

Ambient air ozone mixing ratios during the MOSAiC expedition

by H el ene Angot (helene.angot@epfl.ch)

August 13, 2021

Contents

Description	1
Sampling location	2

Description

The dataset compiles ambient air ozone mixing ratios measured onboard R.V. Polarstern during the Multi-disciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC) expedition from October 2019 to September 2020. The columns include:

- **Date:** Date/Timestamp in ISO 8601 format.
- **lat:** Latitude in degrees north.
- **lon:** Longitude in degrees east.
- **O3_ppb:** Minute-averaged ambient air mixing ratio (raw values).
- **O3_ppb_despiked:** Despiked minute-averaged ambient air mixing ratios. Pollution spikes due to the ship exhaust or other ongoing activities (e.g., use of skidoos) were removed using function `despike` from R package `oce`. Briefly, the function first linearly interpolates across any gaps (missing values). Then, it calculates a running median spanning `k` elements. The result of these two steps is the “reference” time-series. The standard deviation of the difference between data points and the reference is calculated. Any values that differ from the reference by more than `n` times this standard deviation are considered to be spikes. The spike values are replaced by NA (missing value). The function was applied twice using different `k` values (`k = 1439` (~ 1 day) and `k = 61` (~1 hour)). `n = 3` was used.
- **flag:** While the `despike` function is useful to remove pollution spikes, it is not designed to detect and discard data associated with pollution events lasting several hours or days.
 - `non polluted` indicates that measurements were performed in clean air conditions (i.e., wind direction within +/- 120 degrees from the bow crane - see Fig.1).
 - `potentially polluted` indicates that measurements were not performed in clean air conditions and are *potentially* impacted by the ship exhaust.
- **O3_ppb_despiked_adjusted:** Adjusted mixing ratios after cross-calibration against the instrument located in the Atmospheric Radiation Measurement (ARM) container.

Sampling location

Data collected from October 2019 to September 2020 onboard icebreaker Polarstern during the (MOSAiC) expedition. Measurements were performed from the University of Colorado (CU) container, located below deck in the forward cargo hold. Sampling lines were deployed from the container to the bow crane to allow measurements forward of the vessel (see Fig.1).

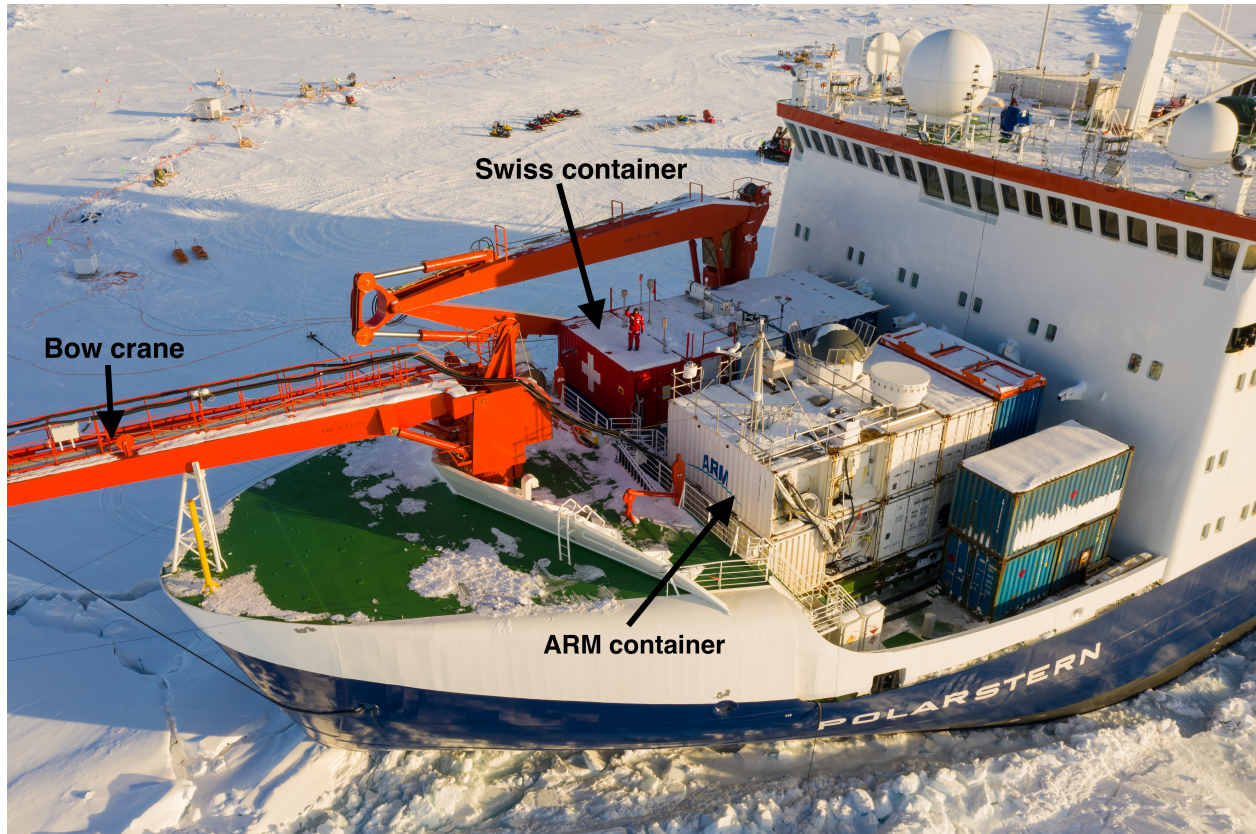


Figure 1: Location of the sea-laboratory containers and bow crane on icebreaker Polarstern. Photo credits: Julia Schmale.