Name: SOP for vessel:sonne:smb_sonne:sbe_45_0619 (7526)
Version: 1.0
Valid from: 2022-10-06
Status: This is a **public version**. Certain sensitive information, such as server names, addresses, and exact paths and storage locations that is not meant for others than AWI associates was removed in that document.

Changelog:

1. 2022-10-06
    - initial publication

1. Contacts/Responsible Persons

Name: Michael Schlundt
Affiliation: GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel
Email: mschlundt@geomar.de
ORCID: https://orcid.org/0000-0003-4462-8230

Name: Barbara Glemser
Affiliation: GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel
Email: bglemser@geomar.de
ORCID: https://orcid.org/0000-0002-5747-0244

2. Purpose & Scope

Description: This SOP describes device configuration, parameter characteristics, transmission and processing of its output, ingest procedure, storage, data access possibilities, and publishing. Intended user groups are device owners, technicians, and data managers.
Comment: This item is managed and processed by the Deutsche Allianz Meeresforschung (German Marine Research Alliance), please see www.allianz-meeresforschung.de for further information.

3. Item Description

Short Name: SBE_45_0619
Long Name: SBE 45 Micro thermosalinograph
URN: vessel:sonne:smb_sonne:sbe_45_0619
ID: 7526
UUID: 5e6db750-c641-48b1-a260-9615b47dd887
Description: Thermosalinograph for measurement of temperature and conductivity from underway vessels. Integrates with the optional remote temperature sensor SBE 38.
Serial No.: 0619
Manufacturer: Sea-Bird Scientific
PID/Handle: https://hdl.handle.net/10013/sensor.63f8b2cb-ccf3-4586-9f3d-17332353eeee

4. Parameter Description

Short Name: conductivity
Long Name: conductivity
full URN: vessel:sonne:smb_sonne:sbe_45_0619:conductivity
ID: 87864
UUID: d91586fd-f1bf-4e52-a9f1-a2b6fd740ef7
Type: conductivity
Unit: S/m
Comment:
Measurement Properties: none

Short Name: salinity
Long Name: salinity
full URN: vessel:sonne:smb_sonne:sbe_45_0619:salinity
ID: 87865
UUID: 490ed145-7029-4466-82a7-8f7664eed7a7
Type: salinity
Unit: PSU
Comment:
Measurement Properties: none

Short Name: water_temperature
Long Name: internal water temperature
full URN: vessel:sonne:smb_sonne:sbe_45_0619:water_temperature
ID: 87866
UUID: 6ab885be-7c75-4ac8-aa2a-ceecf71c16d4
Type: water temperature
Unit: °C
Comment:
Measurement Properties: none

Short Name: sound_velocity
Long Name: internal sound velocity
full URN: vessel:sonne:smb_sonne:sbe_45_0619:sound_velocity
ID: 87867
UUID: 36ae9a1e-2e65-4211-8a53-3e1ef5c23949
Type: sound velocity
Unit: m/s
Comment:
Measurement Properties: none

---

5. Processing

This instrument measures temperature and electrical conductivity of sea water. Using those two properties salinity (and additionally sound velocity) are estimated (Sea-Bird Electronics 2020b). Usually, an additional temperature sensor SBE38 (Sea-Bird Electronics 2020a) is related to the SBE45. All data are stored through the data management system DAVIS-SHIP (DSHIP). After the cruise all data are transfered to the DSHIP land system. From there data are obtained for further evaluation.

5.1. Acquisition

The SBE45 is installed within the Self-cleaning Monitoring Box (SMB) in the Reinseewasserlabor (Bergmann 2022). The SMB is directly flushed with sea water through the two deep inlets in about 4m depth. At the two inlets the two aditional SBE38 temperature sensors are installed.

Auxiliary Files:

Name: *"Sonne" research vessel manual*
Type: Manual
Description: General overview on the research vessel Sonne with detailed information on onboard scientific devices
URL: https://attachment.rrz.uni-hamburg.de/882d41d5/SO-Handbuch.pdf
Last Modification: Jan. 2022

Name: *SBE45 MicroTSG Thermosalinograph*
Type: Manual
Description: User manual of SBE45 MicroTSG Thermosalinograph
URL: https://www.seabird.com/asset-get.download.jsa?id=54627862504
Last Modification: 2020

Name: *SBE38 Digital Oceanographic Thermometer*
Type: Manual
Description: User manual of SBE38 Digital Oceanographic Thermometer
URL: https://www.seabird.com/asset-get.download.jsa?id=54627862501
Last Modification: 2020

5.2. Extraction

Data are extracted from the DSHIP land system at BSH (dship.bsh.de). The data are stored per cruise and extracted likewise. Together with accompanying system parameters like latitude, longitude, ships speed, and flow rate through the system, all relevant SBE45 parameters are extracted in one-second resolution. Output of the extraction is the usual DSHIP export, consisting of a folder with three files, (1) a *.dat ASCII-data file, (2) a *.xml order-file and (3) a *.sys log-file.

