

The CMS, CIRP Website, and Documentation Wiki

Mitchell Brown

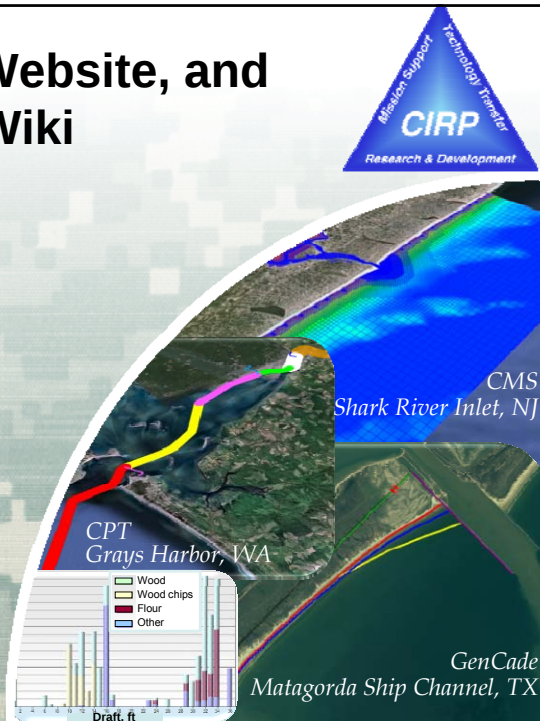
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US Army Corps of Engineers

BUILDING STRONG



Objective of CIRP

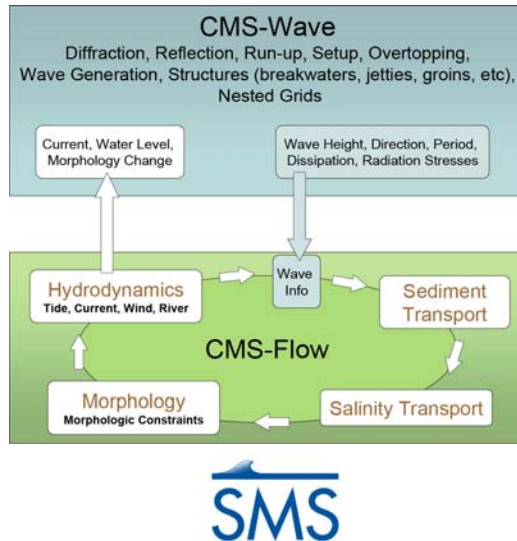


- **Deliver** to engineers' desktops **integrated** advanced models that can be used as **practical** engineering tools for **coastal** inlet and adjacent beach studies.
 - ▶ Integrated: All relevant processes, models efficiently coupled together
 - ▶ Practical: PC-based, user-friendly interface, fast, robust and accurate
 - ▶ Deliver: Manuals, tech reports, journal papers, Wiki, workshops, phone help, etc.





CMS Overview



Since 1997...

- 36 workshops
- Districts can independently run the CMS!

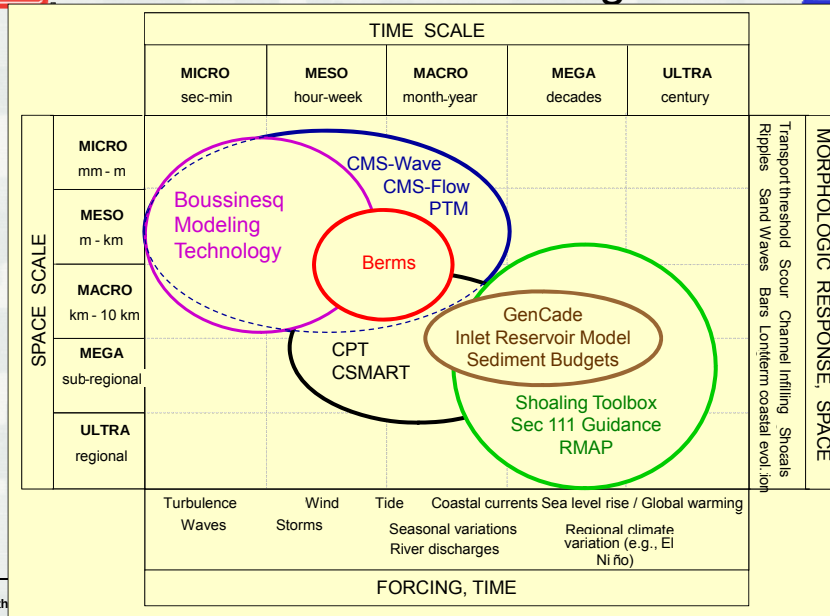
Advantages...

