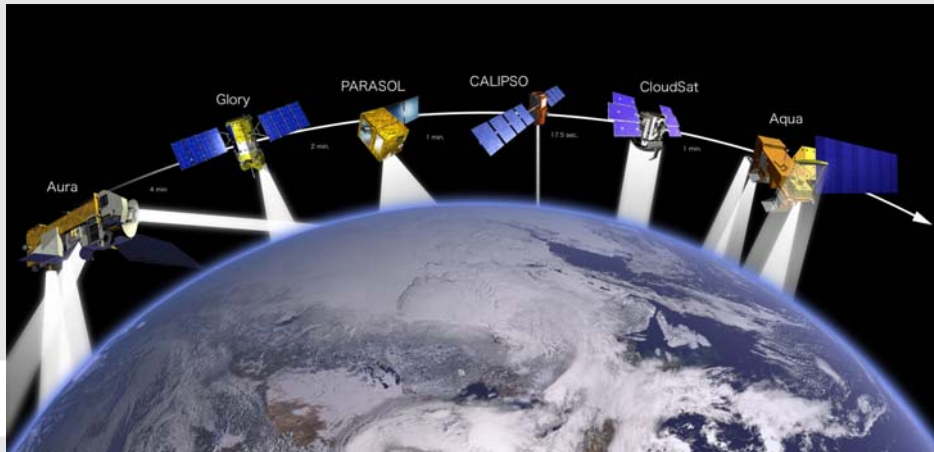




NASA Support for Gulf Oil Spill Response

Michael H. Freilich
May 19, 2010

NASA Satellite and Airborne Platforms



- **NASA is providing measurements from Earth-observing research satellites and aircraft instruments to support both responders and science-based monitoring of the oil spill and its impacts on the coastal ecosystem**

NASA Satellite Imagery - MODIS

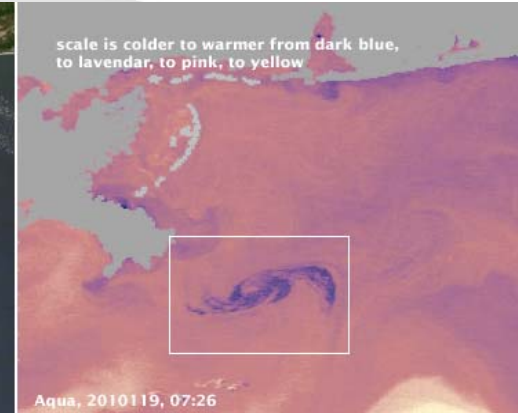


MODIS image of slick on 9 May 2010

2300 km swath width; ~4 passes/day
250 m spatial resolution; requires clear skies
MODIS instruments on 2 missions: Terra and Aqua



Terra – Visible (day)

