

European Pavilion

Digital Ocean

Nice | France
2 - 13 JUNE 2025

Advances in Observing the Ocean for Climate

June 12, 2025



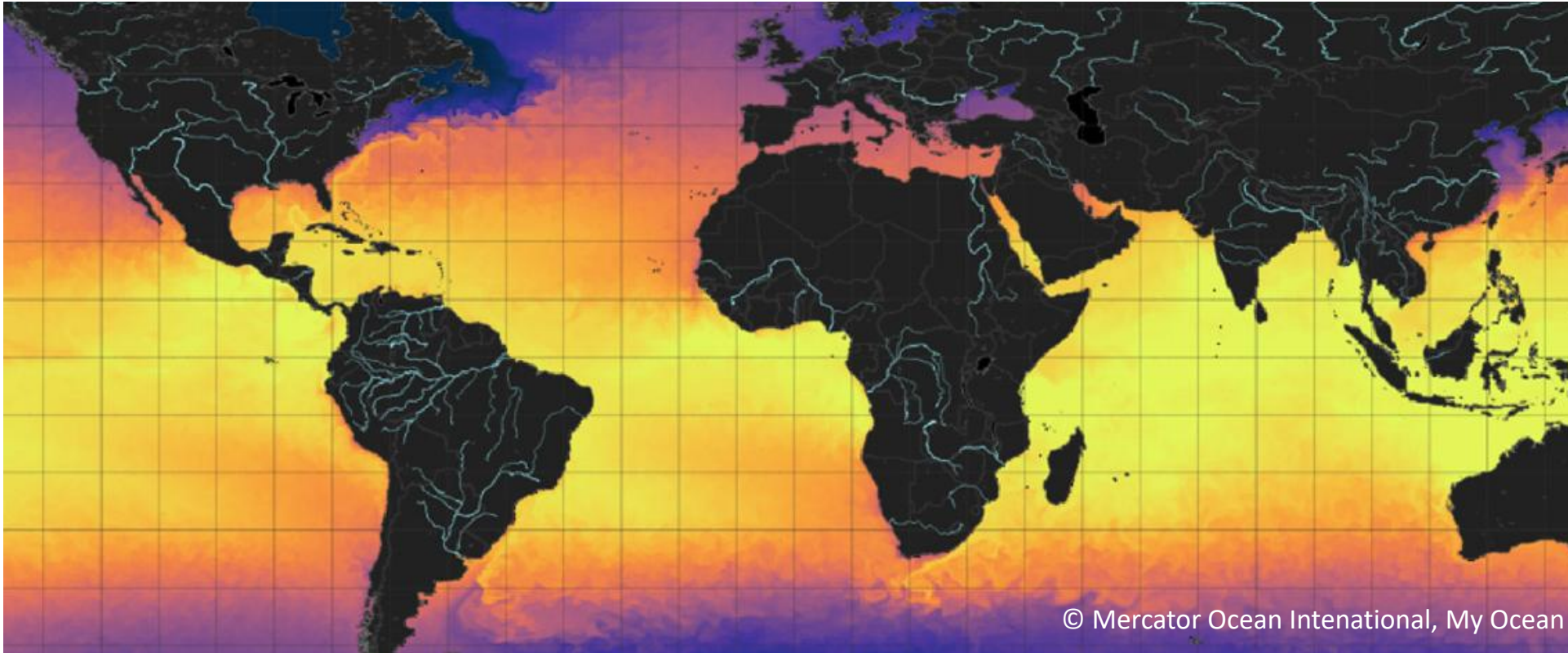


Holger Brix

EuroGOOS



The view from space

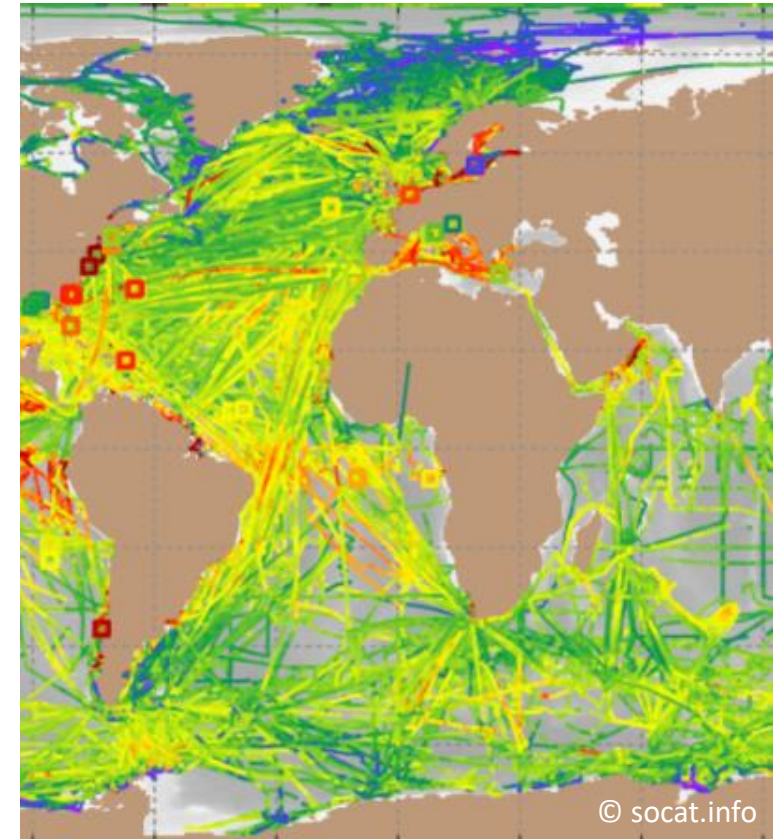


- Satellite data can provide data from the ocean surface
- Advanced products blend satellite observations and model calculations
- Tremendous progress during the last decade, but
- Still issues with clouds, resolution etc.
- Limited to information that can be sensed from space
- Needs validation through in situ (ground) data