- Robust
- Physics-based
- Integrated SYSTEM
- In SMS
- User-friendly

, 2011



Scales of Coverage



12th

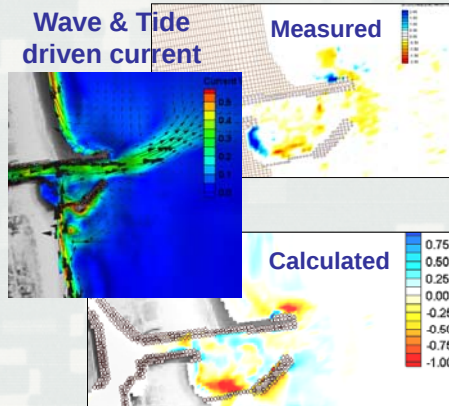




CMS-Flow Key Features



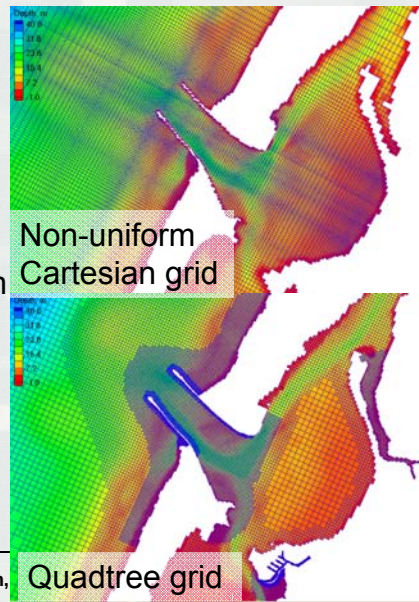
- Finite Volume Method
 - ▶ Conserves mass
 - ▶ Stable
 - ▶ Accessible
- Coupled with spectral wave model (CMS-Wave)
 - ▶ Wave-current interactions
- Inline sediment transport and morphology change
 - ▶ New Non-equilibrium sediment Transport model (NET)
- Nesting capability
- Tide, river, wind, atm. pres., forcing
- Integrated Particle Tracking Model (CMS-PTM)



CMS-Flow Key Features



- Grid options
 - ▶ Non-uniform Cartesian grid: Easy to setup
 - ▶ Telescoping (quadtree) grid: Efficient, flexible
- Solver options
 - ▶ Implicit: Tidal flow, long-term morphology change. ~10 min time step
 - ▶ Explicit: Flooding, breaching, super-critical flow. ~1 sec time step
- Parallel Processing

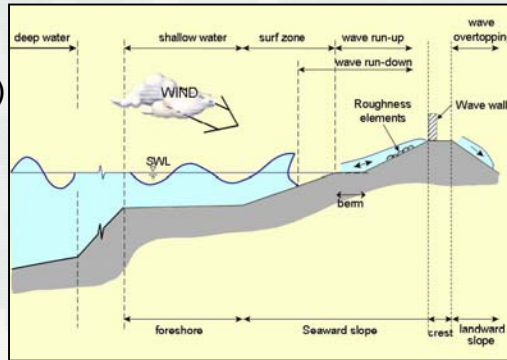




CMS-Wave: Key Features



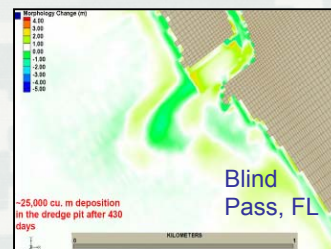
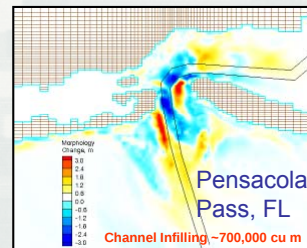
- Shoaling, refraction, diffraction, reflection
- Bottom friction
- White capping
- Wave breaking (4 options)
- Wind generation
- Wave-current, and wave-wave interactions
- Transmission, runup and overtopping
- Muddy bottom
- Automatic grid rotation
- Non-uniform Cartesian grid with nesting capability
- "Fast Mode"



