BOX 1. ROBOTS TO MONITOR mCDR DEPLOYMENTS

The word "robots" refers here to autonomous vehicles and platforms, which include:

- Buoyancy-driven robots, encompassing
  - Biogeochemical (BGC)-Argo floats (Figures B1 and B2)
  - BGC-gliders (Figure B3)
- Uncrewed surface vehicles (USVs; Figure B4)

Floats and USVs could rendezvous for data intercomparison and transfer (Figure B5). In the future, USVs could intercept and reposition floats to maintain them in the best monitoring locations or create "virtual moorings."

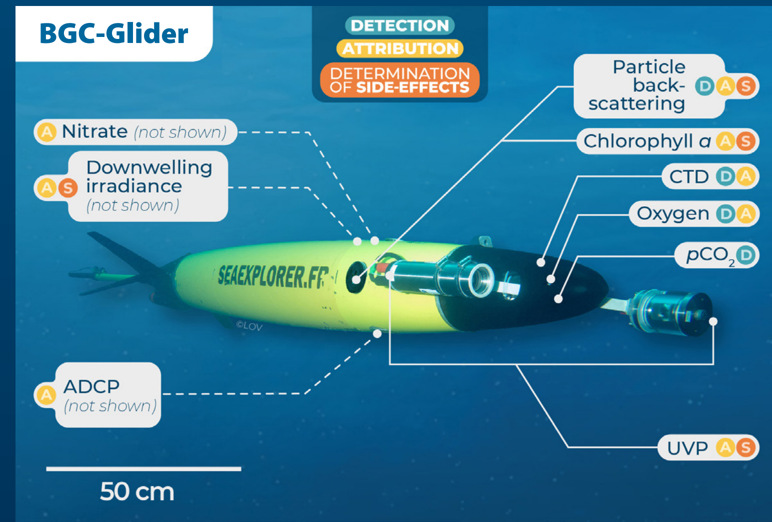

FIGURE B3. Biogeochemical SEAEXPLORER underwater glider (BGC-glider) equipped with almost the same array of sensors as BGC-Argo floats (Figure B1). Sensors are identified for the three mCDR monitoring objectives (detection, attribution, and determination of side effects). Such gliders can typically dive to 1,000 m depth and stay at sea up to 100 days. *Photo credit: David Luquet, used with his permission. Licensed under CC BY-SA 4.0 by Thomas Boniface*

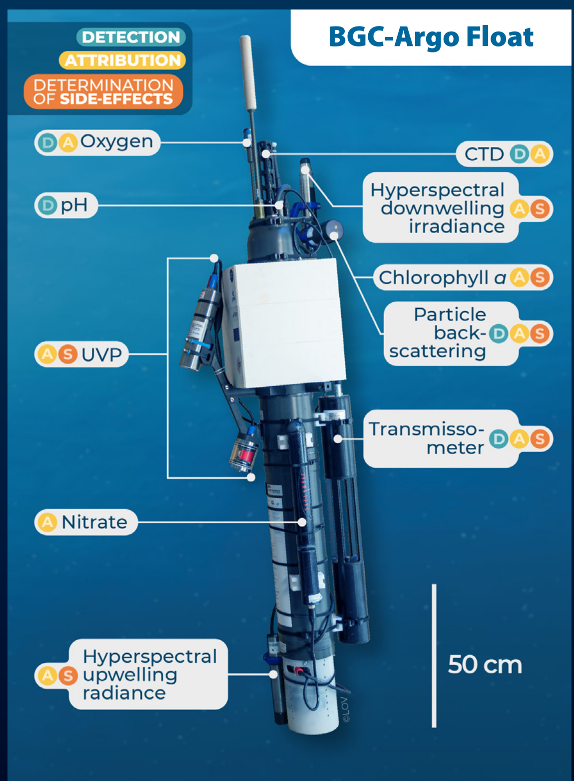

FIGURE B1. A jumbo biogeochemical profiling float (BGC-Argo float, REFINE type NKE CTS5) can provide profiles every five days over four years. Sensors are identified that contribute to the three mCDR monitoring objectives (detection, attribution, and determination of side effects). *Photo credit: David Luquet, used with his permission. Licensed under CC BY-SA 4.0 by Thomas Boniface*

