



Re: AVIRIS oil volumes, preliminary

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Victor F Labson o Marcia K McNutt

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Cc: Roger N Clark

05/22/2010 05:18 PM

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History: This message has been replied to.

Marcia,

Roger has refined his estimate of the amount of the sea-surface oil covered by AVIRIS on May 17 from 10% to 15% which would change your estimate to 4103 - 7739 bbl/day. The assessment of the area covered seems to be the parameter with the most uncertainty.

Roger has put the paper into review. Bryant Cramer and Mike Hutt are the reviewers.

The FRTT is trying to produce their estimate of the flow rate from the origination points. They have been hampered by the low quality of the video received from BP. A BP VP was on the conference call and was to find them appropriate video for the analysis. I have not seen any report on whether that has been delivered to the FRTT. It is possible that we will get to tomorrow's meeting with the AVIRIS determination the only quantitative estimate. That will put a spotlight on the assumptions in the estimation. The Team may be able to help refine them.

Vic

Marcia K McNutt

I have some final rates for you based on numbers...

05/22/2010 02:50:08 PM

From: Marcia K McNutt/DO/USGS/DOI
To: Roger N Clark/GD/USGS/DOI@USGS; Victor F Labson/GD/USGS/DOI@USGS
Date: 05/22/2010 02:50 PM
Subject: Re: AVIRIS oil volumes, preliminary

I have some final rates for you based on numbers from the Coast Guard and Incident Command. The amount of oil burned up to May 17 was 11,642 barrels. The amount of oil skimmed was 158,378 barrels with an average oil content of 15%. Oil was dispersed subsea for a total of 129 hours prior to collecting the data. If we assume that none of that dispersed oil reached the surface, then the net number of days represented for the oil on the surface is 27-5 = 22 days. So taking Roger's lower and upper bounds, adding back in the skimmed and burned oil, and dividing by the number of days that oil was rising to the surface yields lower and upper bounds of 6154 to 11609 barrels per day.

Marcia

----- Original Message -----

From: "Roger N. Clark" [rclark@usgs.gov]
Sent: 05/21/2010 06:24 PM CST
To: Victor Labson; Marcia McNutt
Cc: Roger Clark
Subject: AVIRIS oil volumes, preliminary

Marcia, Vic

Attached are the results for the oil volumes derived from the AVIRIS data. The AVIRIS covers a fraction the spill area (we are working on that now, probably around 10%). The numbers are thick oil detected at the surface. We'll describe the caveats in the paper. If the AVIRIS fraction is 10%, then there was about 100,000 to 220,000 barrels of oil on the surface on May 17. Much of the ugly looking brown seen in images is very small amounts of oil and does not contribute much to the total volume.

We are working on the paper -- many little things to add for supporting documentation.

I hope to be in to review tomorrow.

Roger
AVIRIS May 17, 2010

Total oil found Runs 08 - 13:

Run			
08	Total volume found = liters (aggressive)	185844 liters (conservative)	1086051
09	Total volume found = liters (aggressive)	270628 liters (conservative)	388353
10	Total volume found = liters (aggressive)	308931 liters (conservative)	604916
11	Total volume found = liters (aggressive)	533054 liters (conservative)	794326
12	Total volume found = liters (aggressive)	54913 liters (conservative)	80452
13	Total volume found = liters (aggressive)	458279 liters (conservative)	765601
<hr/>			
	Total: liters (aggressive)	1811549 liters (conservative)	3719699
	barrels	10783 barrels	22141
Area of spill ____?____ sq km			
Area of AVIRIS lines 6,000 sq km (includes area outside spill) = ____ percent of spill area (probably about 10)			

Note:

Sheen in one aviris pixel: 1 micron thick = 0.00007225 liters/pixel
Sheen in one aviris pixel: 10 micron thick = 0.0007225 liters/pixel

Therefore sheen is small total volume

AVIRIS Run 08: 677x21651 pixels

Oil volume 90 : 10 0.500 mm: = 49708.6 (49708.6 aggr) liters in 2299
pixels
Oil volume 75 : 25 1.500 mm: = 1276.1 (1276.1 aggr) liters in 63
pixels