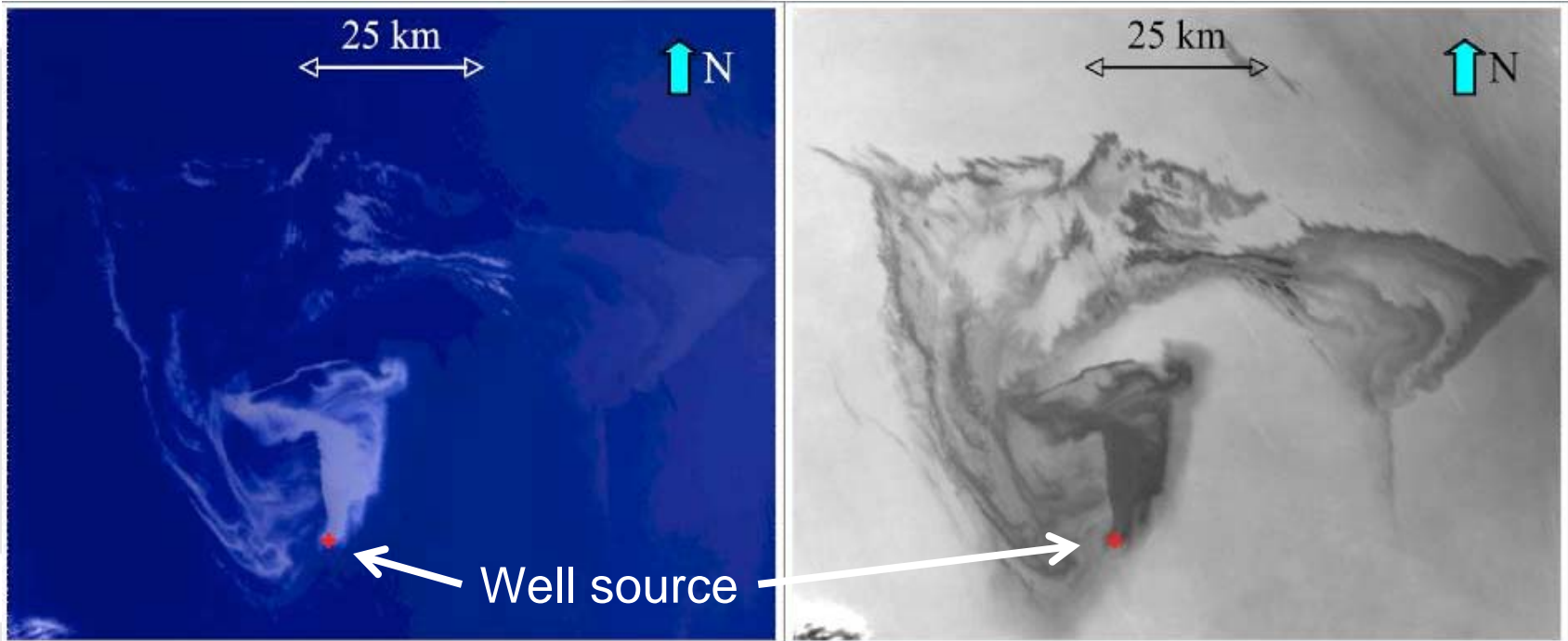


Aqua – Infrared (night)

29 April 2010

The broad coverage and high spatial resolution of satellite-based imagery allows accurate mapping of the *surface manifestation* of the slick in cloud-free conditions

