



U.S.ARMY



RECENT ADVANCEMENTS IN THE SMS GUI FOR THE CMS AND TECHNOLOGY TRANSFER COASTAL MODELING SYSTEM WU

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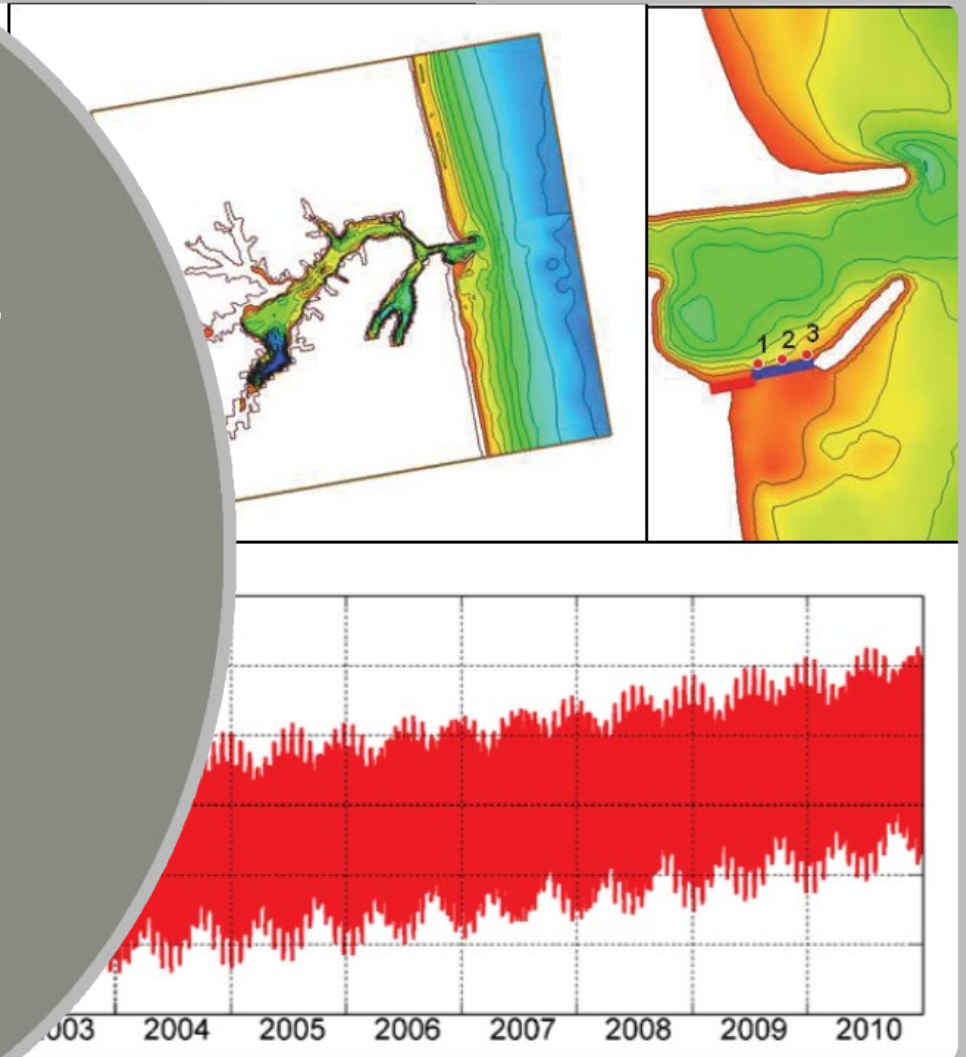
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BLUF

This work is needed to incorporate features added to the CMS over the last few years into a user-friendly interface (SMS 13.0 and SMS 13.1).

- CMS internal Dredge Module allows users to simulate a period of time during which areas were dredged and that material was placed using pre-defined locations and scheduling.
- Task order with Aquaveo to add capability to SMS 13.1 to make it easier to develop sediment management alternatives for future projects through use of a Mass Balance tool. Previously, meticulous effort went into defining the mining and placement zones for each grid.