Oil volume 80 : 20 pixels	1.500 mm: =	4191.9 (6287.8 aggr) liters in 167
Oil volume 60 : 40 pixels	0.025 mm: =	0.0 (9.6 aggr) liters in 13
Oil volume 60 : 40 pixels	0.050 mm: =	0.0 (13.9 aggr) liters in 13
Oil volume 60 : 40 pixels	0.100 mm: =	34.6 (34.6 aggr) liters in 14
Oil volume 60 : 40 pixels	0.500 mm: =	2238.3 (2238.3 aggr) liters in 326
Oil volume 60 : 40 pixels	1.900 mm: =	195.4 (247.6 aggr) liters in 12
Oil volume 60 : 40 pixels	4.000 mm: =	4075.9 (8151.7 aggr) liters in 204
Oil volume 40 : 60 pixels	0.025 mm: =	0.0 (10.4 aggr) liters in 63
Oil volume 40 : 60 pixels	0.050 mm: =	0.0 (24.9 aggr) liters in 67
Oil volume 40 : 60 pixels	0.100 mm: =	199.5 (199.5 aggr) liters in 269
Oil volume 40 : 60 pixels	0.500 mm: =	115.9 (115.9 aggr) liters in 37
Oil volume 40 : 60 pixels	1.900 mm: =	1194.1 (1512.6 aggr) liters in 143
Oil volume 40 : 60 pixels	4.000 mm: =	7054.0 (14080.0 aggr) liters in 582
Oil volume 23 : 77 pixels	0.025 mm: =	0.0 (0.7 aggr) liters in 559
Oil volume 23 : 77 pixels	0.050 mm: =	0.0 (7.4 aggr) liters in 25
Oil volume 23 : 77 pixels	0.100 mm: =	38.1 (38.8 aggr) liters in 95
Oil volume 23 : 77 pixels	0.500 mm: =	5242.1 (5242.1 aggr) liters in 1391
Oil volume 23 : 77 pixels	1.900 mm: =	58032.4 (73507.7 aggr) liters in 7774
Oil volume 23 : 77 pixels	4.000 mm: =	52246.4 (104492.8 aggr) liters in 5607
Oil volume 1 : 98 pixels	7.000 mm: =	0.0 (3464.1 aggr) liters in 10712
Oil volume 1 : 98 pixels	20.000 mm: =	0.0 (815277.8 aggr) liters in 52079
Total volume found (aggressive)		185844 liters (conservative) 1086051 liters

PRELIMINARY

AVIRIS Run 09: 677x17893 pixels

Oil volume 90 : 10 pixels	0.500 mm: =	6782.2 (6782.2 aggr) liters in 303
Oil volume 75 : 25 pixels	1.500 mm: =	90525.9 (90525.9 aggr) liters in 2817
Oil volume 80 : 20 pixels	1.500 mm: =	68946.5 (103419.8 aggr) liters in 1824
Oil volume 60 : 40 pixels	0.025 mm: =	0.0 (12.2 aggr) liters in 14
Oil volume 60 : 40 pixels	0.050 mm: =	0.0 (25.9 aggr) liters in 70
Oil volume 60 : 40 pixels	0.100 mm: =	57.1 (57.1 aggr) liters in 53
Oil volume 60 : 40 pixels	0.500 mm: =	46921.8 (46921.8 aggr) liters in 10293

