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Manual

How to adjust in-situ locations considered in the sea state module

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1 Introduction

The ***seastate module*** is a MATLAB-Toolbox that provides a real-time overview of the significant wave height in the German Bight based on data from high resolution coastal wave forecast models (Behrens 2025, DWD OpenData) and quality controlled in-situ measurements (BSH - Seegang). The information at the in-situ locations is extracted from the grid-based data and the so-called *scaling factor* is calculated as ratio between the numerical and measuring data. The scaling information is interpolated between the in-situ locations on discretized lines, which serve as the basis for creating an interpolation matrix. However, not all locations are connected with each other; individual connections must be deselected manually. For example, a line between FN3 (NNW) and NOR (SSE) would not make sense, as there are several in-situ sites and the island of Heligoland in between (Figure 1).

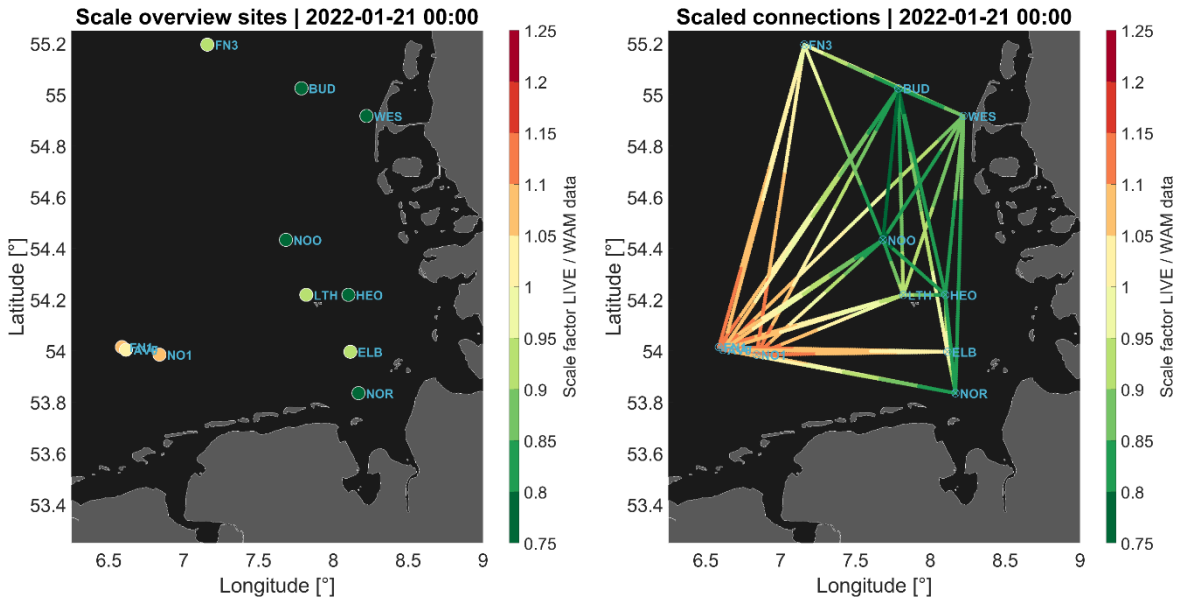


Figure 1 - Scale factors and interpolation lines between in-situ locations

2 Set siteConnections via .xlsx

The overview of all existing in-situ locations with information regarding latitude, longitude, water depth and installed sensors can be found here *...\10_inputFiles\30_siteOverview\siteOverview.xlsx*. This file is mandatory for the tool execution and must be kept up to date.

The file *siteConnections.xlsx*, which is located in the directory *...\10_inputFiles\30_siteOverview*, is used to set the siteConnections. The symmetry matrix shown here (Figure 2) specifies whether an interpolation line should be created between the sites (→ **1**) or not (→ **0**). Only the top-right half needs to be filled in, the rest is completed automatically. Cells that should not be changed are also password-protected. In case of fundamental changes / adjustments, the protection can be removed with the password *orExclude* (not recommended!).