NASA Satellite Imagery – MISR



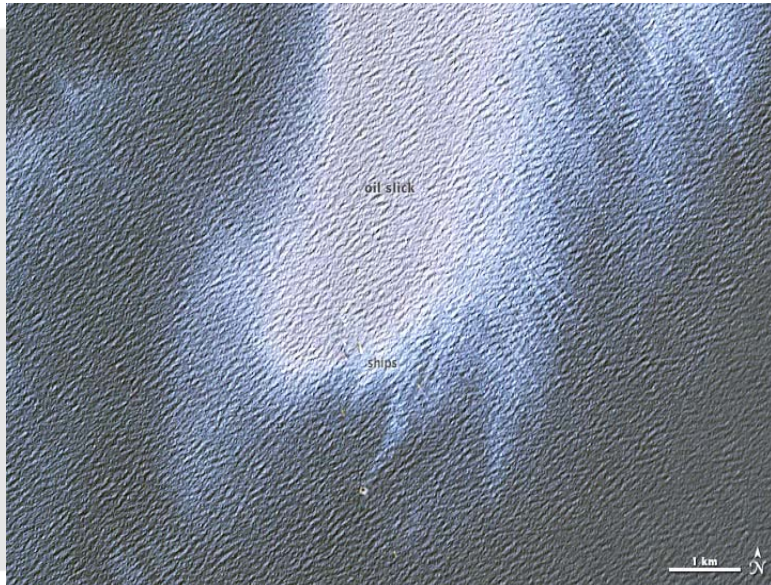
Nadir Camera – slick is light

Fore/Aft composite – slick is dark

MISR image of slick on 1 May 2010

**360 km swath width - partial slick sampling
275 m spatial resolution; requires clear skies**

MISR instrument on Terra - 9 cameras, 4 frequencies



ASTER image of slick on 1 May 2010

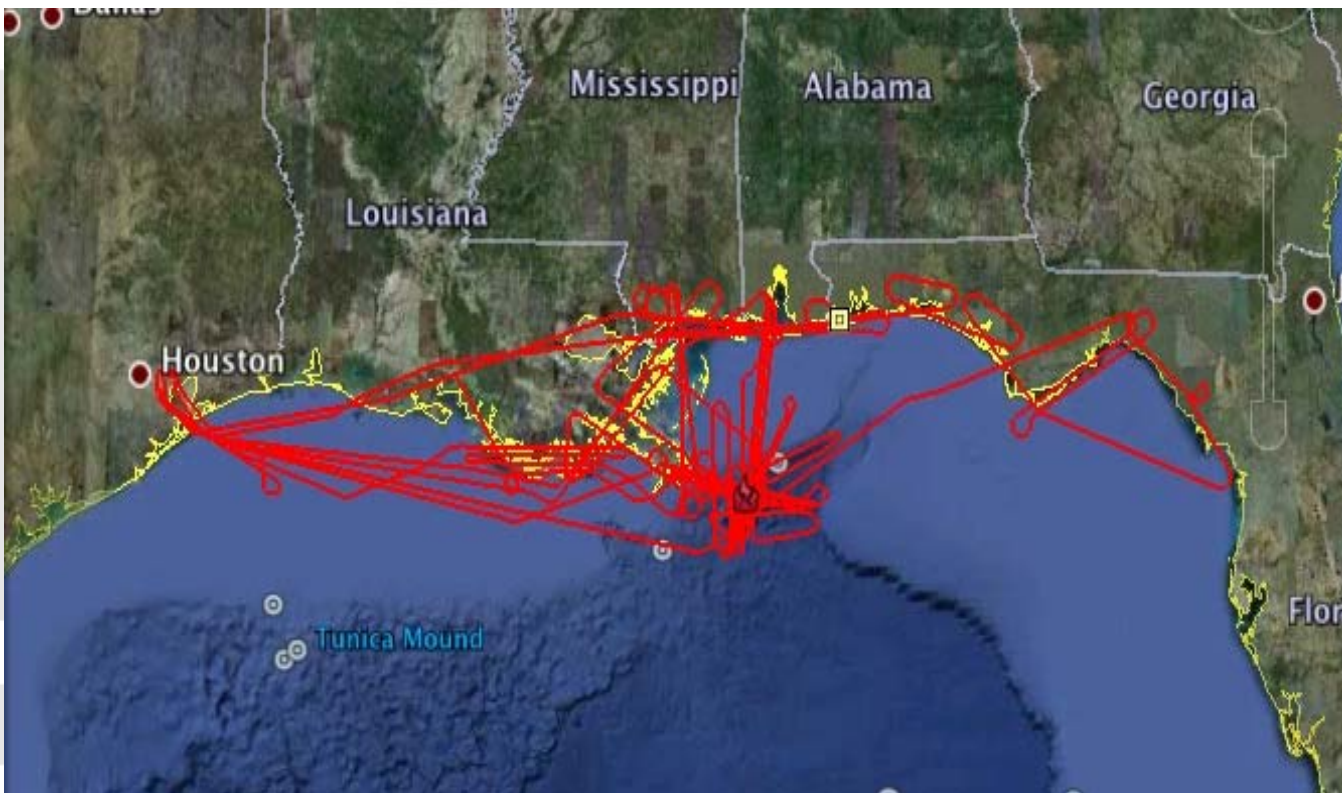
**60 km swath width - partial slick sampling
15-90 m spatial resolution; requires clear skies
Data obtained 1, 3, 8, 10, 14, 17 May 2010
ASTER instrument on Terra - visible, near-infrared,
thermal infrared, short-wave infrared channels**



EO-1/Advanced Land Imager, April 2010

**37 km swath width - partial slick sampling
10-30 m spatial resolution; requires clear skies
Data obtained 24, 25, 29, 30 April; 5, 7 May
ALI instrument on EO-1: 9 bands, visible,
near-infrared, short-wave infrared**

NASA Airborne Imagery – AVIRIS



**Airborne Visible/Infrared Imaging Spectrometer and Cirrus Digital Camera System on ER-2
Flights 6-13 May 2010 (additional sorties have been flown on 17, 18 May)**