pixels
Oil volume 60 : 40 1.900 mm: = 783.2 (992.0 aggr) liters in 56
pixels
Oil volume 60 : 40 4.000 mm: = 19217.0 (38434.0 aggr) liters in 1291
pixels
Oil volume 40 : 60 0.025 mm: = 0.0 (2.3 aggr) liters in 15
pixels
Oil volume 40 : 60 0.050 mm: = 0.0 (4.3 aggr) liters in 13
pixels
Oil volume 40 : 60 0.100 mm: = 69.1 (69.1 aggr) liters in 144
pixels
Oil volume 40 : 60 0.500 mm: = 355.0 (355.0 aggr) liters in 298
pixels
Oil volume 40 : 60 1.900 mm: = 1194.2 (1512.6 aggr) liters in 363
pixels
Oil volume 40 : 60 4.000 mm: = 22783.0 (45565.9 aggr) liters in 4893
pixels
Oil volume 23 : 77 0.025 mm: = 0.0 (10.0 aggr) liters in 104
pixels
Oil volume 23 : 77 0.050 mm: = 0.0 (1.9 aggr) liters in 8
pixels
Oil volume 23 : 77 0.100 mm: = 8.1 (8.1 aggr) liters in 33
pixels
Oil volume 23 : 77 0.500 mm: = 97.6 (97.6 aggr) liters in 87
pixels
Oil volume 23 : 77 1.900 mm: = 8110.7 (1023.6 aggr) liters in 2561
pixels
Oil volume 23 : 77 4.000 mm: = 4776.7 (53.5 aggr) liters in 1096
pixels
Oil volume 1 : 98 1.000 mm: = 0.0 (140.3 aggr) liters in 939
pixels
Oil volume 1 : 98 20.000 mm: = 0.0 (33588.4 aggr) liters in 3702
pixels
Total volume found = 270628 liters (conservative) 388353 liters
(aggressive)

If sheen covered the scene Run 08 = 12113561 pixels = 8752 liters at 10 microns thick

AVIRIS Run 10 677x221 pixels:

Oil volume 90 : 1 0.500 mm: = 31639.3 (31639.3 aggr) liters in 1455
pixels
Oil volume 75 : 25 1.500 mm: = 51271.2 (51271.2 aggr) liters in 1265
pixels
Oil volume 80 : 20 1.500 mm: = 47663.1 (71494.6 aggr) liters in 1220
pixels
Oil volume 60 : 40 0.025 mm: = 0.0 (4.0 aggr) liters in 8
pixels
Oil volume 60 : 40 0.050 mm: = 0.0 (40.7 aggr) liters in 86
pixels
Oil volume 60 : 40 0.100 mm: = 66.0 (66.0 aggr) liters in 62
pixels
Oil volume 60 : 40 0.500 mm: = 38058.0 (38058.0 aggr) liters in 6104
pixels
Oil volume 60 : 40 1.900 mm: = 1055.4 (1336.8 aggr) liters in 81
pixels
Oil volume 60 : 40 4.000 mm: = 17357.7 (34715.4 aggr) liters in 1028
pixels
Oil volume 40 : 60 0.025 mm: = 0.0 (7.5 aggr) liters in 42
pixels

Oil volume 40 : 60 0.050 mm: = 0.0 (6.0 aggr) liters in 15
pixels
Oil volume 40 : 60 0.100 mm: = 371.4 (371.4 aggr) liters in 723
pixels
Oil volume 40 : 60 0.500 mm: = 205.0 (205.0 aggr) liters in 139
pixels
Oil volume 40 : 60 1.900 mm: = 1879.4 (2380.6 aggr) liters in 341
pixels
Oil volume 40 : 60 4.000 mm: = 31399.7 (62799.3 aggr) liters in 4086
pixels
Oil volume 23 : 77 0.025 mm: = 0.0 (32.0 aggr) liters in 228
pixels
Oil volume 23 : 77 0.050 mm: = 0.0 (2.4 aggr) liters in 14
pixels
Oil volume 23 : 77 0.100 mm: = 17.3 (17.3 aggr) liters in 48
pixels
Oil volume 23 : 77 0.500 mm: = 310.1 (310.1 aggr) liters in 270
pixels
Oil volume 23 : 77 1.900 mm: = 52072.1 (65958.0 aggr) liters in 13719
pixels
Oil volume 23 : 77 4.000 mm: = 35565.7 (71131.7 aggr) liters in 6466
pixels
Oil volume 1 : 98 1.000 mm: = 0.0 (639.8 aggr) liters in 3243
pixels
Oil volume 1 : 98 20.000 mm: = 0.0 (172.30 aggr) liters in 16492
pixels
Total volume found = 308931 liters (conservative) 604916 liters
(aggressive)

AVIRIS Run 11 677x16835 pixels:

PRELIMINARY

Oil volume 90 : 10 0.500 mm: = 97832.2 (97832.2 aggr) liters in 3956
pixels
Oil volume 75 : 25 1.500 mm: = 83893.1 (83893.1 aggr) liters in 2302
pixels
Oil volume 80 : 20 1.500 mm: = 96098.2 (144147.4 aggr) liters in 2776
pixels
Oil volume 60 : 40 0.050 mm: = 0.0 (25.7 aggr) liters in 45
pixels
Oil volume 60 : 40 0.050 mm: = 0.0 (103.2 aggr) liters in 276
pixels
Oil volume 60 : 40 0.100 mm: = 249.0 (249.0 aggr) liters in 236
pixels
Oil volume 60 : 40 0.500 mm: = 87516.2 (87516.2 aggr) liters in 15349
pixels
Oil volume 60 : 40 1.900 mm: = 11366.7 (14397.8 aggr) liters in 570
pixels
Oil volume 60 : 40 4.000 mm: = 82638.1 (165276.1 aggr) liters in 3484
pixels
Oil volume 40 : 60 0.025 mm: = 0.0 (42.6 aggr) liters in 181
pixels
Oil volume 40 : 60 0.050 mm: = 0.0 (48.4 aggr) liters in 97
pixels
Oil volume 40 : 60 0.100 mm: = 165.0 (165.0 aggr) liters in 440
pixels
Oil volume 40 : 60 0.500 mm: = 638.5 (638.5 aggr) liters in 414
pixels
Oil volume 40 : 60 1.900 mm: = 4329.4 (5483.9 aggr) liters in 819
pixels
Oil volume 40 : 60 4.000 mm: = 33945.7 (67891.5 aggr) liters in 5384

pixels
Oil volume 23 : 77 0.025 mm: = 0.0 (95.1 aggr) liters in 670
pixels
Oil volume 23 : 77 0.050 mm: = 0.0 (17.6 aggr) liters in 75
pixels
Oil volume 23 : 77 0.100 mm: = 72.9 (72.9 aggr) liters in 175
pixels
Oil volume 23 : 77 0.500 mm: = 314.9 (314.9 aggr) liters in 318
pixels
Oil volume 23 : 77 1.900 mm: = 19684.3 (24933.4 aggr) liters in 7611
pixels
Oil volume 23 : 77 4.000 mm: = 14309.4 (28618.8 aggr) liters in 3902
pixels
Oil volume 1 : 98 1.000 mm: = 0.0 (344.7 aggr) liters in 2244
pixels
Oil volume 1 : 98 20.000 mm: = 0.0 (72217.7 aggr) liters in 8580
pixels
Total volume found = 533054 liters (conservative) 794326 liters
(aggressive)

AVIRIS Run 12 677x23878 pixels:

Oil volume 90 : 10 0.500 mm: = 31669.6 (31669.6 aggr) liters in 1655
pixels
Oil volume 75 : 25 1.500 mm: = 1061.0 (1061.0 aggr) liters in 82
pixels
Oil volume 80 : 20 1.500 mm: = 4077.0 (4077.0 aggr) liters in 251
pixels
Oil volume 60 : 40 0.025 mm: = 0.0 (27.2 aggr) liters in 35
pixels
Oil volume 60 : 40 0.050 mm: = 0.0 (5.4 aggr) liters in 10
pixels
Oil volume 60 : 40 0.100 mm: = 27.9 (27.9 aggr) liters in 23
pixels
Oil volume 60 : 40 0.500 mm: = 801.6 (801.6 aggr) liters in 200
pixels
Oil volume 60 : 40 1.900 mm: = 285.8 (362.0 aggr) liters in 29
pixels
Oil volume 60 : 40 4.000 mm: = 1086.4 (2172.8 aggr) liters in 90
pixels
Oil volume 40 : 60 0.025 mm: = 0.0 (205.3 aggr) liters in 566
pixels
Oil volume 40 : 60 0.050 mm: = 0.0 (208.3 aggr) liters in 273
pixels
Oil volume 40 : 60 0.100 mm: = 82.9 (82.9 aggr) liters in 99
pixels
Oil volume 40 : 60 0.500 mm: = 1761.2 (1761.2 aggr) liters in 560
pixels
Oil volume 40 : 60 1.900 mm: = 3326.0 (4212.9 aggr) liters in 566
pixels
Oil volume 40 : 60 4.000 mm: = 5820.1 (11640.3 aggr) liters in 918
pixels
Oil volume 23 : 77 0.025 mm: = 0.0 (221.6 aggr) liters in 861
pixels
Oil volume 23 : 77 0.050 mm: = 0.0 (68.5 aggr) liters in 172
pixels
Oil volume 23 : 77 0.100 mm: = 309.2 (309.2 aggr) liters in 419
pixels
Oil volume 23 : 77 0.500 mm: = 332.9 (332.9 aggr) liters in 202
pixels
Oil volume 23 : 77 1.900 mm: = 1244.5 (1576.4 aggr) liters in 524