	AV0	BO1	BUD	DBU	ELB	FN1	FN3	HEL	HEO	LTH	NO1	NOO	NOR	WES
AV0	0	1	1	1	1	1	1	1	0	1	1	1	0	0
BO1	1	0	1	1	1	1	1	1	0	1	1	1	0	0
BUD	1	1	0	1	0	1	1	0	0	0	1	1	0	1
DBU	1	1	1	0	0	1	1	1	0	1	1	1	0	0
ELB	1	1	0	0	0	1	0	1	1	0	1	0	1	0
FN1	1	1	1	1	1	0	1	1	0	1	1	1	0	0
FN3	1	1	1	1	0	1	0	0	0	0	1	1	0	0
HEL	1	1	0	1	1	1	0	0	1	1	1	0	0	0
HEO	0	0	0	0	1	0	0	1	0	1	0	1	0	0
LTH	1	1	0	1	0	1	0	1	1	0	1	1	0	0
NO1	1	1	1	1	1	1	1	1	0	1	0	1	0	0
NOO	1	1	1	1	0	1	1	0	1	1	1	0	0	1
NOR	0	0	0	0	1	0	0	0	0	0	0	0	0	0
WES	0	0	1	0	0	0	0	0	0	0	0	1	0	0

Tabelle1

Figure 2 – Setting site connections via symmetry matrix

2.1 How to add a new site?

If you want to add a new in-situ site to be considered in the module, adjustments at three locations are necessary:

- *...\10_inputFiles\30_siteOverview\siteOverview.xlsx*
- *...\10_inputFiles\30_siteOverview\siteConnections.xlsx*
- *...\ 30_execution\seastateInput.bat*

➢ Open *siteOverview.xlsx*, choose a suitable abbreviation for the new location (3 digits) and fill the lat, lon, depth and sensor column. Set 1 = true for available sensors and 0 = false for sensors that are not available at this site.

	A	B	C	D	E	F	G	H
1	name	lat	lon	depth	adcp	dwr	radac	radacSingle
2	AVF	54.004200	6.614430	29.00	0	0	0	0
3	AV0	54.004200	6.614430	29.00	1	0	0	1
4	BUD	55.024667	7.787000	18.00	0	0	1	0
5	BUH	54.788333	8.270000	10.00	0	1	0	0
6	DBU	54.302925	5.786058	38.00	0	0	1	0
7	ELB	53.996500	8.113667	25.00	0	1	0	0
8	FN1	54.014861	6.587639	28.00	1	1	1	0
9	FN3	55.195030	7.158161	22.00	1	1	1	0
10	HEL	54.159667	7.867667	25.00	0	1	0	0
11	HEO	54.218670	8.100570	27.00	0	1	0	0
12	LTH	54.218667	7.819167	25.50	0	1	0	0
13	NO1	53.985167	6.838667	30.00	1	0	1	0
14	WES	54.908170	8.221400	13.00	0	1	0	0
15	NOR	53.835000	8.168056	10.00	0	0	1	0
16	NOO	54.433330	7.683333	25.00	1	0	1	0
17	LAW	53.863300	8.127500	9.39	0	0	0	0
18	SYL	55.011000	8.412500	-24.70	0	0	0	0
19	UFS	54.179600	7.458700	0.00	0	0	0	0
20	BO1	54.356200	5.933600	20.00	0	1	0	0
21								
22								
23								
24								
25								
26								

Figure 3 - siteOverview | Add new row

➢ Open *siteConnections.xlsx*, fill the chosen site abbreviations in first free column (Figure 4 – left), then set the corresponding connections to other sites. Set 1 for creating interpolation lines to this site and 0 for not creating an interpolation line.