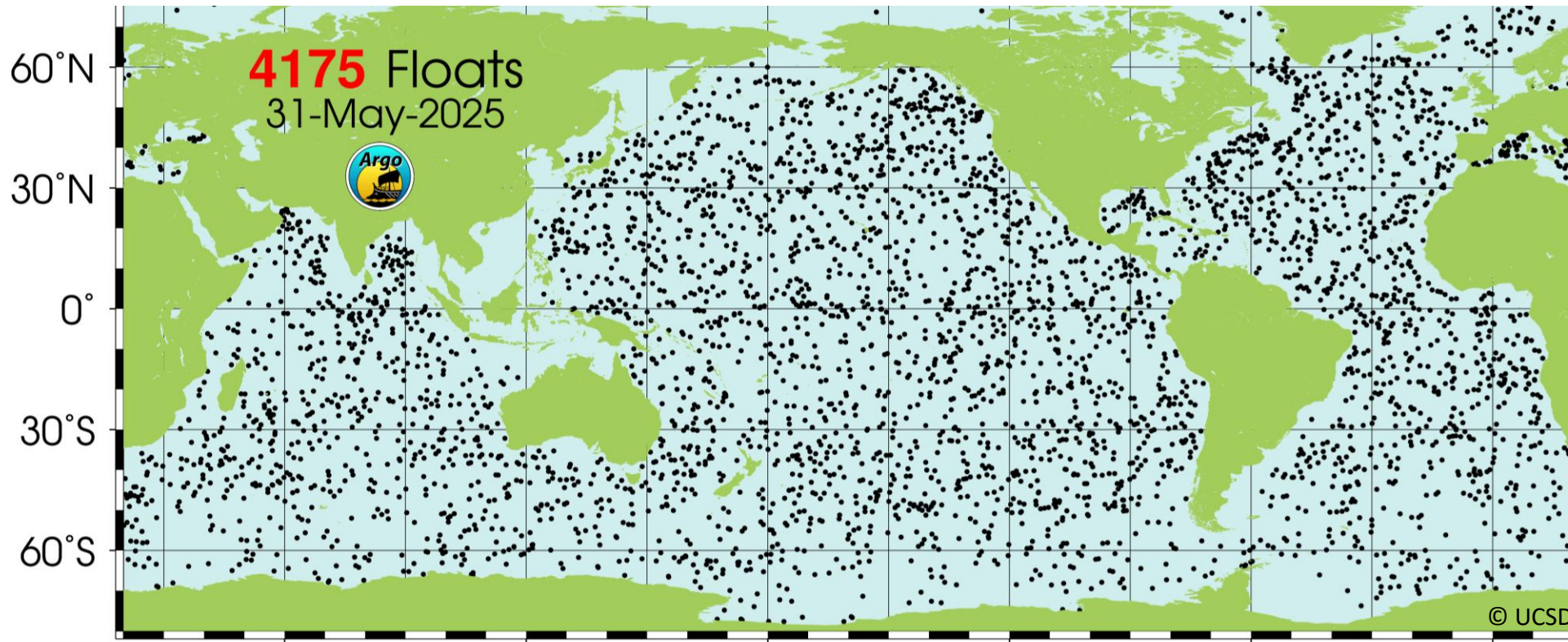


The traditional approach

- ✓ Ship-going measurements provide valuable data
- ✓ Wide range of possible measurements
- ✓ Ability to sample the deep ocean
- ✓ Limited in space and time due to cost, weather etc.



