

Effects of Dispersants on Oil-SPM Aggregation and Fate in US Coastal Waters

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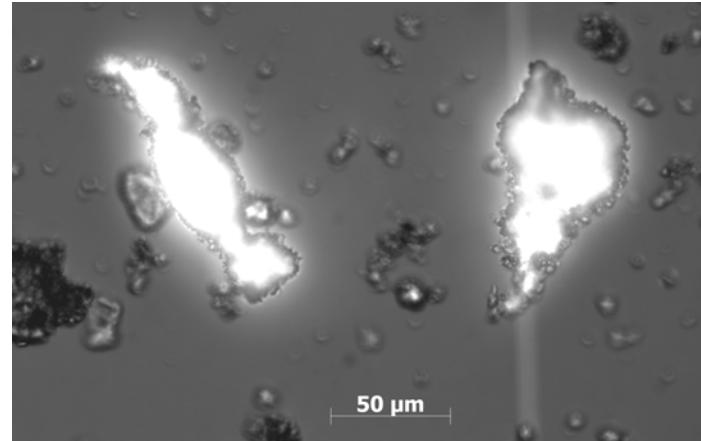
April 2007

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Facts



Jolly Rubino, South Africa, BBC News, 14/09/2002



Formation of Oil-SPM Aggregates (OSAs)

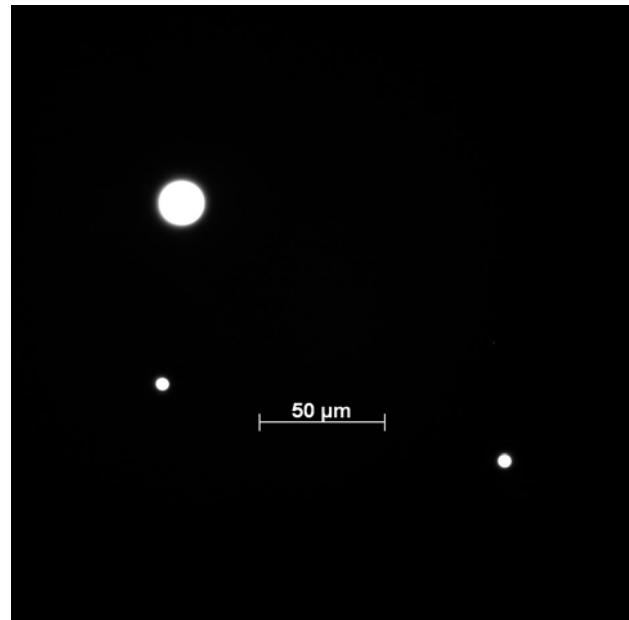
- Denser than crude oils
- Lighter than sediment



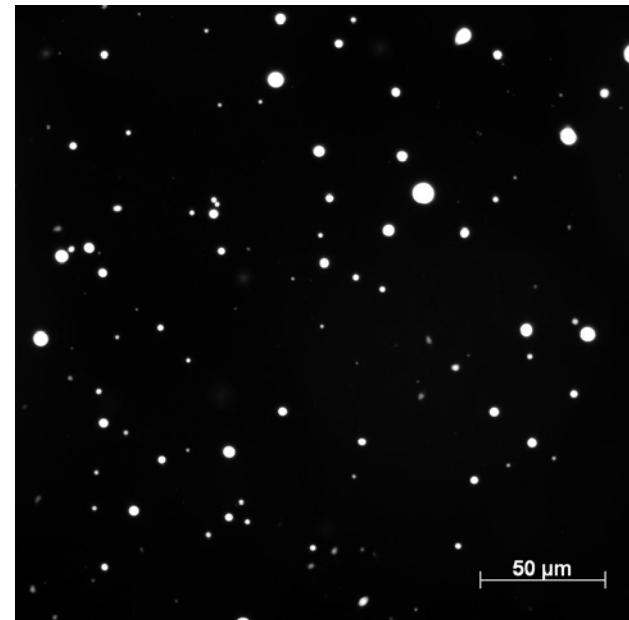
Facts (...)

Application of Chemical Dispersant

- { Reduces droplet size
- Increases droplet concentration



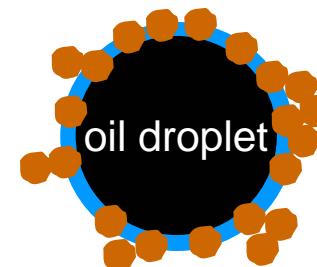
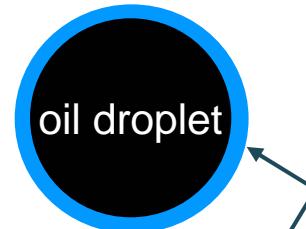
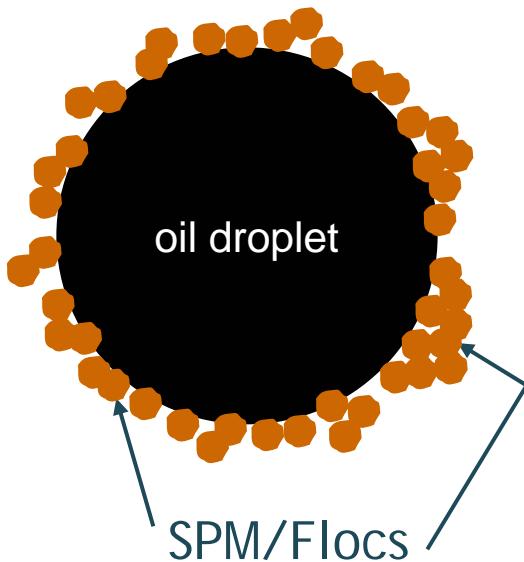
ANS No Dispersant