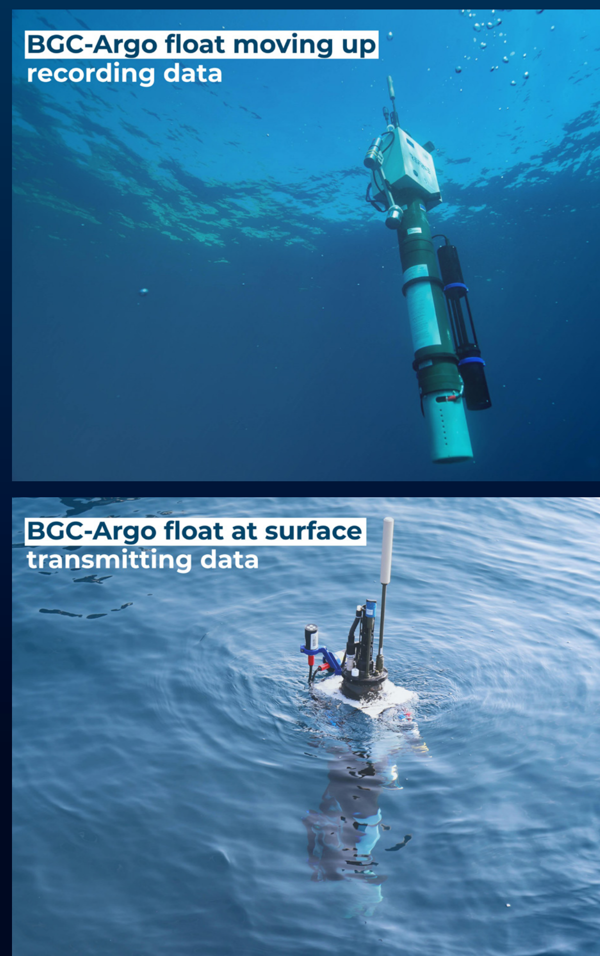

FIGURE B2. BGC-Argo floats record variables from 2,000 m depth to the surface, where data are rapidly transmitted to a satellite. The floats then descend to a parking depth (e.g., 1,000 m) where they stay for 10 days before initiating the next vertical profile. During the parking phase, floats have the potential to monitor key properties for mCDR such as wind (passive acoustic) and particle flux (transmissometer used as optical sediment trap). *Photo credits: (top) David Luquet and (bottom) Thomas Boniface, used with their permissions. Licensed under CC BY-SA 4.0 by Thomas Boniface*.

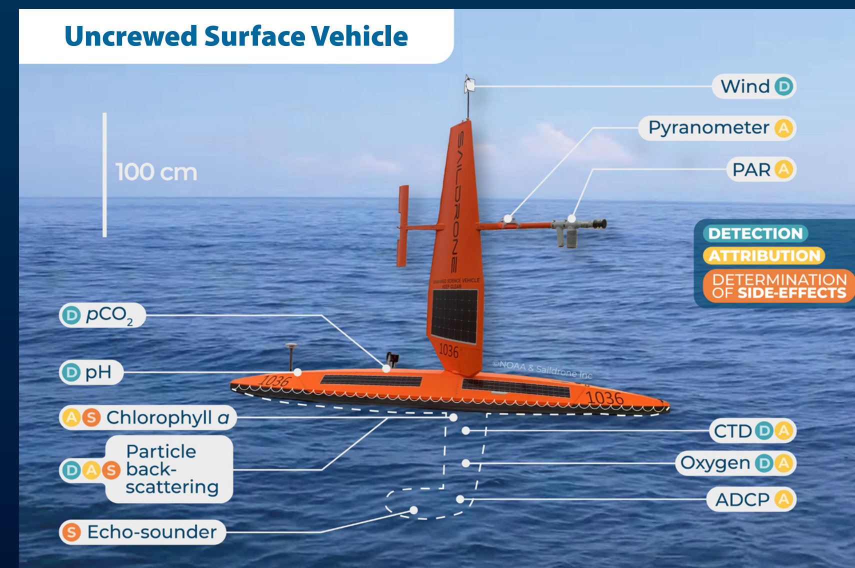

FIGURE B4. A saildrone, a USV powered by wind and solar energy, with identification of sensors for the three mCDR monitoring objectives (detection, attribution, and determination of side effects). USVs would be key in acquiring accurate pCO_2 measurements for mCDR monitoring. The USVs could be deployed as fleets of intercommunicating platforms for pCO_2 measurements, and some could also rendezvous with BGC-Argo floats (Figure B5). Another type of USV, the waveglider (not shown), is powered by wave motion and solar energy. *This work is a derivative of https://commons.wikimedia.org/wiki/File:SD_1036.jpg by NOAA and Saildrone, in the public domain.*

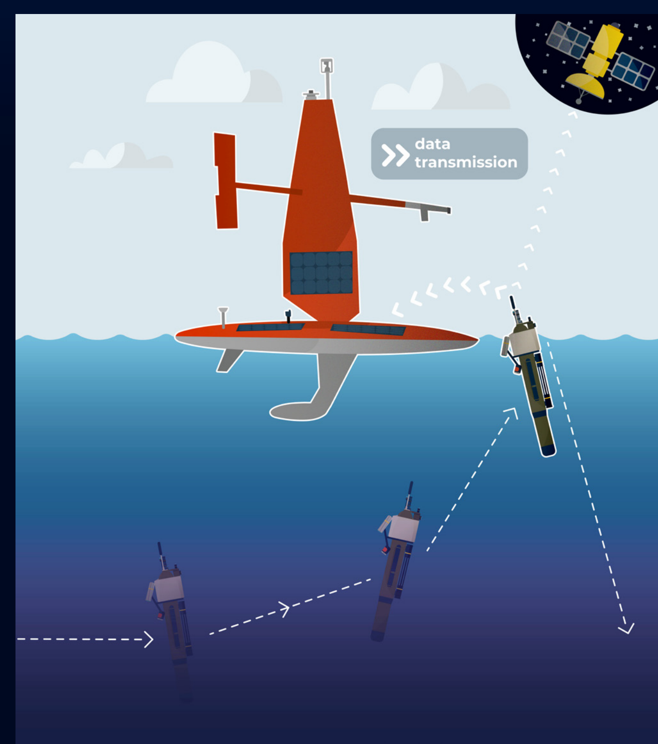

FIGURE B5. During a rendezvous between a saildrone and a surfacing BCG-Argo float, the USV would record data from the float and simultaneously make pCO_2 measurements. Data files too large to be transmitted to satellites by the float (e.g., particle and plankton images) could be transferred to the USV for later downloading when it returns to port. *Licensed under CC BY-SA 4.0 by Thomas Boniface*