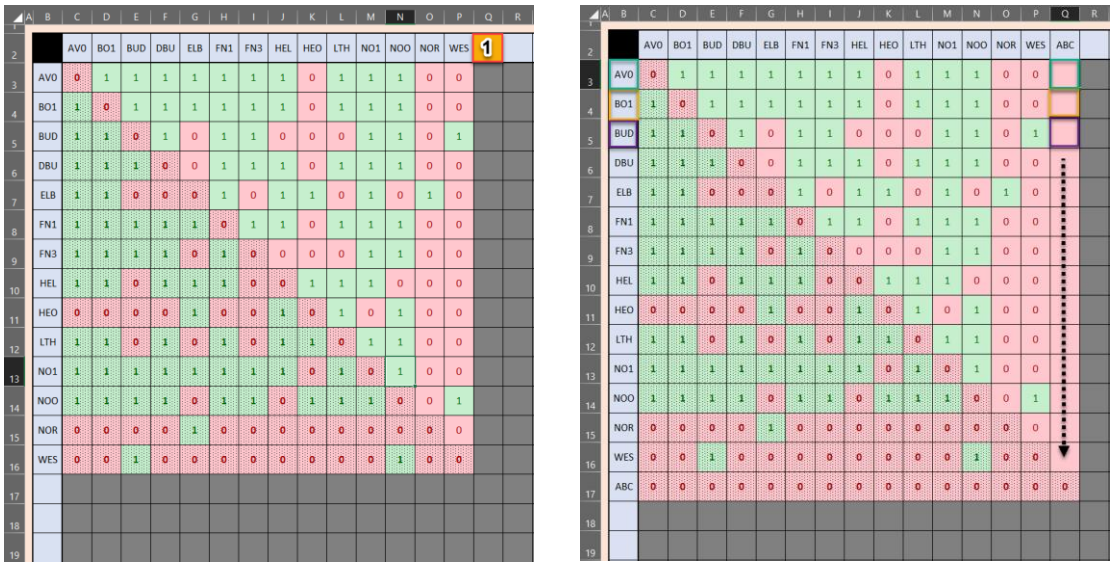


Figure 4 - siteConnection | Add new site

- Open the batch file *seastateInput.bat* and add your site abbreviation as string to the insitu settings. Currently it's the parameter *i1* (Dependent on the version of the module, could be another *i** parameter in future versions).

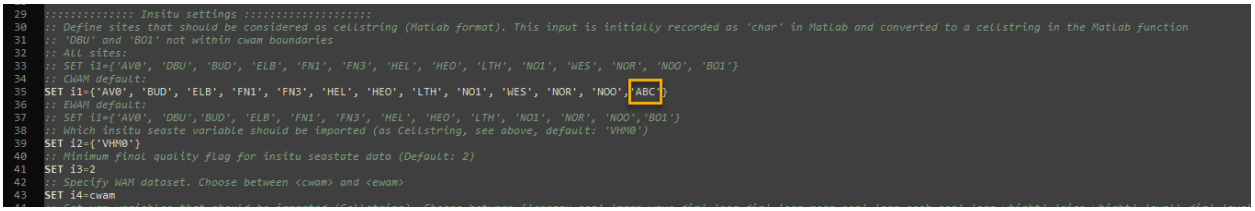


Figure 5 - seastateInput | Add site abbreviation to cell string

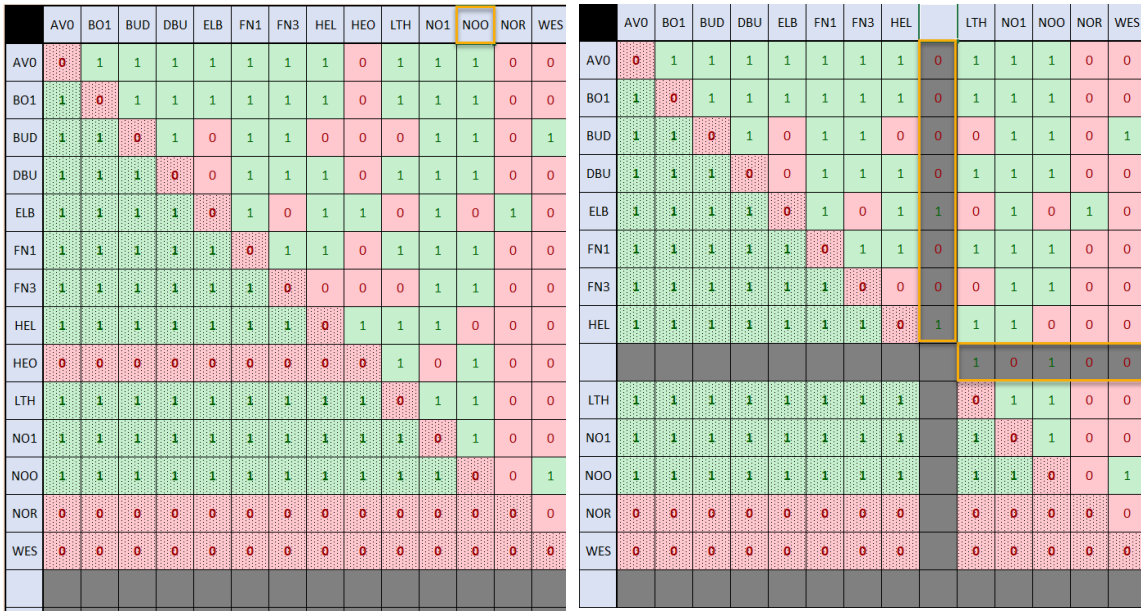
2.2 How to remove a site?

If you want to remove an in-situ site from the module, adjustments at two locations are necessary:

- *...\10_inputFiles\30_siteOverview\siteConnections.xlsx*
- *...\ 30_execution\seastateInput.bat*

It's optional to also remove the site from the *siteOverview.xlsx* file. If you are sure, that the site will never used again for sensor deployment, you can also remove the corresponding row from this file.