ANS + Corexit-9500 @ 1:10

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Concerns



? Formation
Fate

- Sediment types & concentration
- Dispersant types & concentration
- Oil types
- Comparison with no dispersant conditions

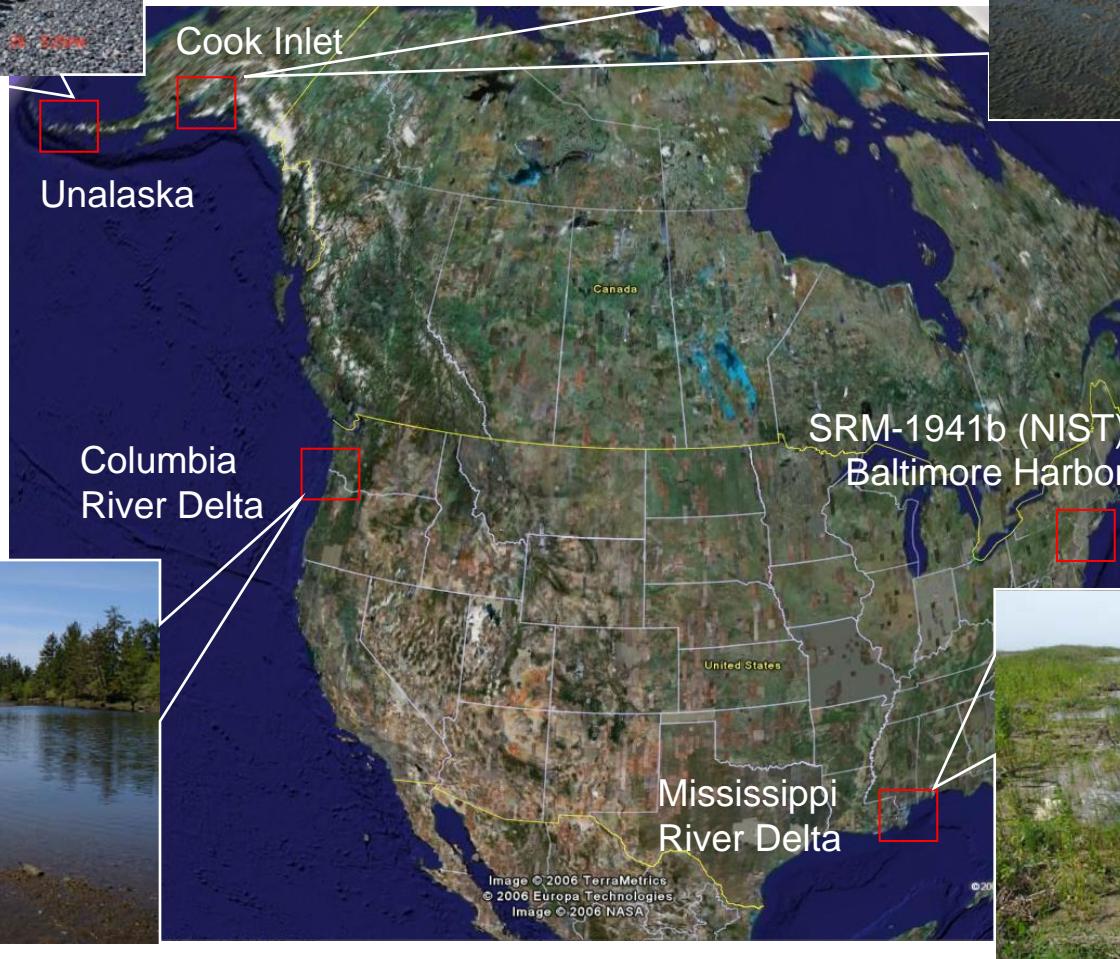
The Project



By Dr. Gary Shigenaka
NOAA



By Ms. Susan Saupe
Cook Inlet RCAC



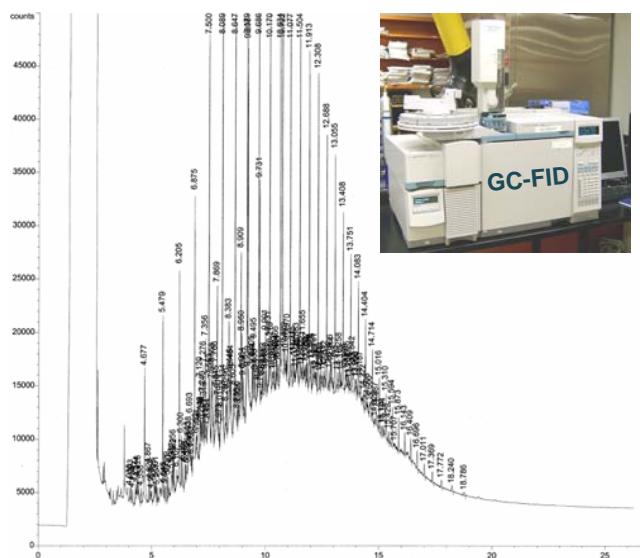
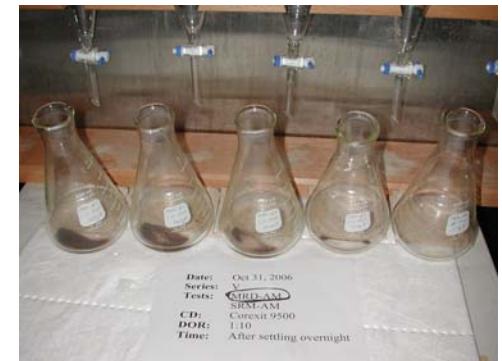
By Dr. Amy Merten
NOAA