Auxiliary Files: none

5.3. Conversion

The aforementioned DSHIP-Export is processed with Python with the following steps: (1) parsing of the data file with the output of a Geodataframe using the time as index, (2) checking for dummy-values, (3) comparison of position data against Mastertrack, (4) checking whether position data are in an EEZ, (5) averaging into one-minute

means, (6) several quality tests (global range test, spike test, gradient test, test of adjacent values, flow speed test), and (if applicable) (7) calibration of temperature and salinity data with independent data (direct samples or CTD data from inlet depth).

Software: -

Network Share Name: - ← *public version, input cropped*

Filename Convention: -

-

Auxiliary Files:

Name: -

Type: -

Description: -

URL: -

Last Modification: -

6. Ingest

Ingest is part of the O2A process chain (Koppe et al. 2015, Gerchow et al. 2017) and is the starting point to collect, store, and redistribute data and metadata.

There is no automated data transfer available for this workflow. All data must be retrieved manually from BSH.

Protocol: MDM

Project path: *public version, input removed*

Campaign Data: yes

Filename Convention: per campaign

Expected Data Interval: per campaign

Ingest Data Interval: per campaign

Mapping: -

Save Directory: -

json/xml:

Script: -

Script call:

Repository: -

7. Storage

7.1. Raw Data

Location *public version, input cropped*

Backup Policy: does not apply

7.2. Near Real-Time Data

Info: no NRT for this workflow

Service: link to near real-time data service

7.3. Publications and further Reading

Publication: Schlundt 2022, Brix et al. 2022, Brix et al. 2021, Berndt and Schlundt 2021, Beck and Schlundt 2022
Further Reading: This device and workflow is part of DAM, please check https://www.allianz-meeresforschung.de/ for further information.

References

Beck, Aaron and Michael Schlundt (July 2022). "Continuous thermosalinograph oceanography along RV SONNE cruise SO279". en. In: DOI: 10.1594/PANGAEA.946377. URL: https://doi.pangaea.de/10.1594/PANGAEA.946377 (visited on 09/21/2022).

Bergmann, Klaus (Jan. 2022). *"Sonne" research vessel manual*. en. URL: https://attachment.rrz.uni-hamburg.de/882d41d5/SO-Handbuch.pdf (visited on 11/25/2022).

Berndt, Christian and Michael Schlundt (Feb. 2021). "Continuous thermosalinograph oceanography along RV SONNE cruise SO277". en. In: DOI: 10.1594/PANGAEA.928567. URL: https://doi.pangaea.de/10.1594/PANGAEA.928567 (visited on 09/21/2022).

Brix, Saskia, Michael Schlundt, Simon Tewes, and James Taylor (Nov. 2021). "Continuous thermosalinograph oceanography along RV Sonne cruise SO280". en. In: DOI: 10.1594/PANGAEA.938476. URL: https://doi.pangaea.de/10.1594/PANGAEA.938476 (visited on 09/21/2022).

Brix, Saskia, Michael Schlundt, Simon Tewes, and James Taylor (May 2022). "Continuous thermosalinograph oceanography along RV SONNE cruise SO276". en. In: DOI: 10.1594/PANGAEA.943865. URL: https://doi.pangaea.de/10.1594/PANGAEA.943865 (visited on 09/21/2022).

Gerchow, Peter, Roland Koppe, Ana Macario, Antonie Haas, Christian Schäfer-Neth, Hans Pfeiffenberger, and Angela Schäfer (Nov. 2017). "O2A - Data Flow Framework from Sensor Observations to Archives". In: *EPIC3 Digital Infrastructures for Research 2017, Brussels, 2017-11-30-2017-12-01Brusseles, DI4R 2017 conference*. Brusseles: DI4R 2017 conference. URL: https://indico.egi.eu/indico/event/3455/session/1/contribution/114/material/slides/1.pdf (visited on 01/21/2020).

Koppe, Roland, Peter Gerchow, Ana Macario, Antonie Haas, Christian Schäfer-Neth, and Hans Pfeiffenberger (June 2015). "O2A: A Generic Framework for Enabling the Flow of Sensor Observations to Archives and Publications". In: *OCEANS 2015 Genova*. DOI: 10.1109/OCEANS-Genova.2015.7271657. URL: https://epic.awi.de/id/eprint/38295/.

Schlundt, Michael (May 2022). "Continuous thermosalinograph oceanography along RV SONNE cruise SO278". en. In: DOI: 10.1594/PANGAEA.943794. URL: https://doi.pangaea.de/10.1594/PANGAEA.943794 (visited on 09/21/2022).

Sea-Bird Electronics (2020a). *SBE38 Digital Oceanographic Thermometer*. URL: https://www.seabird.com/asset-get.download.jsa?id=54627862501 (visited on 11/22/2022).

Sea-Bird Electronics (2020b). *SBE45 MicroTSG Thermosalinograph*. URL: https://www.seabird.com/asset-get.download.jsa?id=54627862504 (visited on 11/22/2022).