➢ Open *siteConnections.xlsx* and remove the corresponding site abbreviation in Row 2. The abbreviation and connection values will be removed automatically in the bottom-left part of the matrix (Figure 6 – left). Next, you have to remove the defined sit connections in the top-right part of the matrix manually (Figure 6 – right)



	AV0	BO1	BUD	DBU	ELB	FN1	FN3	HEL	HEO	LTH	NO1	NOO	NOR	WES
AV0	0	1	1	1	1	1	1	1	0	1	1	1	0	0
BO1	1	0	1	1	1	1	1	1	0	1	1	1	0	0
BUD	1	1	0	1	0	1	1	0	0	0	1	1	0	1
DBU	1	1	1	0	0	1	1	1	0	1	1	1	0	0
ELB	1	1	1	1	0	1	0	1	1	0	1	0	1	0
FN1	1	1	1	1	1	0	1	1	0	1	1	1	0	0
FN3	1	1	1	1	1	1	0	0	0	0	1	1	0	0
HEL	1	1	1	1	1	1	1	0	1	1	1	0	0	0
HEO	0	0	0	0	0	0	0	0	0	1	0	1	0	0
LTH	1	1	1	1	1	1	1	1	1	0	1	1	0	0
NO1	1	1	1	1	1	1	1	1	1	1	0	1	0	0
NOO	1	1	1	1	1	1	1	1	1	1	1	0	0	1
NOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WES	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	AV0	BO1	BUD	DBU	ELB	FN1	FN3	HEL		LTH	NO1	NOO	NOR	WES
AV0	0	1	1	1	1	1	1	1	0	1	1	1	0	0
BO1	1	0	1	1	1	1	1	1	0	1	1	1	0	0
BUD	1	1	0	1	0	1	1	0	0	0	1	1	0	1
DBU	1	1	1	0	0	1	1	1	0	1	1	1	0	0
ELB	1	1	1	1	0	1	0	1	1	0	1	0	1	0
FN1	1	1	1	1	1	0	1	1	0	1	1	1	0	0
FN3	1	1	1	1	1	1	0	0	0	0	1	1	0	0
HEL	1	1	1	1	1	1	1	0	1	1	1	0	0	0
										1	0	1	0	0
LTH	1	1	1	1	1	1	1	1		0	1	1	0	0
NO1	1	1	1	1	1	1	1	1		1	0	1	0	0
NOO	1	1	1	1	1	1	1	1		1	1	0	0	1
NOR	0	0	0	0	0	0	0	0		0	0	0	0	0
WES	0	0	0	0	0	0	0	0		0	0	0	0	0

Figure 6 - siteConnection | Remove site

➢ Open the batch file *seastateInput.bat* and remove your site abbreviation from the in-situ parameter *i1* (Dependent on the version of the module, could be another *i** parameter in future versions).

```
29  :::::::::::::: Insitu settings ::::::::::::::::::::
30  :: Define sites that should be considered as cellstring (Matlab format). This input is initially recorded as 'char' in Matlab and converted to a cellstring in the Matlab function
31  :: 'DBU' and 'BO1' not within cwam boundaries
32  :: ALL sites:
33  :: SET i1={'AV0', 'DBU','BUD', 'ELB', 'FN1', 'FN3', 'HEL', 'HEO', 'LTH', 'NO1', 'WES', 'NOR', 'NOO','BO1'}
34  :: CWAM default:
35  SET i1={'AV0', 'BUD', 'ELB', 'FN1', 'FN3', 'HEO', 'LTH', 'NO1', 'NOR', 'NOO'}
36  :: EWAM default:
37  :: SET i1={'AV0', 'DBU','BUD', 'ELB', 'FN1', 'FN3', 'HEL', 'HEO', 'LTH', 'NO1', 'NOR', 'NOO','BO1'}
38  :: Which insitu seaste variable should be imported (as Cellstring, see above, default: 'VHM0')
39  SET i2={'VHM0'}
40  :: Minimum final quality flag for insitu seastate data (Default: 2)
41  SET i3=2
```

Figure 7 - seastateInput | Remove site abbreviation from cell string

2.3 How to change available sensors at a site?

If the available sensors at a location change (e.g. no dwr available anymore, but a new radac system installed), just change the Boolean values in the corresponding columns in the file *...\10_inputFiles\30_siteOverview\siteOverview.xlsx.*