By Dr. Gary Shigenaka
NOAA

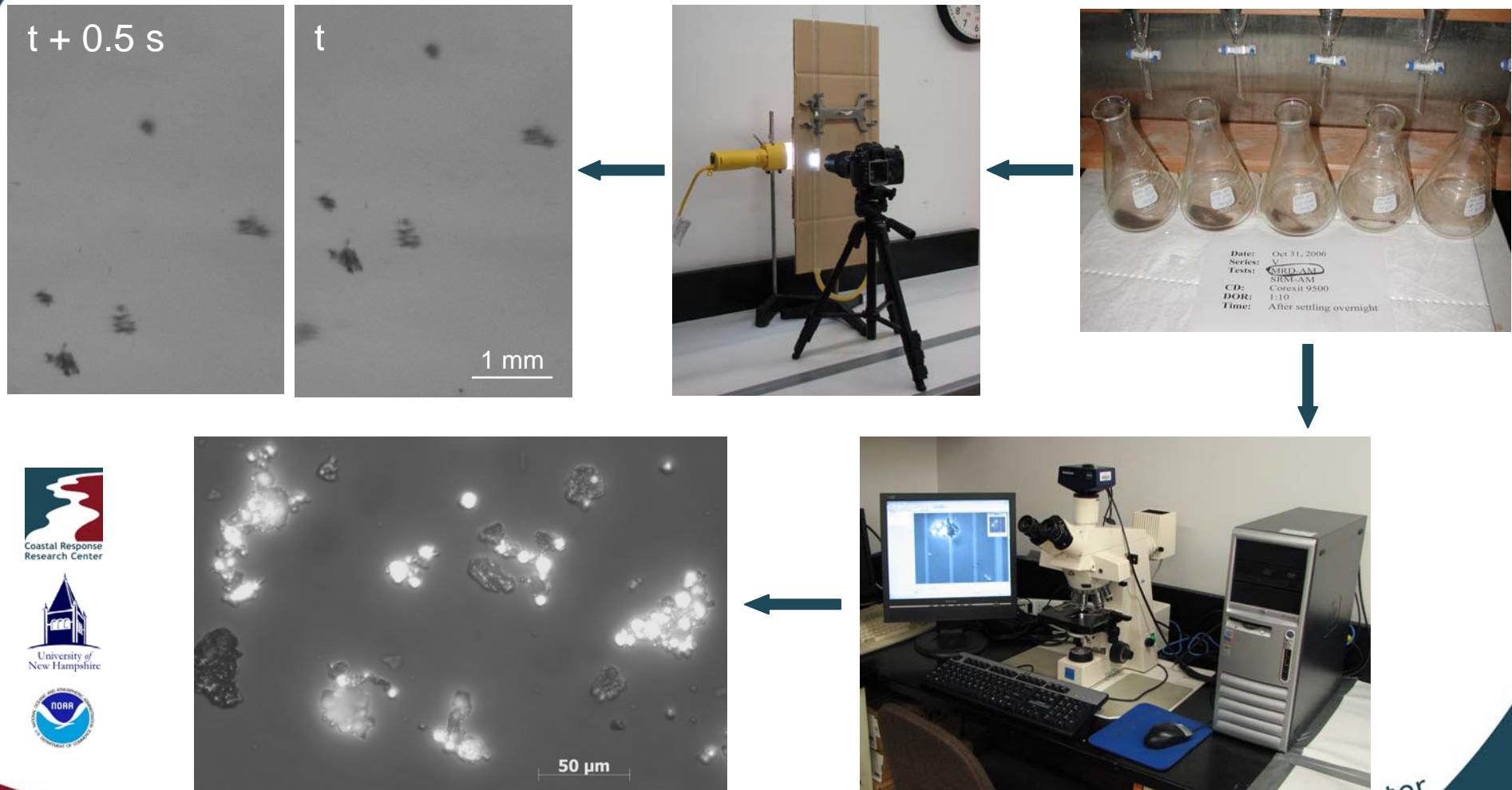
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Experimental Procedure