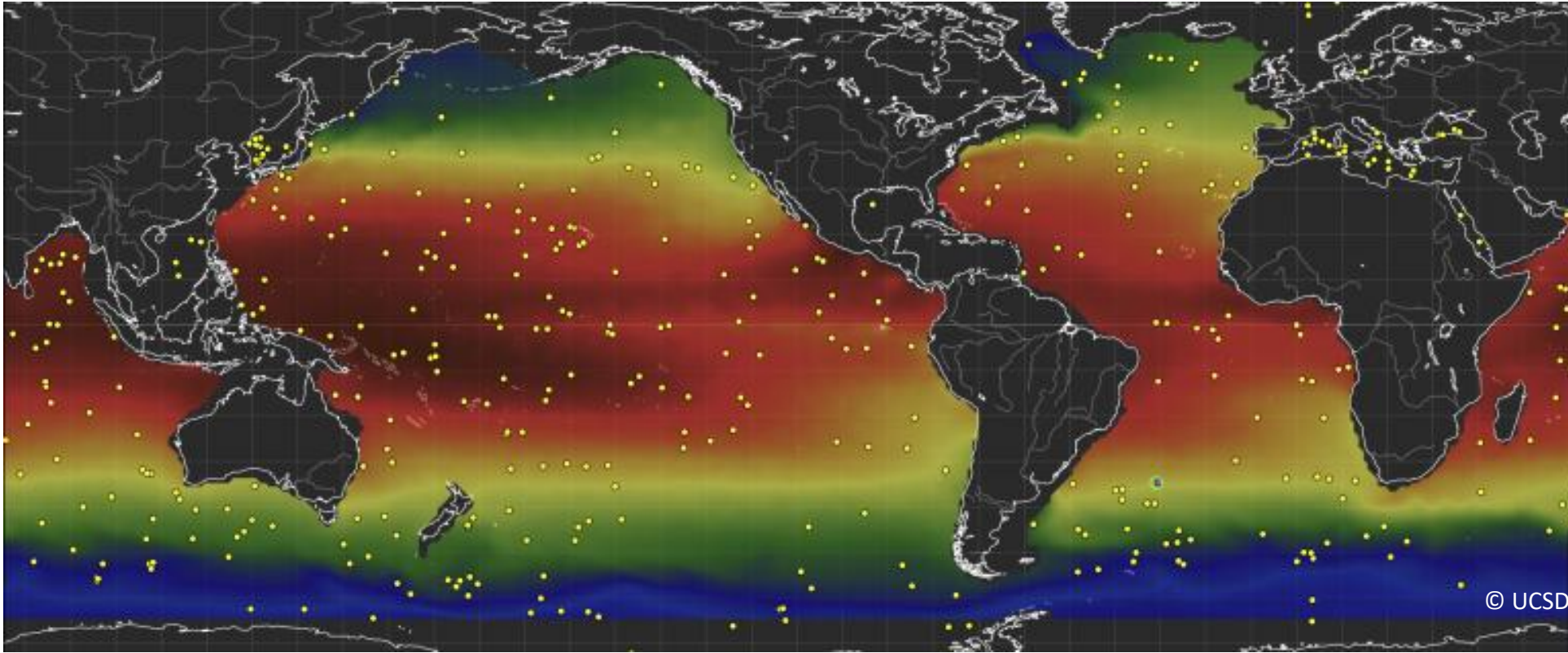
Floats in the oceans



- Argo floats provide data from the entire water column
- Automated systems, global collaboration
- Huge step forward regarding data availability
- Physical parameters and some biogeochemical measurements



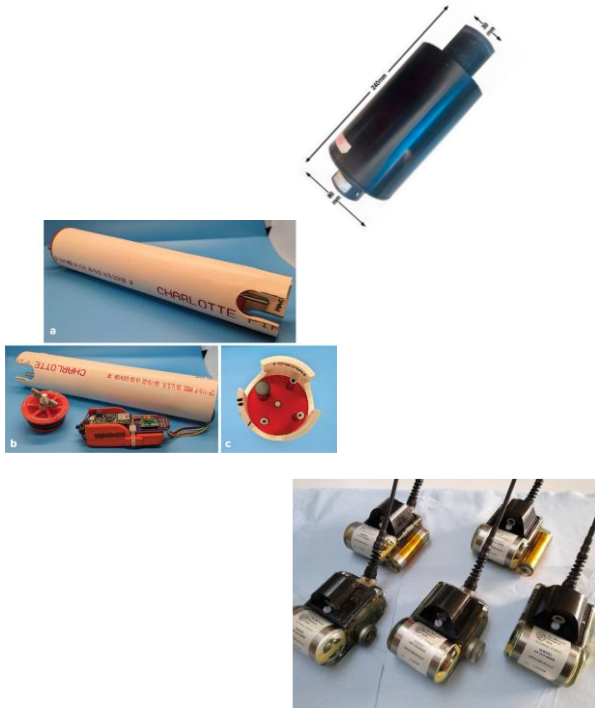
Floats in the oceans



- Argo floats provide data from the entire water column
- Automated systems, global collaboration
- Huge step forward regarding data availability
- Physical parameters and some biogeochemical measurements, but
- Limited numbers of quantities
- Gaps ...