The two tasks above have been designed to be consistent and well complement each other.

- Ongoing interface development for four structure types (Weirs, Rubble Mound jetties, Culverts, & Tide Gates) added to CMS and CHETNs published in 2013. User had much bookkeeping to do for each type.

New interfaces will have drop-down selections for options and will enforce range of values for parameters.

- Menus added to SMS 13.0 for implementation of Sea-level change for projects. Curve or constant value gets applied to off-shore forcing.

FY19 – Implementation of Dredge Module interface into SMS 13.0



Two simple dialogs to define parameters, zone selection, and schedule for removal and placement of material.

Sediment is removed and placed according to a set schedule or based on depth/volume threshold as defined by the user.

☒ Enable Dredge Module

Name:
CapitolDredge

Dredging Update Interval (Explicit schedule only):
0.0

Dredge Dataset:
 DredgeArea

Dredge Method:
Specified Cell
Note: A dredging starting point is defined by a specified cell ID and progresses to cells farther away from the starting point.
5292 Enter Cell ID for starting cell

Dredge Rate:
10000.0
m³/day

Trigger:
Method:
Depth
Note: Dredging is triggered when the depth of a cell in the source area exceeds a depth threshold.
6.0 Enter depth beyond which dredging begins.
m

☒ Define Placement Area 1

Placement Area 1:
Placement Dataset:
 PlacementArea

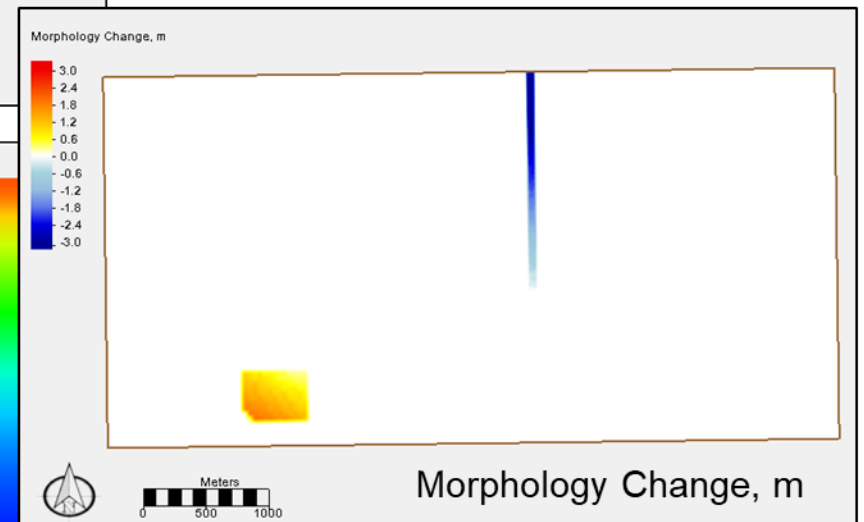
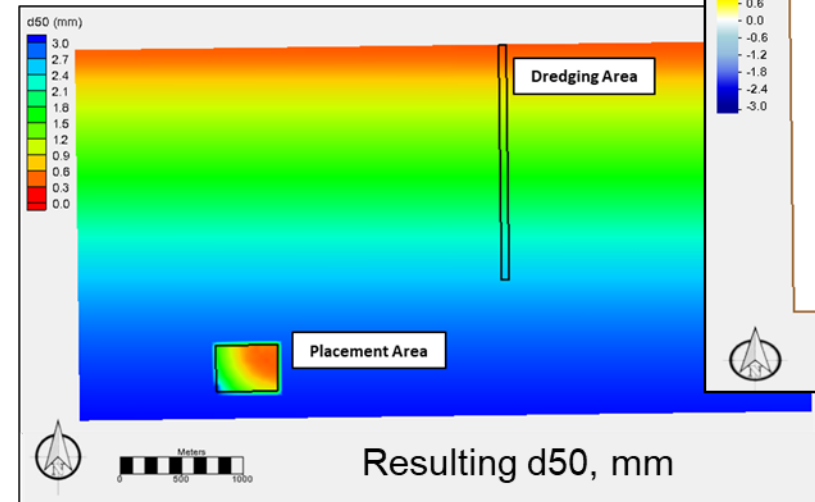
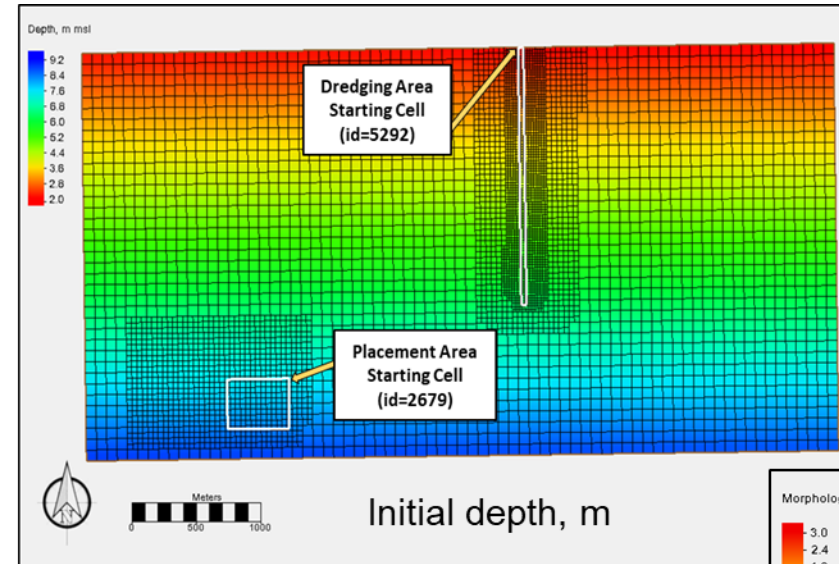
Placement Method:
Specified Cell
Note: The dredge material is placed starting at the user-specified point.
2679 Enter Cell ID for starting cell