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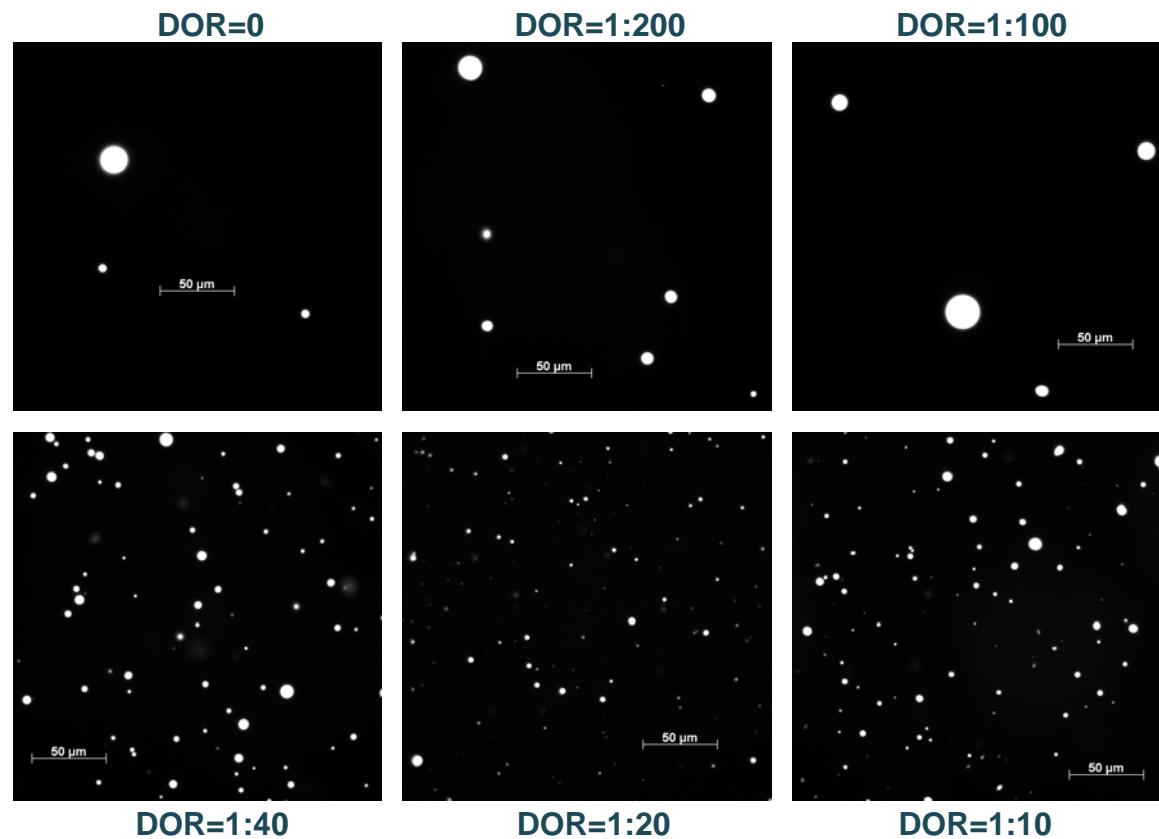
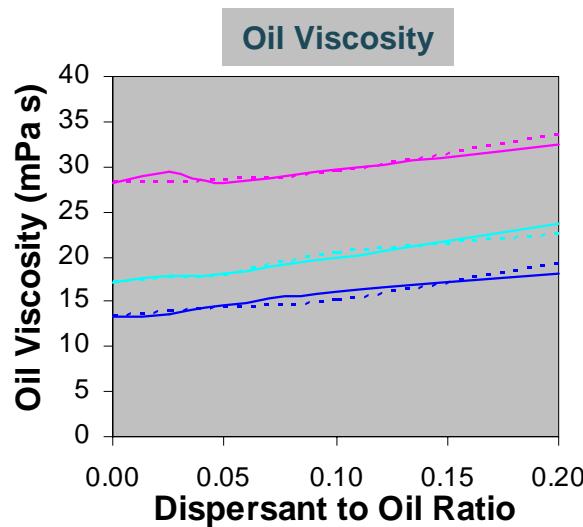
Experimental Procedure (...)



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Results

Effects of Chemical Dispersant on Oil Properties & Dispersion



Oil-Brine Interfacial Tension

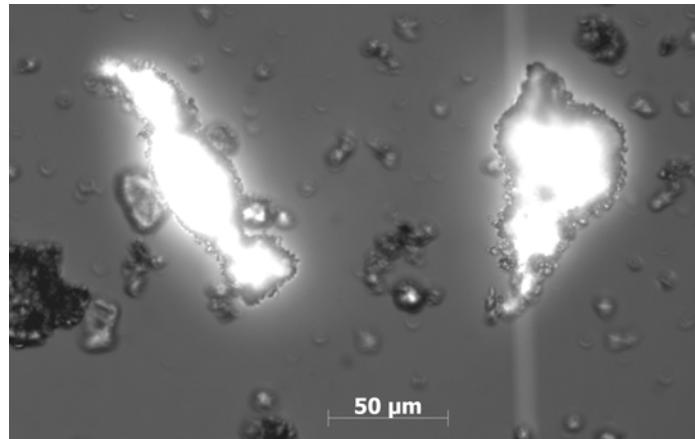
20 mN/m
→
< 3.6 mN/m



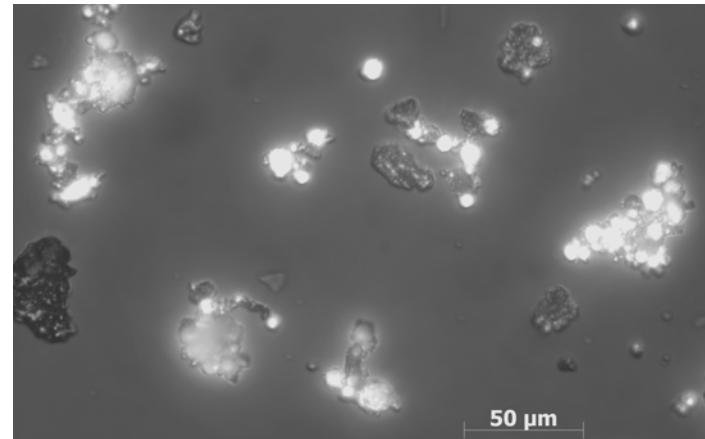
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Results