Low-Cost Sensors



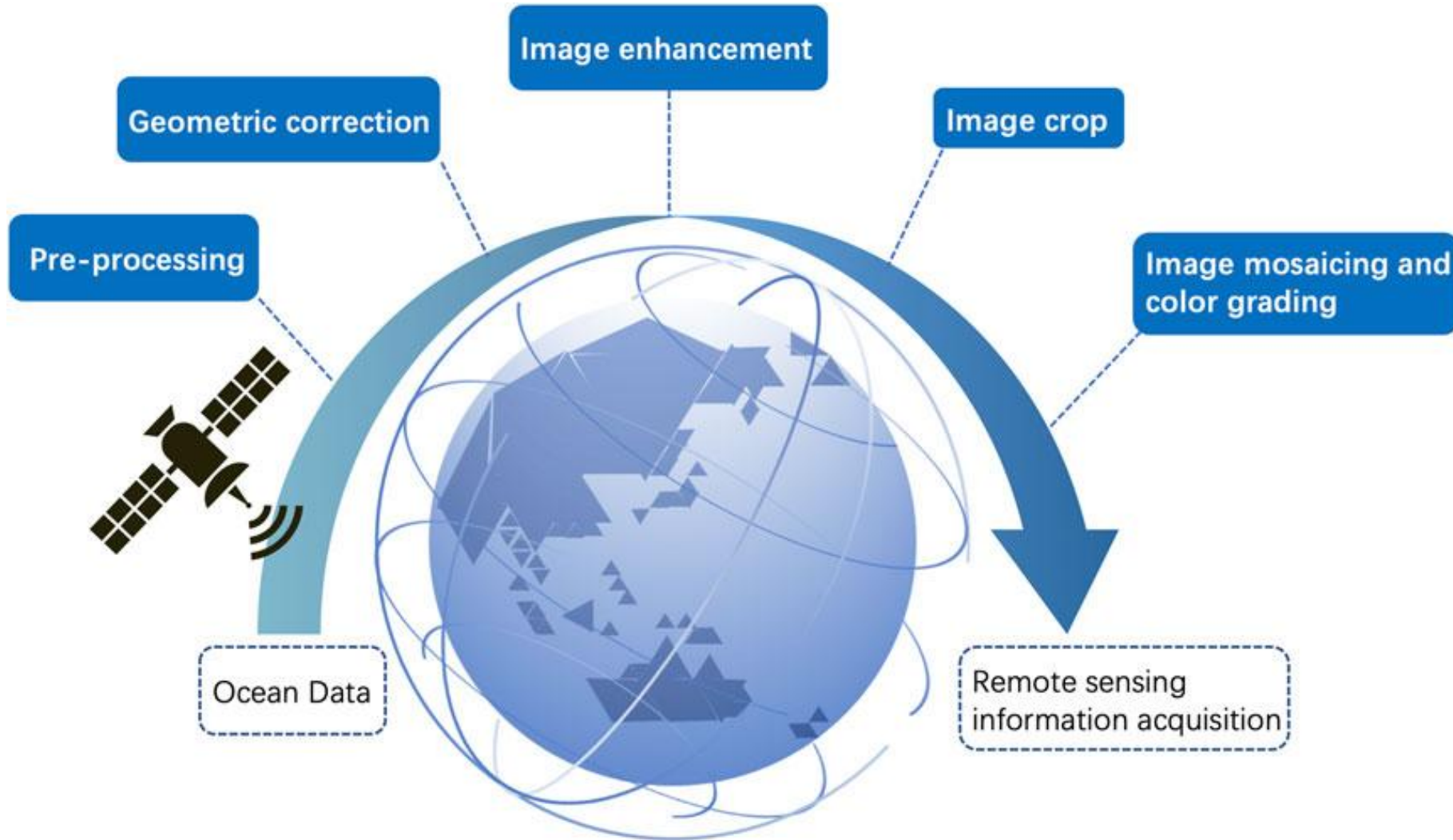
- ✓ Enhance spatial and temporal coverage
- ✓ Improve sustainability of observing systems
- ✓ Support for citizen science and research democratization
- ✓ Also cover biological observations etc.
- ✓ Improve input for numerical forecasting
- ✓ Data quality assessment through machine learning techniques