Distribution Percentage:
100.0 Enter percentage of material from Dredge Area placed in Placement Area 1

Choose Method for Limits on Placement in this Placement Area:
Depth
3.0 m
Enter the depth below water surface that material placement cannot exceed.

☐ Define Placement Area 2

☐ Define Placement Area 3



FY19 – Implementation of Mass Balance tool interface into **SMS 13.1**



Mass Balance Table

Name	ID	Polygon type	Cut / fill type	Value	Priority	Priority %	Total (m ³) based on slope	Required (m ³)	Available (m ³)	Cut (m ³)	Fill (m ³)
1 Channel	2	Specified cut region	Constant elevation (m)	-5			1.03508e+6	(350078)		(350078)	
2 Placement	1	Available fill region	Relative thickness (m)	5	1	100	3.78217e+6		1.60559e+6		350078
3									Sum	(350078)	350078
4									Net	0	0

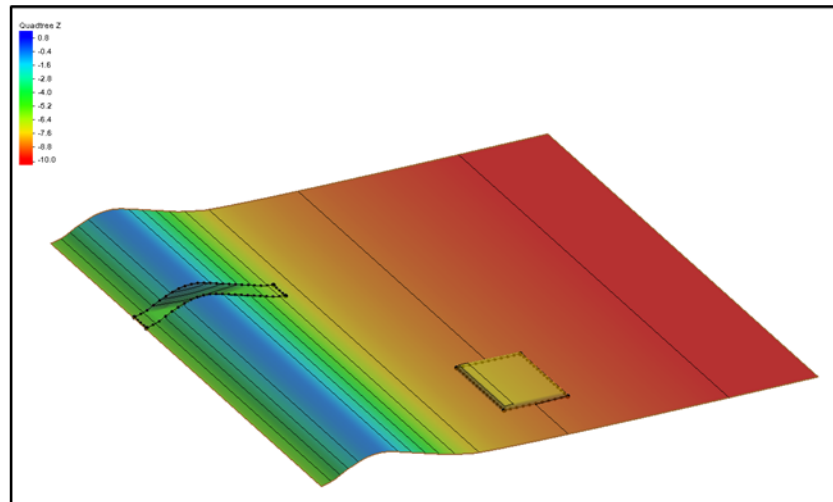
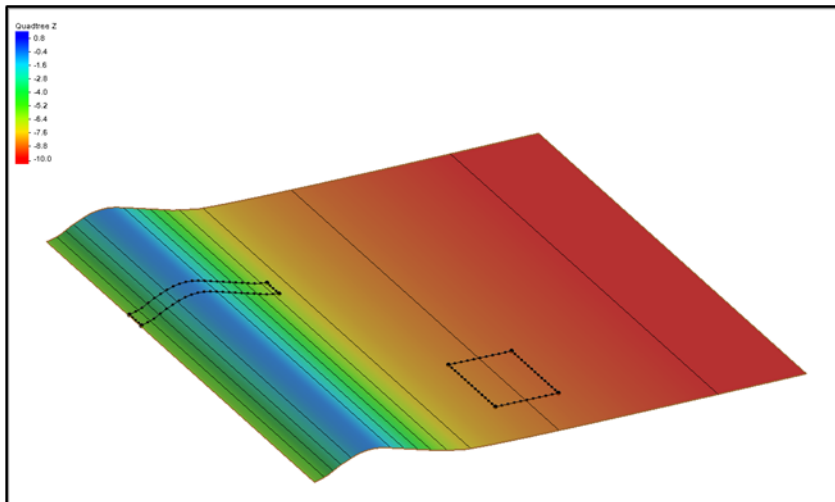
Sort/Normalize Compute Save to File... Help...

Case 1 example:

Dredge a channel through a bar to a specified elevation and placing the material in an off-shore disposal area.

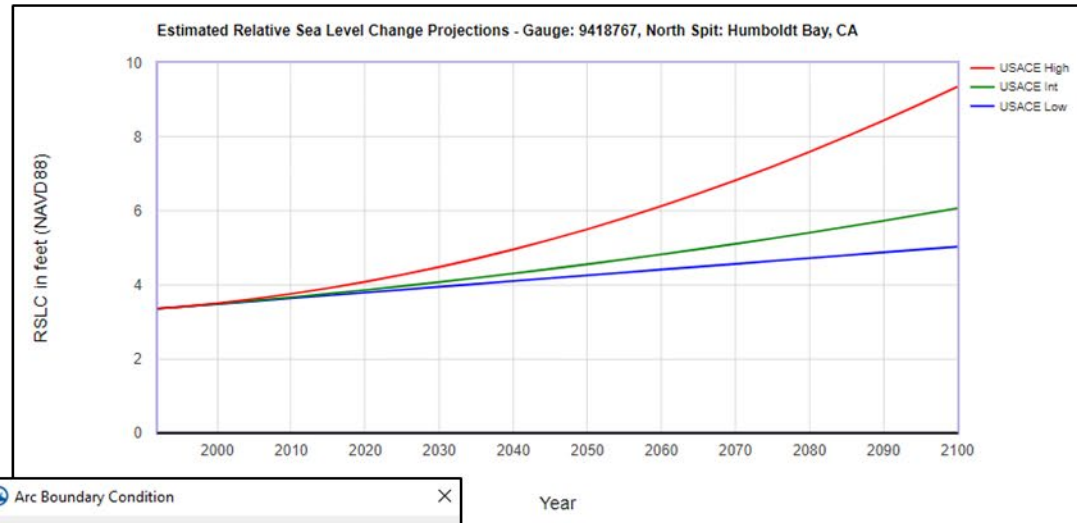
Multiple cut/fill zones can be added and each must be designated as “specified” or “available”. Material can be selected by volume, elevation, or thickness.

A maximum slope can be used to avoid vertical walls and is user-definable depending on the surrounding bathymetry.