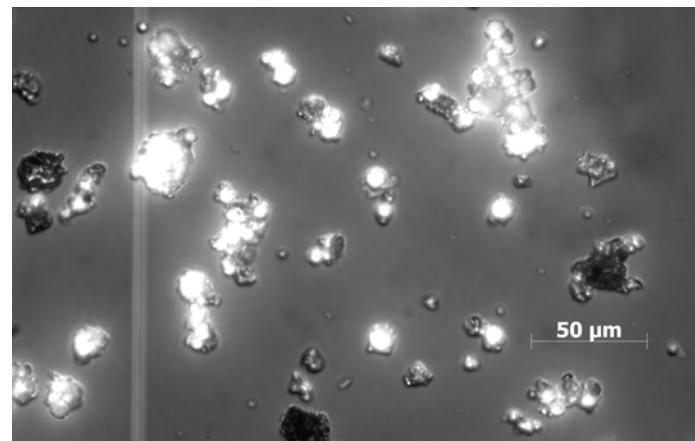
Effects of Chemical Dispersant on OSA Formation



200mg/L SRM-ANS, **No Dispersant**



200mg/L SRM-ANS, **CO-9500 @ 1:10**



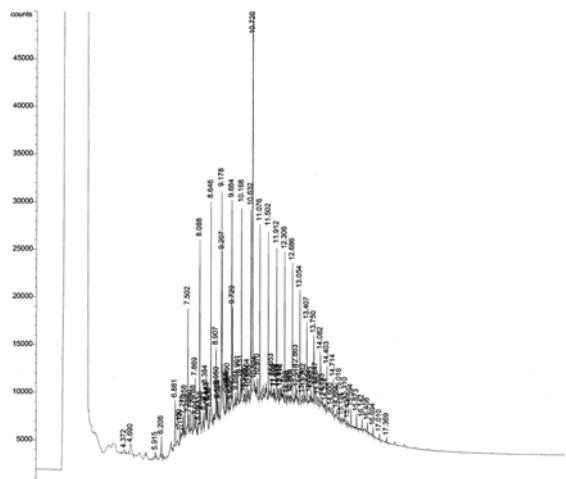
200mg/L SRM-ANS, **CO-9527 @ 1:10**

OSAs form readily with both Corexit 9500 and Corexit 9527

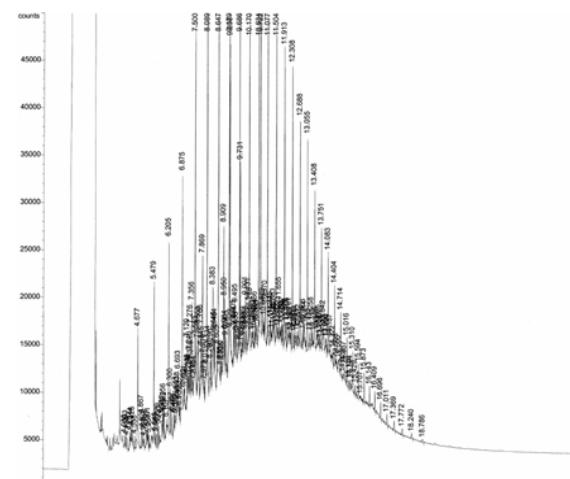


Results

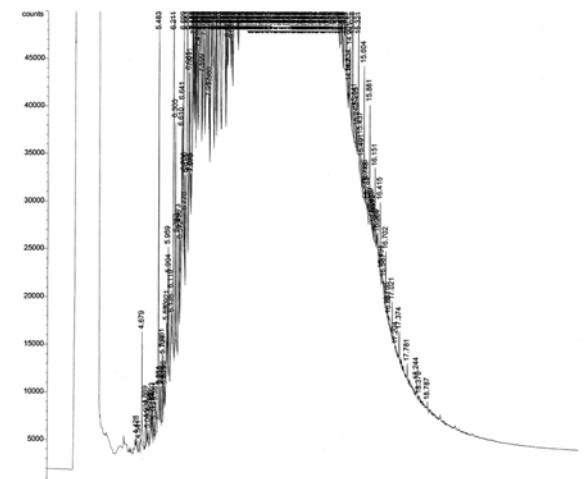
Effects of Chemical Dispersant on OSA Formation (...)