Inspire
ocean & climate



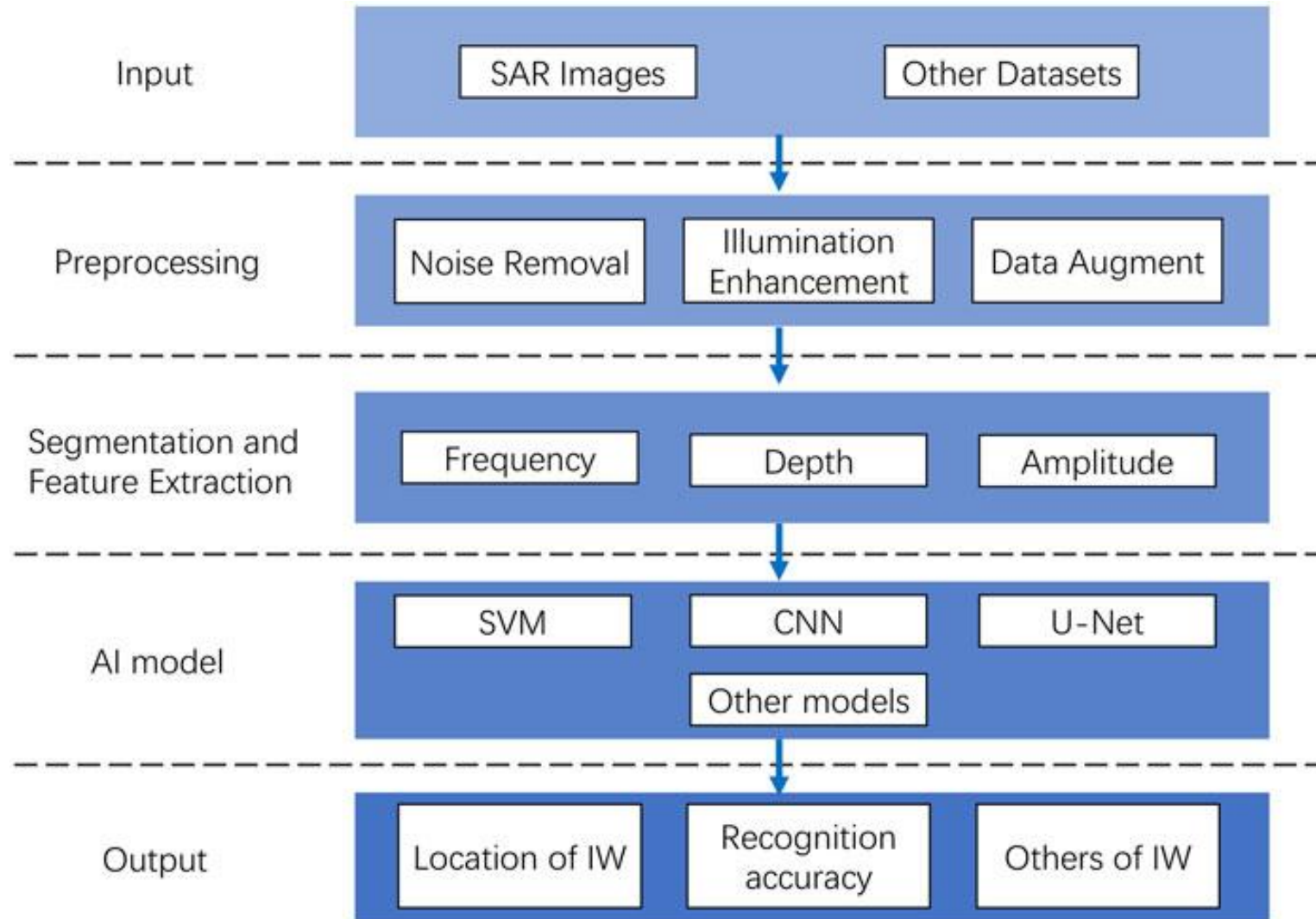
Remote Sensing Data Acquisition



Song et al., 2023



An AI Example: Recognition of Internal Waves



Song et al., 2023



Robotics

- ✓ Automated underwater vehicles have been used in the past
- ✓ New development in robotics allow new insights
- ✓ Remotely operated vehicles use new technologies including AI applications
- ✓ Seabed investigations