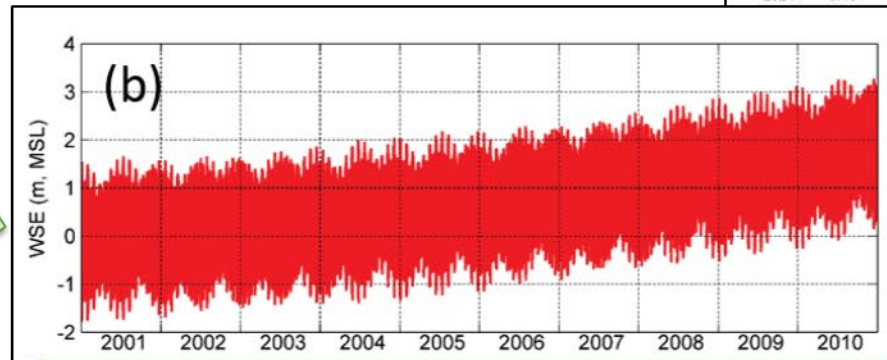
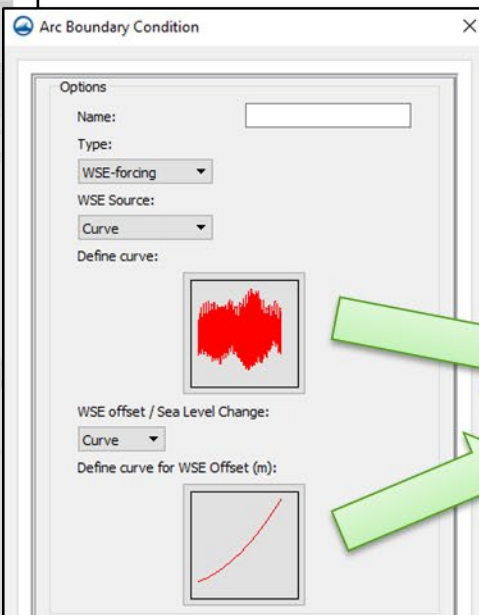
FY19 – Implementation of Sea-level change interface into SMS 13.0

http://corpsmapu.usace.army.mil/rccinfo/slc/slcc_calc.html



Print Curves
Long-term Morphology Simulation
9418767, North Spit: Humboldt Bay, CA
NOAA's Regional Rate: 0.00513 meters/yr
All values are expressed in meters relative to LMSL