Sediment Transport: Key features



- Sediment transport models
 - ▶ Equilibrium Total Load (Exner equation)
 - ▶ Eq. Bed Load + AD Suspended Load
 - ▶ Non-Eq. (AD Total Load)
- Sediment transport formulas
 - ▶ Lund-CIRP
 - ▶ Van Rijn
 - ▶ Watanabe
 - ▶ Soulsby
- Hard-bottom
- Avalanching
- Bed slope influence on bed load
- Multiple-sized sed. transport (**NEW**)





Particle Tracking Model: CMS-PTM



- Lagrangian approach to simulating the transport, dispersion, entrainment and settlement of particles and dissolved constituents under both currents and waves
- Fully integrated with CMS-Flow and implemented in the SMS
- Improved visualization for communication of transport to sponsors
- Large variety and flexibility in specifying sources and sinks
- Calculated spatial maps of sediment mobility, bedform, sediment pathways, etc.



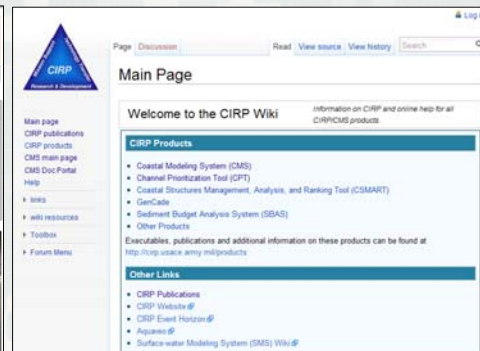
Documentation



- CIRP website
- Wiki Website



<http://cirp.usace.army.mil/>



<http://cirp.usace.army.mil/wiki/>





Documentation Website



Products

- CMS
- GenCade
- Others

Publications

- Technical Reports
- CHETNS
- Journal Articles
- Others

Workshops

- Upcoming
- Recent

12th Annual Workshop, Coastal Inlets



Documentation Wiki



CMS

- Documentation Portal
- Tutorials
- Technical Info (Equations)
- Validation Cases

Gencade

- Information
- User Guide

CPT/CSMART

- Information and Guidance

12th Annual Workshop, Coastal Inlets R

Channel Portfolio Tool (CPT)

POC: Dr. Kenneth Ned Mitchell
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601-634-2022
US Army Engineer Research and Development Center (ERDC)
Coastal and Hydraulics Lab (CHL)
Active URL (Corps machines only): <https://itlgs01.usace.army.mil/CPTWeb/>
CPT is developmental software that is updated frequently.

CPT general layout

Setting the level of analysis (Reach, Project, District, Division)

CPT is designed to enable analysis of commercial utilization of the Corps-maintained waterway infrastructure at a variety of coverage levels. At the most detailed level, individual channel sub-reaches may be chosen for analysis and compared to other sub-reaches in the USACE portfolio of navigation projects. However, in order to provide decision support to personnel at all levels of Corps management, CPT can also be used to analyze and compare commercial usage figures at the Project, District, and Division levels. For example, a District program manager might want to see which navigation project under his or her control handles the most exports of a particular commodity. CPT pulls from a large database that is maintained by the Corps' Waterborne Commerce Statistics Center (WCSC). Setting the desired level of analysis is done through the CPT Home screen: <https://itlgs01.usace.army.mil/CPTWeb/> . Figure 1 shows the four levels of analysis provided by CPT; the desired level is chosen by simply clicking on the respective link.





Reports and Tech Notes



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Publications: Sediment Transport



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Questions?