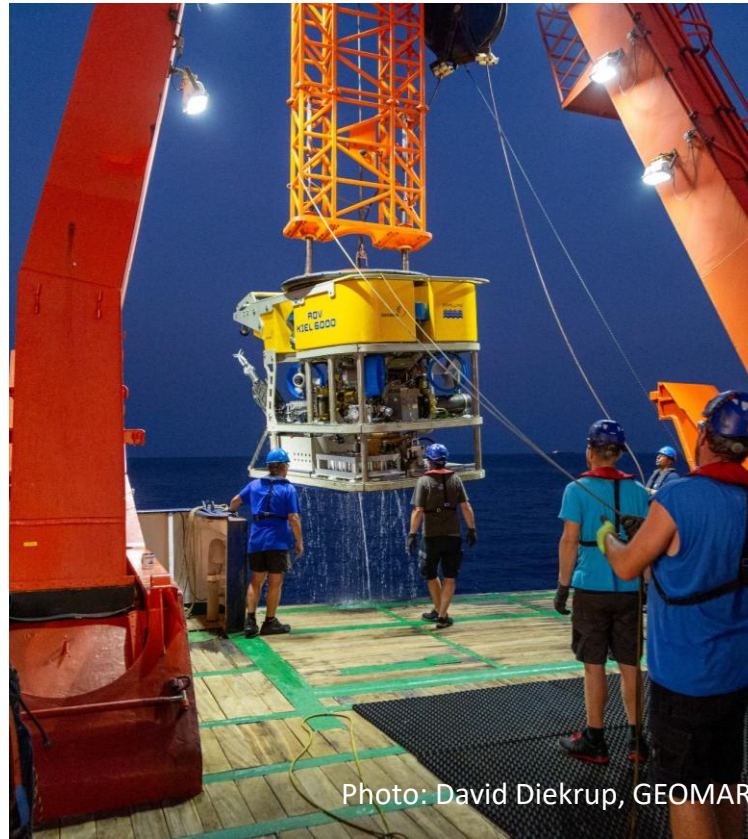


Photo: David Diekrup, GEOMAR

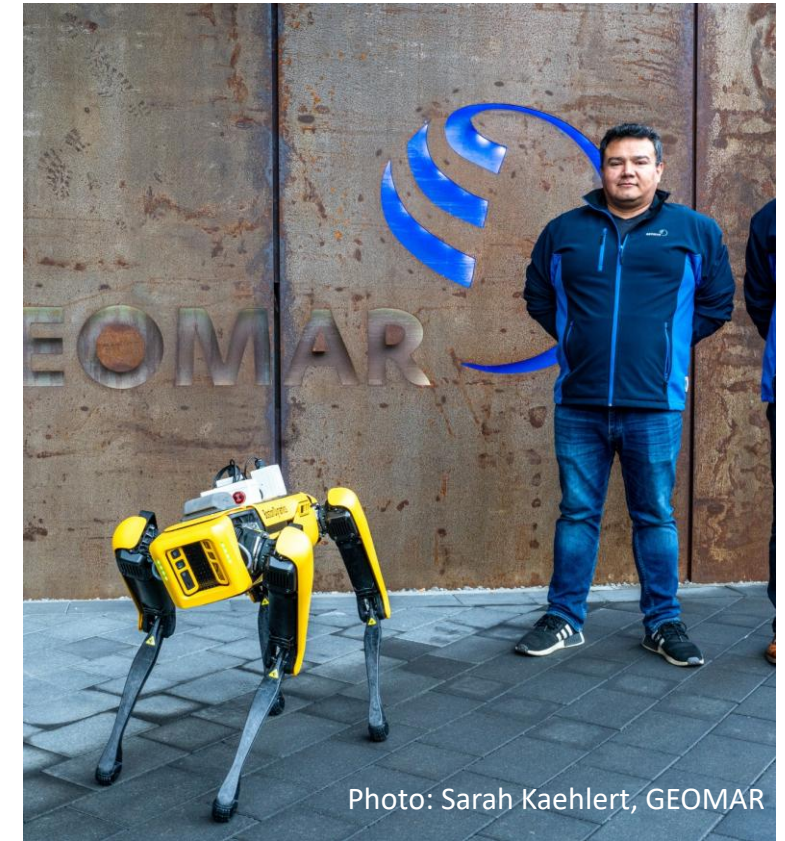


Photo: Sarah Kaehlert, GEOMAR

11th EuroGOOS International Conference

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EuroGOOS
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