25 mg/L SRM-ANS, CO-9500 1:10



50 mg/L SRM-ANS, CO-9500 1:10



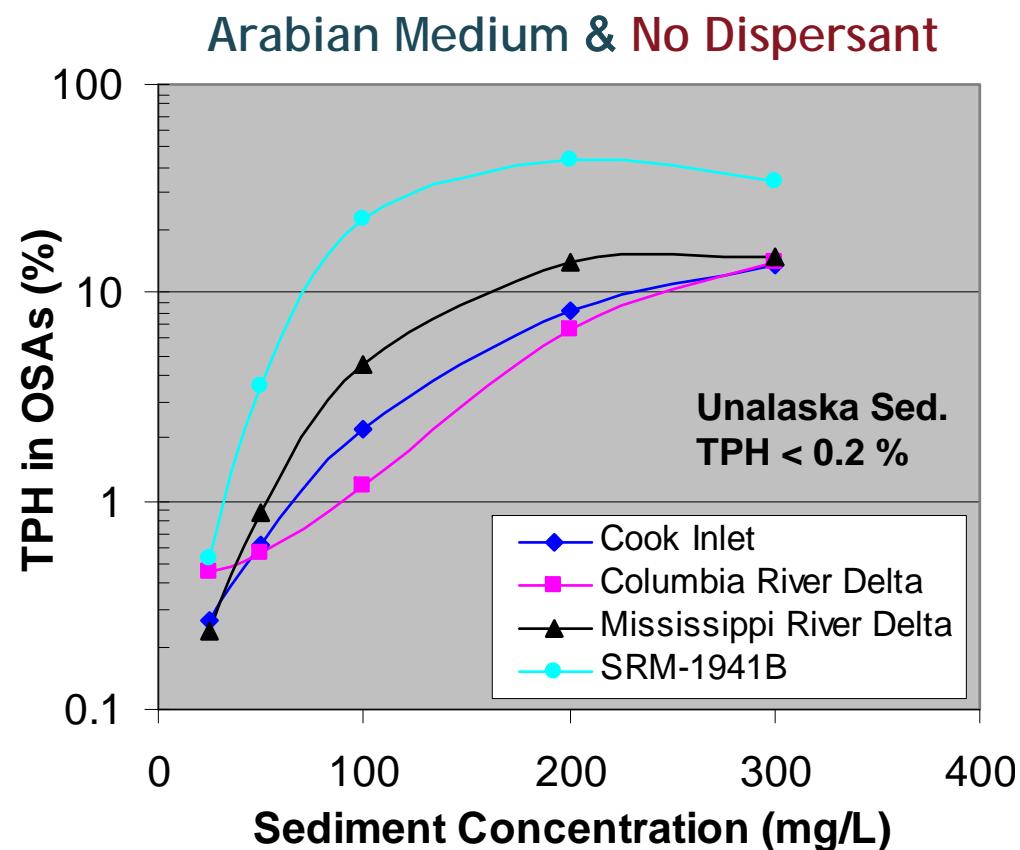
100 mg/L SRM-ANS, CO-9500 1:10

Sedimentation of chemically dispersed oil increases with sediment concentration



Results

Effects of Chemical Dispersant on OSA Formation (...)

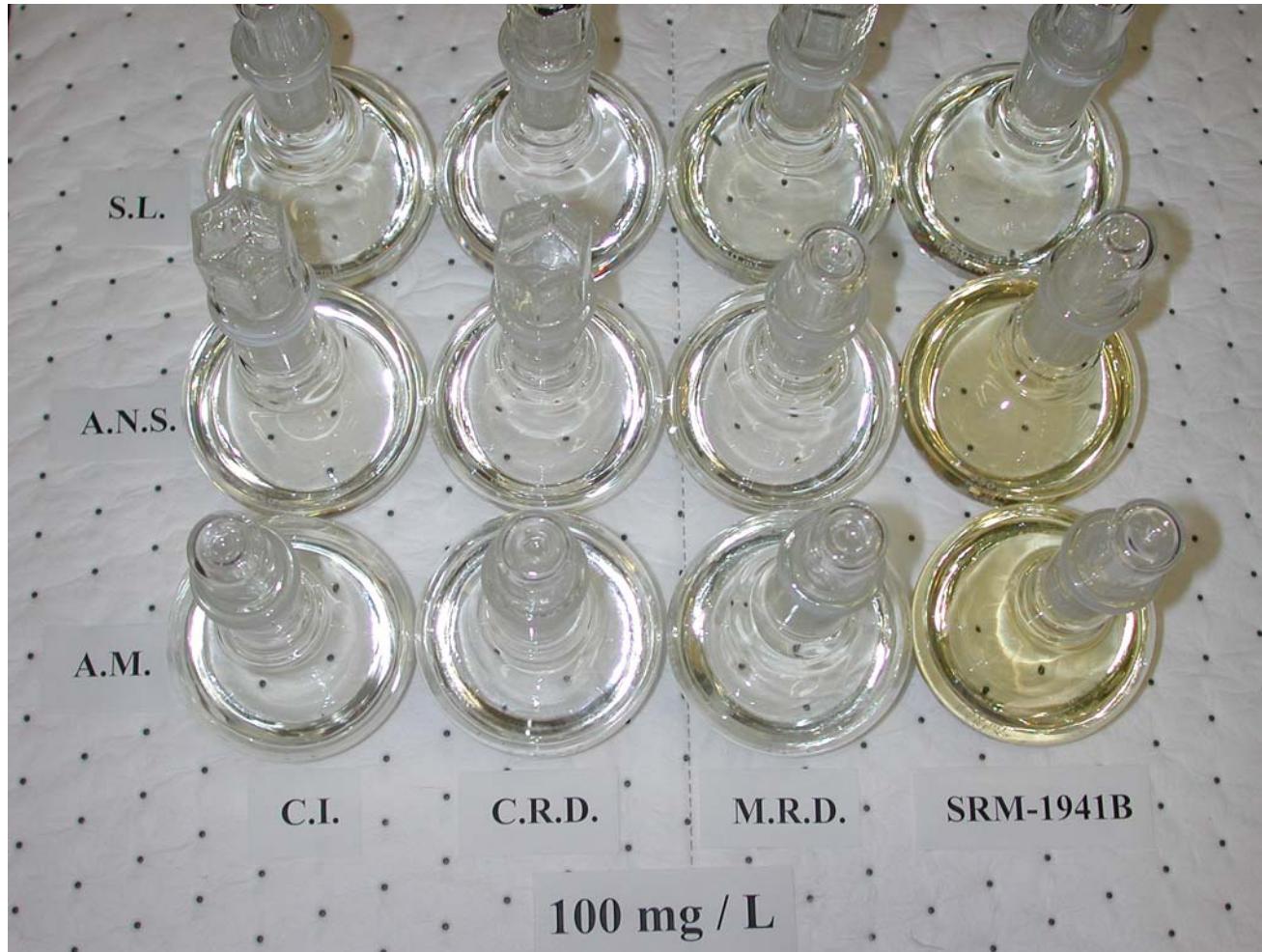


Sediment Sample	D<5µm (wt %)	Organic Matter (wt %)
Cook Inlet	49	3.3
Columbia River Delta	30	8.5
Mississippi River Delta	40	6.9
SRM-1941B	56	10.6
Unalaska	0	0.6



Results

Effects of Chemical Dispersant on OSA Formation (...)



