ensure accessibility and usability of AI models.

Trustworthy AI Standards

- **Establishing standards** for "Trustworthy AI" that ensure transparency, fairness, and accountability in model predictions and decisions.