

# Numerical Modeling of Oil Spills

Past and present romances, future fantasies

(Where have we been and where are we going?)

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for

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# Historical overview of oil spill model development

(The World According to Mark)

1960's - 70's: Environmental movement bring oil spills into focus

- Simple particle-tracking models
- Fay-Holt spreading
- Scattered funding sources

1980's: Key weathering processes included

- Simplified, empirical, sometimes arbitrary
- Don Mackay an active contributor
- Delvigne-Sweeney dispersion - droplet formation
- NOAA, MMS, Environment Canada prime movers



# Historical overview of oil spill model development

## 1990's: Continued high scientific effort

- Improved weathering models
- More focus on biological effects
- Graphical user interfaces improved significantly (communication)
- Improved linkages to exterior data sources (winds, currents)
- Tendency towards common algorithms
- NOAA, MMS, Environment Canada remain key players
- Petroleum industry adds significant financial and scientific support



# Historical overview of oil spill model development

## 2000 ->: Times a'changin'

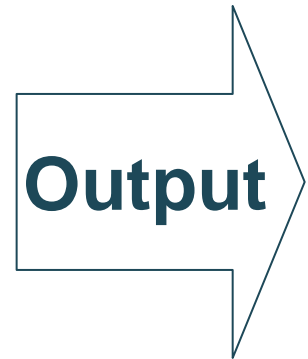
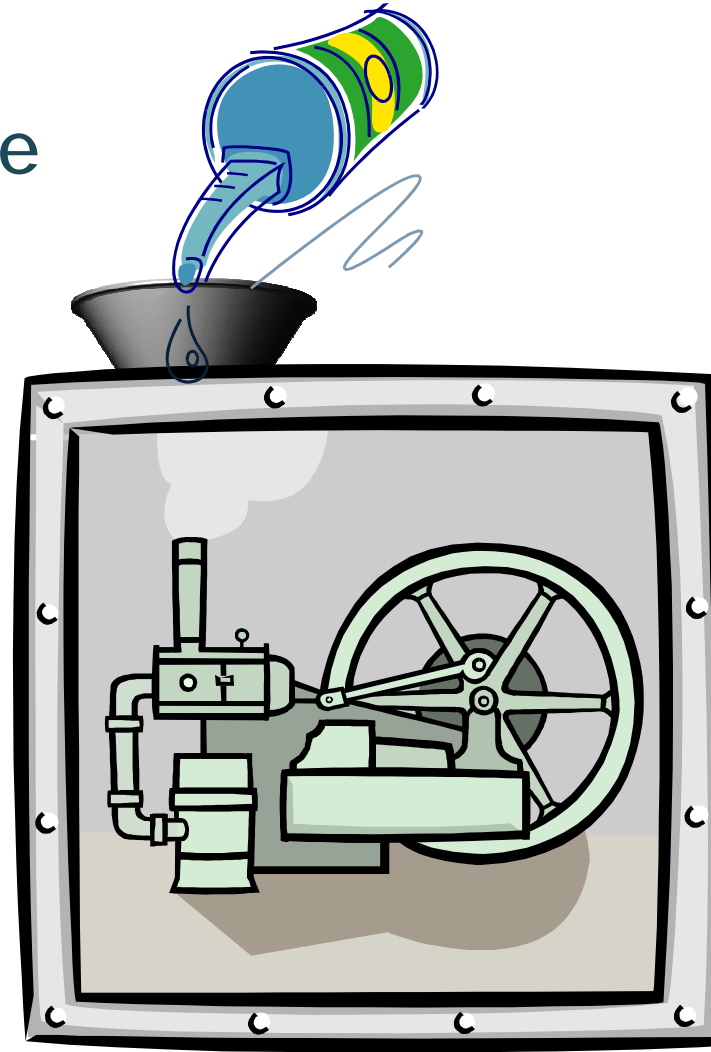
- MMS continues to be active in supporting oil spill related research
- Environment Canada fading from the scene (?)
- NOAA - UNH CRRC created
  - Research program guided by pragmatic needs
  - Encouraging innovative research methods, ideas
  - Focus on scientific quality, peer review



