

Name: SOP for vessel:meteor:tsg_meteor:sbe_21_3413 (7487)

Version: 1.0

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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. 2023-01-12

- 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_21_3413

Long Name: SBE 21 Thermosalinograph

URN: vessel:meteor:tsg_meteor:sbe_21_3413

ID: 7487

UUID: fd280dda-1a2f-4d9f-b7c0-6681924d9d78

Description: Thermosalinograph for measurement of temperature and conductivity from underway vessels. Integrates with the optional remote temperature sensor SBE 38.

Serial No.: 3413

Manufacturer: Sea-Bird Scientific

PID/Handle: <https://hdl.handle.net/10013/sensor.5f1aabfa-b97b-4623-8fce-a6116305167d>

4. Parameter Description

Short Name: conductivity

Long Name: conductivity

45 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:conductivity

ID: 87802

UUID: 163ce931-7c60-4871-a8d3-b1d6c9500e35

Type: conductivity

Unit: S/m

50 **Comment:**

Measurement Properties: none

Short Name: rt

Long Name: Rt

55 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:rt

ID: 87803

UUID: 7a2b7e5f-cc7a-4724-9150-49af62d4bfb7

Type: factor

Unit: none

60 **Comment:**

Measurement Properties: none

Short Name: salinity

Long Name: salinity

65 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:salinity

ID: 87804

UUID: 3dd342cd-d7b9-48cd-bda4-cb6d1456ebc8

Type: salinity

Unit: PSU

70 **Comment:**

Measurement Properties: none

Short Name: sound_velocity_external

Long Name: external sound velocity

75 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:sound_velocity_external

ID: 87805

UUID: 7d245a02-aa13-4fb2-b45d-4d357c828b85

Type: sound velocity

Unit: m/s

80 **Comment:**

Measurement Properties: none

Short Name: water_temperature

Long Name: internal water temperature

85 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:water_temperature

ID: 87806

UUID: 78e1a50c-69cb-4ef4-b235-9ff700ebae37

Type: water temperature

Unit: °C

90 **Comment:**

Measurement Properties: none

Short Name: voltage_1

Long Name: first voltage

95 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:voltage_1

ID: 87807

UUID: e91a4213-cf73-443f-92e3-aaac764b44ef

Type: voltage

Unit: V

100 **Comment:**

Measurement Properties: none

Short Name: sound_velocity_internal

Long Name: internal sound velocity

105 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:sound_velocity_internal

ID: 87808

UUID: 0ca5154a-1655-4624-a3ee-2671c2a47f18

Type: sound velocity

Unit: m/s

110 **Comment:**

Measurement Properties: none

Short Name: voltage_2

Long Name: second voltage

115 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:voltage_2

ID: 87809

UUID: 6eb36efa-b877-4947-9685-4e1f77739d68

Type: voltage

Unit: V

120 **Comment:**

Measurement Properties: none

Short Name: density

Long Name: density

125 **full URN:** vessel:meteor:tsg_meteor:sbe_21_3413:density

ID: 87810

UUID: af320fb8-8018-42f7-b098-c08ef6ef0e31

Type: density

Unit: kg/m3

130 **Comment:**

Measurement Properties: none

5. Processing

135 This instrument measures temperature and electrical conductivity of sea water. Using those two properties salinity (and additionally sound velocity) are estimated (Sea-Bird Electronics 2015). Usually, an additional temperature sensor SBE38 (Sea-Bird Electronics 2020) is related to the SBE21. All data are stored through the data management system DAVIS-SHIP (DSHIP). After the cruise all data are transferred to the DSHIP land system. From there data are obtained for further evaluation.

140 5.1. Acquisition

The SBE21 is installed within the Bodenmessraum (Bergmann 2021). The SBE21 is directly flushed with sea water through the two deep inlets in about 5m depth. At the two inlets the two additional SBE38 temperature sensors are installed.

Auxiliary Files:

145 **Name:** *"Meteor" Bordhandbuch für Expeditionsteilnehmer*

Type: Manual

Description: General overview on the research vessel Meteor with detailed information on onboard scientific devices

URL: <https://fiona.uni-hamburg.de/d1574276/meteorhandbuch.pdf>

Last Modification: Jan. 2021

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Name: *SBE21 SeaCAT Thermosalinograph*

Type: Manual

Description: User manual of SBE45 MicroTSG Thermosalinograph

URL: <https://www.seabird.com/asset-get.download.jsa?id=54627862330>

155 **Last Modification:** 2015

Name: *SBE38 Digital Oceanographic Thermometer*

Type: Manual

Description: User manual of SBE38 Digital Oceanographic Thermometer

160 **URL:** <https://www.seabird.com/asset-get.download.jsa?id=54627862501>

Last Modification: 2020

5.2. Extraction

165 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.

170 **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
175 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: -

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

Filename Convention: -

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Auxiliary Files:

Name: -

185 **Type:** -

Description: -

URL: -

Last Modification: -

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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.

195 **Protocol:** MDM

Project path: *public version, input removed*

Campaign Data: yes

Filename Convention: per campaign

Expected Data Interval: per campaign

200 **Ingest Data Interval:** per campaign

Mapping: -

Save Directory: -

json/xml:

Script: -

205 **Script call:**

Repository: -

7. Storage

7.1. Raw Data

210 **Location** *public version, input cropped*

Backup Policy: does not apply

7.2. Near Real-Time Data

Info: no NRT for this workflow

215 **Service:** [link to near real-time data service](#)

7.3. Publications and further Reading

Publication: Wollschläger and Schlundt 2022, Menapace and Schlundt 2021, Koschinsky and Schlundt 2021, Hübscher and Schlundt 2022, Hansteen and Schlundt 2022, Grevemeyer and Schlundt 2022, Geldmacher and Schlundt 2022, Dürkefälden and Schlundt 2021, Achterberg and Schlundt 2022

Further Reading: This device and workflow is part of DAM, please check <https://www.allianz-meeresforschung.de/> for further information.

References

- Achterberg, Eric Pieter and Michael Schlundt (July 2022). "Continuous thermosalinograph oceanography along RV METEOR cruise M176/2". en. In: DOI: 10.1594/PANGAEA.946388. URL: <https://doi.pangaea.de/10.1594/PANGAEA.946388> (visited on 09/21/2022).
- Bergmann, Klaus (Jan. 2021). "*Meteor*" Bordhandbuch für Expeditionsteilnehmer. ger. URL: <https://fiona.uni-hamburg.de/d1574276/meteorhandbuch.pdf> (visited on 11/17/2022).
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- 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).
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- Hübscher, Christian and Michael Schlundt (July 2022). "Continuous thermosalinograph oceanography along RV METEOR cruise M177". en. In: URL: <https://doi.pangaea.de/10.1594/PANGAEA.946412> (visited on 09/21/2022).
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- Koschinsky, Andrea and Michael Schlundt (Nov. 2021). "Continuous thermosalinograph oceanography along RV Meteor cruise M169". en. In: DOI: 10.1594/PANGAEA.938474. URL: <https://doi.pangaea.de/10.1594/PANGAEA.938474> (visited on 09/21/2022).
- Menapace, Walter and Michael Schlundt (May 2021). "Continuous thermosalinograph oceanography along RV METEOR cruise M167". en. In: DOI: 10.1594/PANGAEA.931406. URL: <https://doi.pangaea.de/10.1594/PANGAEA.931406> (visited on 09/21/2022).
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