No Dispersant

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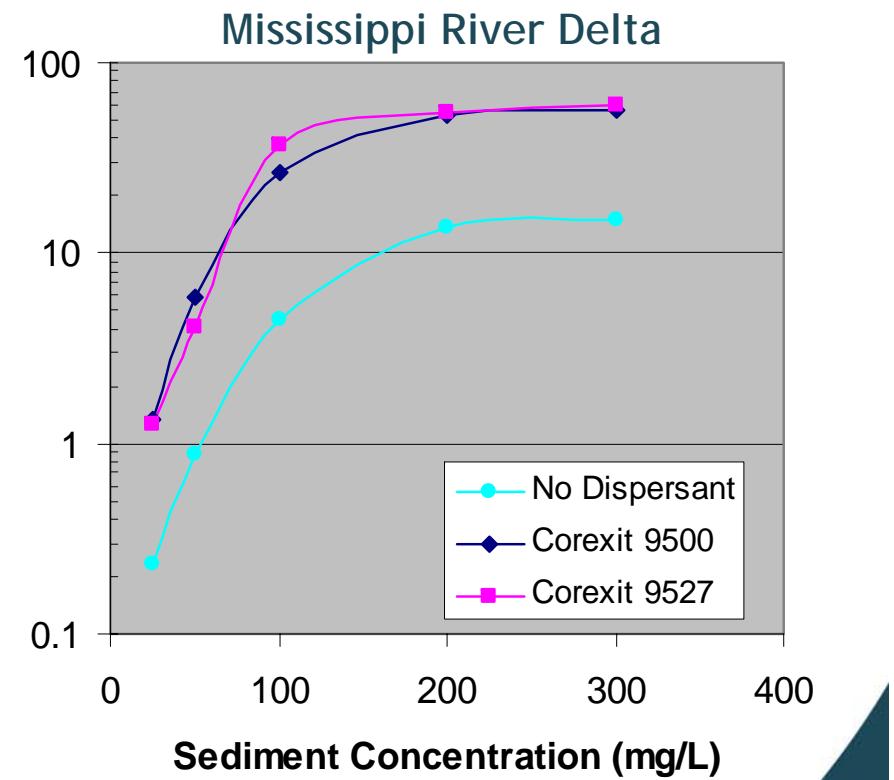
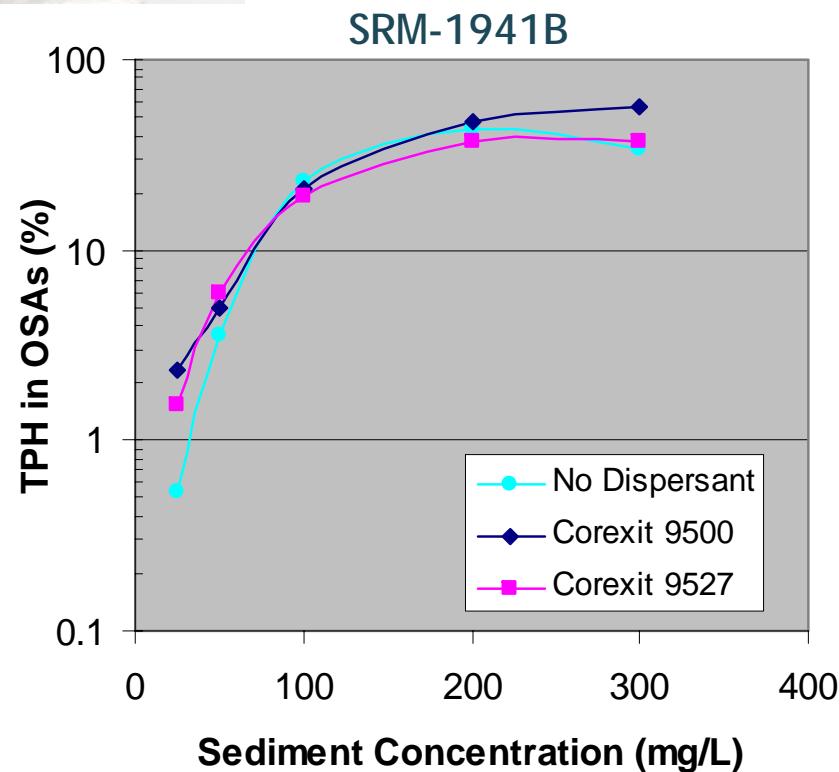


Results



Effects of Chemical Dispersant on OSA Formation (...)

