

tt-meteo Interface

Replacement of “meteo” of the SAI MASS/DIMM software

Specification of an OpenTPL based interface to inject meteo data

Version 1.2

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1 Preface

This document describes a high level interface for providing meteo data for the SAI MASS/DIMM software. For the communication the OpenTPL protocol is used (refer to [1] for protocol specifications).

2 Basics

2.1 Conventions in this document

This manual uses the **typewriter font** whenever OpenTPL protocol text is shown. Text that is enclosed in `<...>` stands as a placeholder. So `VARIABLE=<value>[,<value>[,...]]` means that some real values and not the string `<value>` is expected by the server. Sometimes parameters are optional. This is shown as in the previous example by putting the text in `[...]`. If these brackets are used in the OpenTPL protocol itself, they will be typeset as `<...>` and `[...]`.

In the sections that describe the OpenTSL modules and variables, tables will be used with the following columns:

Name the OpenTPL module/variable name. For the full OpenTPL path, the prefix from the section caption needs to be added. For instance, if a variable `VAR` is discussed in the section describing the `HARDWARE.MONITOR` submodule, the OpenTPL path of this variable is `HARDWARE.MONITOR.VAR`.

T The data type of the OpenTPL variable. Valid types can be found in [1].

R The standard read level of the OpenTPL variable. While it is not recommended to do so, it is of course possible to adapt the individual levels of the different variables to specific needs. Therefore, clients should not be designed in a way that they expect the here documented levels, but either check the real levels or correctly cope with a `DENIED` error. Refer to [1] for an explanation of the read (and write) levels.

W The standard write level of the OpenTPL variable. The same comments as for the read level hold here as well.

Description The detailed explanation of the functionality behind the variable.

3 List of modules

The following modules are specified by the current version of the tt-meteo interface:

Name	Function
WEATHER	Provide ambient weather data (see section 4)
SKY	Provide sky sensor data (see section 5)

3.1 Common module variables

Every module must have at least the following variable, which will not be listed in the detailed module description sections:

Name	T	R	W	Description
VERSION	i		-1	<p>Interface version (I), interface age (A) and revision number (R), coded as 0xIIIIAARR ($\neq 0$ if the module exists, $= 0$ if it does not):</p> <ul style="list-style-type: none"> The interface version will be increased whenever variables are added or removed. The latest tt-meteo interface version is 0x0010 which corresponds to version 1.0. This number must be the same for all available modules on a single server. The interface age allows clients to check if the discovered interface version can be used even if the interface version is different from the expected version. The age is computed as maximum supported interface version minus minimum supported version. <i>Example:</i> interface version is 3 but all variables of version 2 are still in place to stay compatible with old clients. Therefore the age equals $3 - 2 = 1$. The revision number indicates the code revision. In general: the higher, the better, fewer bugs etc.

3.2 Command execution times

When reading from variables, values will be returned immediately (e.g. the typical callback run time is in the order of 1 ms). This also applies to writing variables as there is not action triggered.

3.3 Permissions

tt-meteo allows read access to all variables for any user (regardless of its RLEVEL). Writing to variables has however been restricted. The following table gives an overview of the functional groups accessible for a certain WLEVEL.

WLEVEL	Access rights
10	Access to WEATHER and SKY to allow writing meteo data.
0	Admin user, allowed to access the management interface of the OpenTPL server (SERVER module).

4 The WEATHER module

This module contains variables to provide weather data.

Name	T	R	W	Description
TEMP_AMB	f		10	Ambient temperature [°C]
WIND	f		10	Wind speed [m/s]
WIND_DIR	f		10	Wind direction [°] (currently unused)
RH	f		10	Relative humidity [%]
TEMP_DEW	f		10	Dew point temperature [°C] (currently unused)

Name	T	R	W	Description
PRESSURE	f		10	Air pressure on site [mBar]
RAIN	i		10	Current rain status. Possible values are: 0 Dry (no precipitation) 1 Rain/snow (precipitation)

5 The SKY module

This module contains variables to provide sky sensor data.

Name	T	R	W	Description
STATUS	i		10	Current sky status. Possible values are: 0 Sky is clear. Observation is possible. 1 Sky is lightly clouded. Observation may not be possible. 2 Sky is cloudy. No observation is possible. 3 It is currently raining/snowing. No observation is possible.
TEMP	f		10	Corrected sky temperature as difference between ambient temperature of the sky sensor and the raw sky temperature [°C]

6 Interaction with SAI MASS/DIMM software

The `ameba` program connects to `tt-meteo` and decides based on the current meteo conditions if observations can be carried out. For some values, the user can configure limits in section Components, subsections `Meteo` and `SkySensor` in the `ameba.cfg` file:

tt-meteo variable	Corresponding ameba configuration
WEATHER.RH	<code>HumHigh</code> and <code>HumLow</code> describe when to stop operation and when to resume after stop. The default values are 97 % and 95 %.
WEATHER.WIND	<code>WindHigh</code> and <code>WindLow</code> describe when to stop operation and when to resume after stop. The default values are 9 m/s and 6.5 m/s.
WEATHER.RAIN	1 (Rain/snow (precipitation)) is handled as if <code>WEATHER.RH</code> is beyond <code>HumHigh</code> .
SKY.STATUS	≥ 2 (cloudy resp. raining/snowing) is handled as if <code>SKY.TEMP</code> is above <code>TempStop</code> .
SKY.TEMP	<code>TempStart</code> , <code>TempStop</code> and <code>TempClose</code> describe when to start and stop operation and when to close the dome. The default values are -20°C , -15°C and -10°C .

6.1 Startup conditions

To start the operation of `ameba`, at least the following values must be updated after starting `tt-meteo`. This is because the startup values have been chosen in a way that will disable operation for safety reasons:

- `WEATHER.RH` must be set lower than `HumLow` (default: 97.0),
- `WEATHER.WIND` must be set lower than `WindLow` (default 9.0),
- `WEATHER.RAIN` must be set to 0,
- `SKY.STATUS` must be set to 0 and
- `SKY.TEMP` must be set lower than `TempStart` (default -20.0).

References

- [1] Michael Ruder, Mario Velten, and Daniel Plasa. *OpenTPL, Open Transfer Protocol Language — A protocol for client-server based exchange of data and commands over a TCP/IP network connection*. tau-tec GmbH, Hintere Grabenstr. 30, 72070 Tübingen, Germany, 2012. `opentpl:spec-en`.