Year	USACE Low	USACE Int	USACE High
2000	0.04	0.04	0.05
2001	0.05	0.05	0.06
2002	0.05	0.05	0.06
2003	0.06	0.06	0.07
2004	0.06	0.07	0.08
2005	0.07	0.07	0.09
2006	0.07	0.08	0.09
2007	0.08	0.08	0.10
2008	0.08	0.09	0.11
2009	0.09	0.10	0.12
2010	0.09	0.10	0.13
2011	0.10	0.11	0.14
2012	0.10	0.11	0.15
2013	0.11	0.12	0.16
2014	0.11	0.13	0.17
2015	0.12	0.13	0.18
2016	0.12	0.14	0.19
2017	0.13	0.14	0.20
2018	0.13	0.15	0.21
2019	0.14	0.16	0.22
2020	0.14	0.17	0.23
2021	0.15	0.17	0.24
2022	0.15	0.18	0.26
2023	0.16	0.19	0.27
2024	0.16	0.19	0.28
2025	0.17	0.20	0.29
2026	0.18	0.21	0.30
2027	0.19	0.22	0.31
2028	0.20	0.23	0.32
2029	0.21	0.24	0.33
2030	0.22	0.25	0.34
2031	0.23	0.26	0.35
2032	0.24	0.27	0.36
2033	0.25	0.28	0.37
2034	0.26	0.29	0.38
2035	0.27	0.30	0.39
2036	0.28	0.31	0.40
2037	0.29	0.32	0.41
2038	0.30	0.33	0.42
2039	0.31	0.34	0.43
2040	0.32	0.35	0.44
2041	0.33	0.36	0.45
2042	0.34	0.37	0.46
2043	0.35	0.38	0.47
2044	0.36	0.39	0.48
2045	0.37	0.40	0.49
2046	0.38	0.41	0.50
2047	0.39	0.42	0.51
2048	0.40	0.43	0.52
2049	0.41	0.44	0.53
2050	0.42	0.45	0.54
2051	0.43	0.46	0.55
2052	0.44	0.47	0.56
2053	0.45	0.48	0.57
2054	0.46	0.49	0.58
2055	0.47	0.50	0.59
2056	0.48	0.51	0.60
2057	0.49	0.52	0.61
2058	0.50	0.53	0.62
2059	0.51	0.54	0.63
2060	0.52	0.55	0.64
2061	0.53	0.56	0.65
2062	0.54	0.57	0.66
2063	0.55	0.58	0.67
2064	0.56	0.59	0.68
2065	0.57	0.60	0.69
2066	0.58	0.61	0.70
2067	0.59	0.62	0.71
2068	0.60	0.63	0.72
2069	0.61	0.64	0.73
2070	0.62	0.65	0.74
2071	0.63	0.66	0.75
2072	0.64	0.67	0.76
2073	0.65	0.68	0.77
2074	0.66	0.69	0.78
2075	0.67	0.70	0.79
2076	0.68	0.71	0.80
2077	0.69	0.72	0.81
2078	0.70	0.73	0.82
2079	0.71	0.74	0.83
2080	0.72	0.75	0.84
2081	0.73	0.76	0.85
2082	0.74	0.77	0.86
2083	0.75	0.78	0.87
2084	0.76	0.79	0.88
2085	0.77	0.80	0.89
2086	0.78	0.81	0.90
2087	0.79	0.82	0.91
2088	0.80	0.83	0.92
2089	0.81	0.84	0.93
2090	0.82	0.85	0.94
2091	0.83	0.86	0.95
2092	0.84	0.87	0.96
2093	0.85	0.88	0.97
2094	0.86	0.89	0.98
2095	0.87	0.90	0.99
2096	0.88	0.91	1.00



Effective WSE forcing with SLC curve

- SLC is incorporated in the CMS through application of a constant value or a time-series curve within the SMS framework.
- Presently, this model capability is applicable to the *WSE-forcing* open boundary type specified as a *WSE Curve* or by *Tidal Constituents* in the CMS.

Summary

2017-N-01 – Testing and evaluation of USACE coastal numerical models

2017-N-67 – Guidance for Numerical Modeling of Inlet Ebb Shoal and Navigation Mining Studies



FY19 –

- Added interface for Sea Level Change (SLC) and Dredge Module into SMS 13.0. **** Working in current version of SMS 13.0.7+.**
- Designed interface for Weir and Rubble Mound Jetty structure types for SMS 13.1. Interface design for Culverts and Tide Gates is on-going with scripting assistance from Aquaveo. **** Will finalize during 13.1 beta period (~Aug-Sep 2019) before release in Oct 2019.**
- Sediment Management tools via Aquaveo task order has been demoed for CIRP and will be fully tested in the SMS 13.1 beta period.

FY20 –

- Additional interfaces added for SMS 13.1+ including Sediment Mapping, Cross-shore sediment.
- CMS source code updated with NetCDF input/output option as part of NMTP.
- Creation of suite of test cases for VV/UQ of CMS-Flow and Wave.



Summary of Technology Transfer

FY19 –

- 4-day Workshop on CMS, GenCade, and PTM – Detroit, MI, November 2018
- 5-day (2-hr/day) CMS Basics Webinar in May 2019. * 15 Videos and 10 documents updated.
- **5-day (2-hr/day) Advanced CMS Webinar to be held in Sep 2019.**
- CMS version 5.1 update 8 release – May 2019
- “Modeling sea level change using the CMS” – CHETN published Jun 2019
- “CMS: Dredging Module Simulation with Multiple Grain Sizes” – CHETN final review complete Jul 2019.

FY20 –

- Update and publish CMS User Manual
- Conduct an onsite SMS/CMS/PTM/GenCade workshop
- Generate series of short video clips for CMS support
- Maintain CMS Wiki pages as needed with updated information.