Arabian Medium + Corexit 9500 @ 1:10

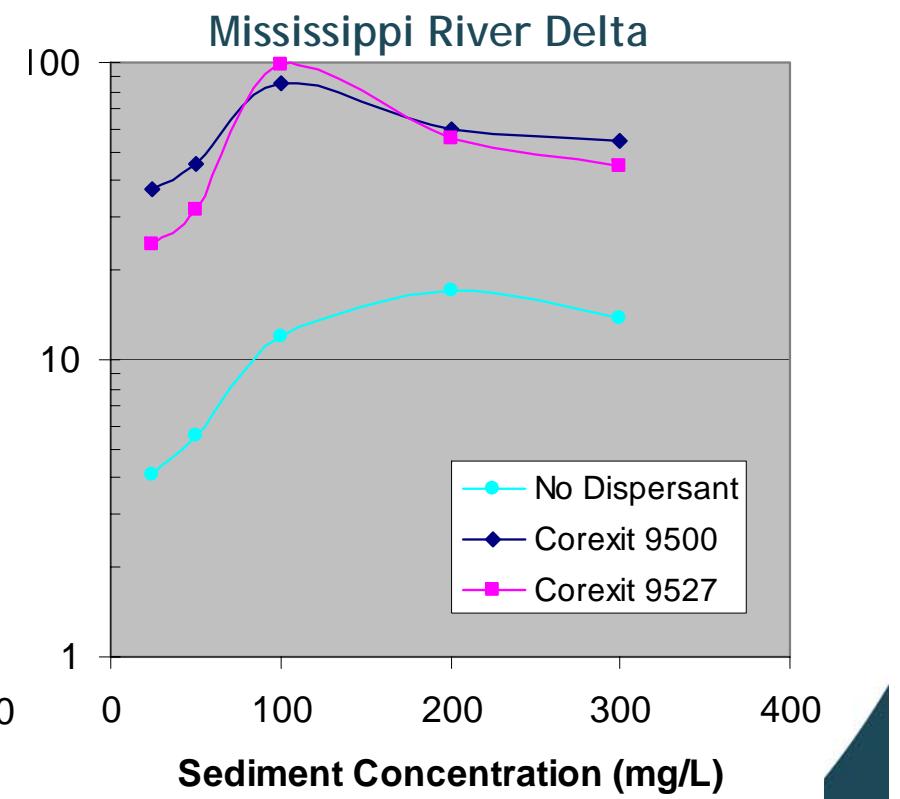
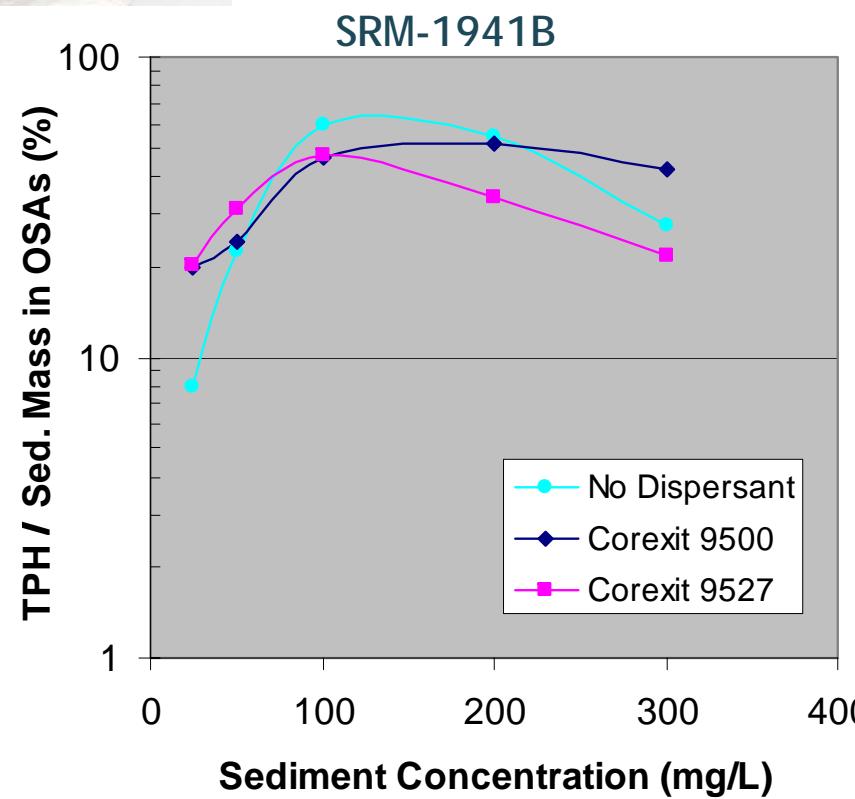


Results



Effects of Chemical Dispersant on OSA Formation (...)

Arabian Medium + Corexit 9500 @ 1:10



Results

Effects of Chemical Dispersant on OSA Formation (...)

Repeatability of TPH measurements: SRM-ANS, 100 mg/L



Test #	TPH (mg)	Sediment in OSAs (mg)	Sediment / TPH
1	9.3	22.3	2.4
2	8.2	21.0	2.6
3	9.1	20.5	2.3
4	8.8	18.3	2.1
5	8.7	19.9	2.3
6	9.2	20.9	2.3
7	8.6	20.1	2.3
Mean	8.8	20.4	2.3
St. Dev.	0.39	1.22	0.15

Next

- Size and settling properties of OSAs
- Mixing energy measurement
- Further data processing and analysis



Acknowledgement

Funding for this project was provided by
the Coastal Response Research Center

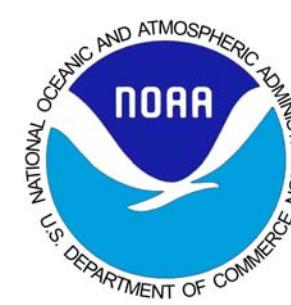
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Coastal Response
Research Center



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