# Future developments

## Oil Weathering Machine

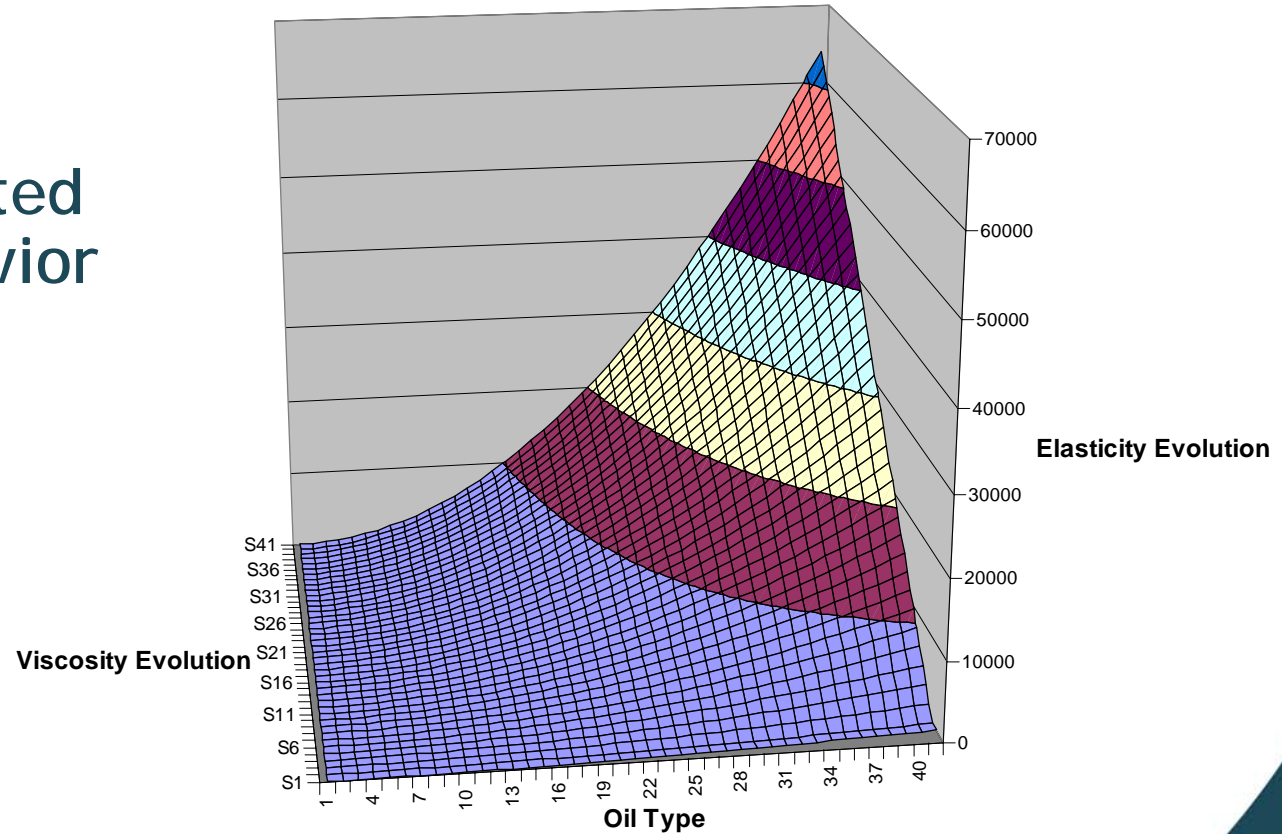
Input: oil sample



# Future developments

## Oil weathering machine

Output: parameters describing expected weathering behavior





# Future developments

## Oil weathering machine

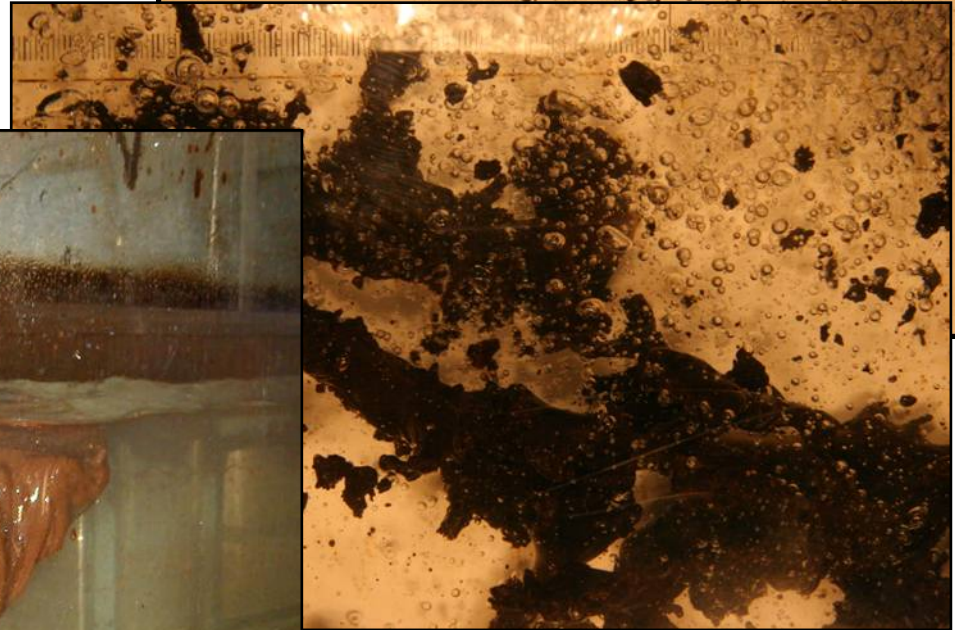
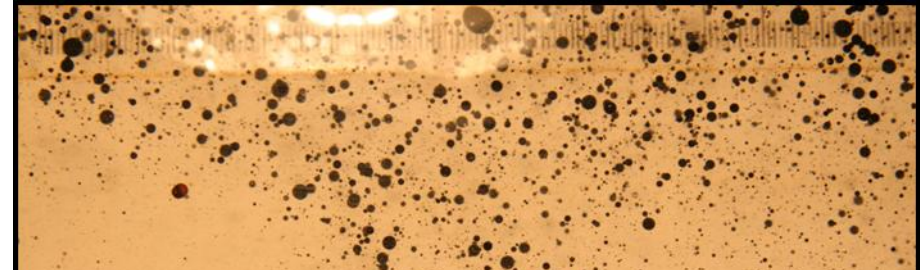
- Parameters governing behavior on the sea surface



# Future developments

## Oil weathering machine

- ... and in the water column





# Future developments

## Oil weathering machine

- ... and windows of opportunity for different response options



# Future developments

## Global 3-D wind and hydrodynamic data and models available 24-7-365 on the www

- ~10 km, 20 layer global resolution
- Updated every 12 hours (satellite and in situ measurements)
- Open data, standardized format
- 3+ day forecasts w/ uncertainty measures associated
- "User-nestable" sub-grids of arbitrary size and resolution
- Easy setup via internet
- Check back in an hour and download the results for your region of interest



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[www.crrc.unh.edu](http://www.crrc.unh.edu)

