

**Name:** SOP for vessel:meteor:tsg\_meteor:sbe\_21\_3313 (7483)

**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. 2023-01-12

- initial publication

## 1. Contacts/Responsible Persons

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## 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](http://www.allianz-meeresforschung.de) for further information.

## 3. Item Description

**Short Name:** SBE\_21\_3313

**Long Name:** SBE 21 Thermosalinograph

**URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313

**ID:** 7483

**UUID:** 59113e0f-b9e7-48fd-b18b-316676949459

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

**Serial No.:** 3313

**Manufacturer:** Sea-Bird Scientific

**PID/Handle:** <https://hdl.handle.net/10013/sensor.8f6c218c-c511-4587-9fdd-24fb01aad848>

#### 4. Parameter Description

**Short Name:** conductivity

**Long Name:** conductivity

45 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:conductivity

**ID:** 87765

**UUID:** 14f70363-7f28-4b97-b453-b0031734f5b6

**Type:** conductivity

**Unit:** S/m

50 **Comment:**

**Measurement Properties:** none

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**Short Name:** rt

**Long Name:** Rt

55 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:rt

**ID:** 87766

**UUID:** 6c57e824-7d1f-475e-959b-881ce15dcaa7

**Type:** factor

**Unit:** none

60 **Comment:**

**Measurement Properties:** none

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**Short Name:** salinity

**Long Name:** salinity

65 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:salinity

**ID:** 87767

**UUID:** b0ff523a-71be-4469-8fea-b9c2e843ca47

**Type:** salinity

**Unit:** PSU

70 **Comment:**

**Measurement Properties:** none

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**Short Name:** water\_temperature

**Long Name:** internal water temperature

75 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:water\_temperature

**ID:** 87768

**UUID:** 9e92bdcf-c426-4cd4-b235-de65dd5493a5

**Type:** water temperature

**Unit:** °C

80 **Comment:**

**Measurement Properties:** none

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**Short Name:** sound\_velocity\_internal

**Long Name:** internal sound velocity

85 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:sound\_velocity\_internal

**ID:** 87770

**UUID:** 18393768-da8f-4001-aefb-abe4f963df28

**Type:** sound velocity

**Unit:** m/s

90 **Comment:**

**Measurement Properties:** none

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**Short Name:** sound\_velocity\_external

**Long Name:** external sound velocity

95 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:sound\_velocity\_external

**ID:** 87771

**UUID:** e8f07bcc-d18b-47dc-ab54-b5c51b82731b

**Type:** sound velocity

**Unit:** m/s

100 **Comment:**

**Measurement Properties:** none

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**Short Name:** density

**Long Name:** density

105 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:density

**ID:** 87772

**UUID:** 518b6d65-6888-4966-bb53-5d79ceb60828

**Type:** density

**Unit:** kg/m3

110 **Comment:**

**Measurement Properties:** none

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**Short Name:** voltage\_1

**Long Name:** first voltage

115 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:voltage\_1

**ID:** 87773

**UUID:** 8ec9312d-b951-4731-8075-da697d04571f

**Type:** voltage

**Unit:** V

120 **Comment:**

**Measurement Properties:** none

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**Short Name:** voltage\_2

**Long Name:** second voltage

125 **full URN:** vessel:meteor:tsg\_meteor:sbe\_21\_3313:voltage\_2

**ID:** 87774

**UUID:** 0005aabc-3519-489d-b87b-8a41889c3288

**Type:** voltage

**Unit:** V

130 **Comment:**

**Measurement Properties:** none

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## 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).
- Dürkefälden, Antje and Michael Schlundt (Mar. 2021). "Continuous thermosalinograph oceanography along RV METEOR cruise M168". en. In: DOI: 10.1594/PANGAEA.928768. URL: <https://doi.pangaea.de/10.1594/PANGAEA.928768> (visited on 09/21/2022).
- Geldmacher, Jörg and Michael Schlundt (June 2022). "Continuous thermosalinograph oceanography along RV METEOR cruise M176". en. In: URL: <https://doi.pangaea.de/10.1594/PANGAEA.945706> (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*. Brussels: DI4R 2017 conference. URL: <https://indico.egi.eu/indico/event/3455/session/1/contribution/114/material/slides/1.pdf> (visited on 01/21/2020).
- Grevemeyer, Ingo and Michael Schlundt (Feb. 2022). "Continuous thermosalinograph oceanography along RV METEOR cruise M170". en. In: DOI: 10.1594/PANGAEA.940645. URL: <https://doi.pangaea.de/10.1594/PANGAEA.940645> (visited on 09/21/2022).
- Hansteen, Thor H. and Michael Schlundt (Jan. 2022). "Continuous thermosalinograph oceanography along RV METEOR cruise M175". en. In: DOI: 10.1594/PANGAEA.940367. URL: <https://doi.pangaea.de/10.1594/PANGAEA.940367> (visited on 09/21/2022).
- 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).
- 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/>.
- 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).
- Sea-Bird Electronics (2015). *SBE21 SeaCAT Thermosalinograph*. URL: <https://www.seabird.com/asset-get.download.jsa?id=54627862330> (visited on 11/22/2022).

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Wollschläger, Jochen and Michael Schlundt (Sept. 2022). "Continuous thermosalinograph oceanography along RV METEOR cruise M179/1". en. In: URL: <https://doi.pangaea.de/10.1594/PANGAEA.948559> (visited on 09/21/2022).

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