Narrow swath width - partial slick sampling

9 m, 15 m spatial resolution (28kft, 45 kft altitude); requires clear skies

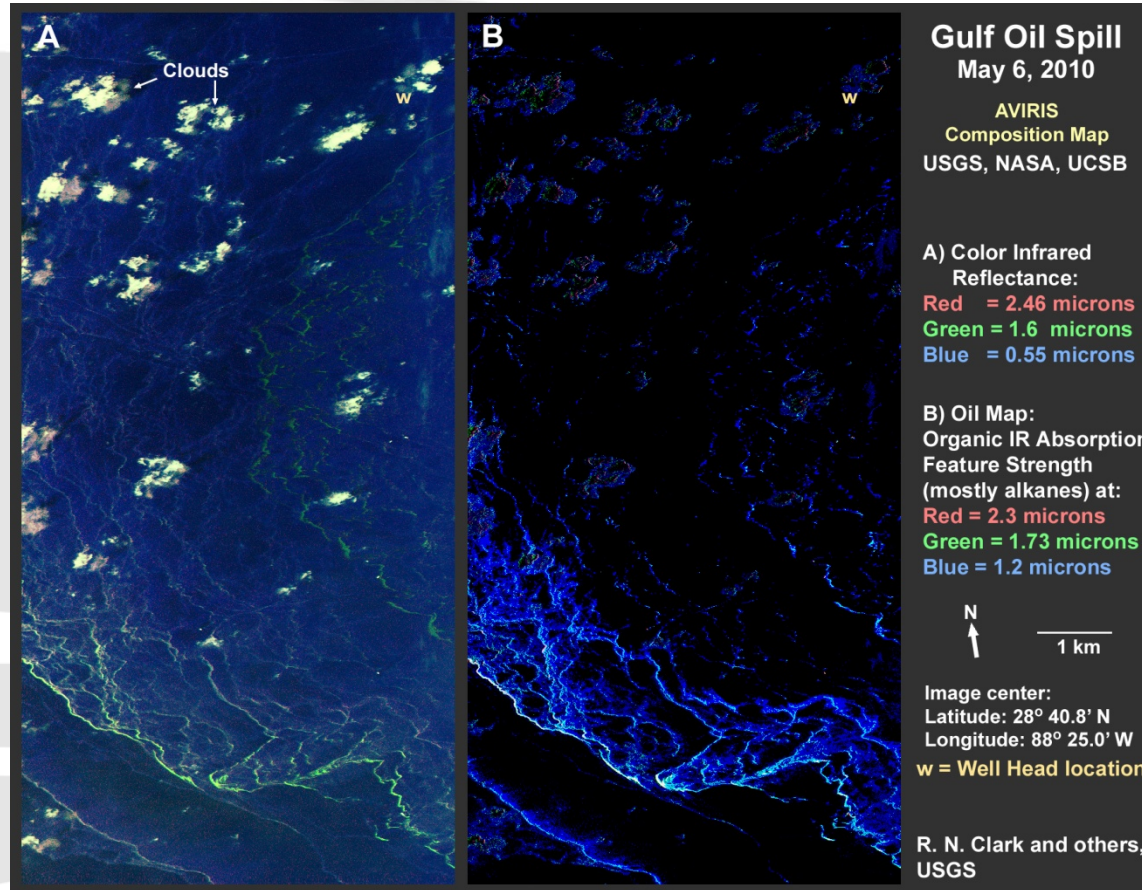
Data obtained 6, 10, 11, 13 17, 18 May 2010 (4-7 hours of data per flight)

AVIRIS instrument (JPL) on ER-2 - 224 frequencies hyperspectral; DCS instrument (ARC) provides 1.5m resolution

ER-2 based at Ellington Field; Processing at Johnson Space Center

**Multi-NASA-center, multi-agency, collaboration yields processed airborne data products
available to USGS and NOAA within 6-12 hours of plane landing**

NASA Airborne Imagery – AVIRIS



Locations of high oil concentrations from AVIRIS data (blue in right image)

Additional NASA Airborne Contributions



**Langley Research Center B-200 King Air
carrying the HRSL (High Spectral
Resolution Lidar) and the GISS
RSP (Research Scanning Polarimeter) instruments**

**Experimental determination of slick reflective
properties, possible slick thickness, and near-
surface phytoplankton concentrations**

Calipso (satellite) calibration

10, 11 May: 6.1 hours total



**NASA Gulfstream-III
carrying the UAVSAR instrument**

**L-band radar for coastal ecosystem
monitoring – penetrates clouds**

**Previous flights on Gulf Coast in
Fall, 2009 (baseline)**

**Will deploy Monday, 24 May for
at least 20 hours of flight**



- Satellite data products provided daily to the USGS HDDS (Hazardous Data Distribution System) for use by first-responders and researchers
 - Also archived/distributed by NASA's ESDIS research data system
- AVIRIS/DCS aircraft data products are generated rapidly by NASA teams deployed at Johnson Space Center; processed data made available within ~12 hours to HDDS and the USGS Spectroscopy Lab in Denver
 - Also processed/archived/distributed by AVIRIS Data Facility at JPL (AVIRIS), ESDIS (DCS)
 - Processed data disks shipped overnight to National Geospatial-Intelligence Agency