PRELIMINARY

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pixels
Oil volume 23 : 77    4.000 mm: =      2926.9 (   5853.8 aggr) liters in 779
pixels
Oil volume 1 : 98     1.000 mm: =       0.0 (    66.8 aggr) liters in 343
pixels
Oil volume 1 : 98     20.000 mm: =      0.0 ( 11668.6 aggr) liters in 1101
pixels
Total volume found =      54813 liters (conservative)           80452 liters
(aggressive)
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AVIRIS Run 13 677x21281 pixels

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Oil volume 90 : 10    0.500 mm: =  219892.0 ( 219892.0 aggr) liters in 12608
pixels
Oil volume 75 : 25    1.500 mm: =  18487.5 ( 18487.5 aggr) liters in 1797
pixels
Oil volume 80 : 20    1.500 mm: =  42040.0 ( 63060.0 aggr) liters in 3009
pixels
Oil volume 60 : 40    0.025 mm: =     0.0 (    625.0 aggr) liters in 795
pixels
Oil volume 60 : 40    0.050 mm: =     0.0 (    35.0 aggr) liters in 64
pixels
Oil volume 60 : 40    0.100 mm: =     389.2 (   389.2 aggr) liters in 265
pixels
Oil volume 60 : 40    0.500 mm: =     5567.2 (  5567.2 aggr) liters in 1383
pixels
Oil volume 60 : 40    1.900 mm: =     2306.6 ( 1921.7 aggr) liters in 203
pixels
Oil volume 60 : 40    4.000 mm: =     8786.1 ( 17593.6 aggr) liters in 824
pixels
Oil volume 40 : 60    0.025 mm: =     0.0 ( 2175.1 aggr) liters in 5870
pixels
Oil volume 40 : 60    0.050 mm: =     0.0 ( 2352.7 aggr) liters in 2909
pixels
Oil volume 40 : 60    0.100 mm: =     1773.4 ( 1773.4 aggr) liters in 2088
pixels
Oil volume 40 : 60    0.500 mm: =     17638.3 ( 17638.3 aggr) liters in 4830
pixels
Oil volume 40 : 60    1.900 mm: =     40519.9 ( 51325.2 aggr) liters in 5252
pixels
Oil volume 40 : 60    4.000 mm: =     47028.6 ( 94057.2 aggr) liters in 5842
pixels
Oil volume 23 : 77    0.025 mm: =     0.0 ( 2163.2 aggr) liters in 7966
pixels
Oil volume 23 : 77    0.050 mm: =     0.0 ( 972.2 aggr) liters in 2161
pixels
Oil volume 23 : 77    0.100 mm: =     2198.0 ( 2198.0 aggr) liters in 2748
pixels
Oil volume 23 : 77    0.500 mm: =     3217.1 ( 3217.1 aggr) liters in 2066
pixels
Oil volume 23 : 77    1.900 mm: =     16173.0 ( 20485.7 aggr) liters in 6295
pixels
Oil volume 23 : 77    4.000 mm: =     32251.1 ( 64502.2 aggr) liters in 8550
pixels
Oil volume 1 : 98     1.000 mm: =     0.0 (  934.6 aggr) liters in 3151
pixels
Oil volume 1 : 98     20.000 mm: =     0.0 ( 173234.0 aggr) liters in 15198
pixels
Total volume found =      458279 liters (conservative)           765601 liters
(aggressive)
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PRELIMINARY