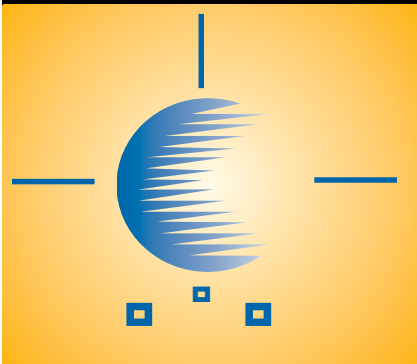


# Real-Time GPS Structural Monitoring

A Presentation to the  
Southeast Levee Flood  
Protection Authority - East



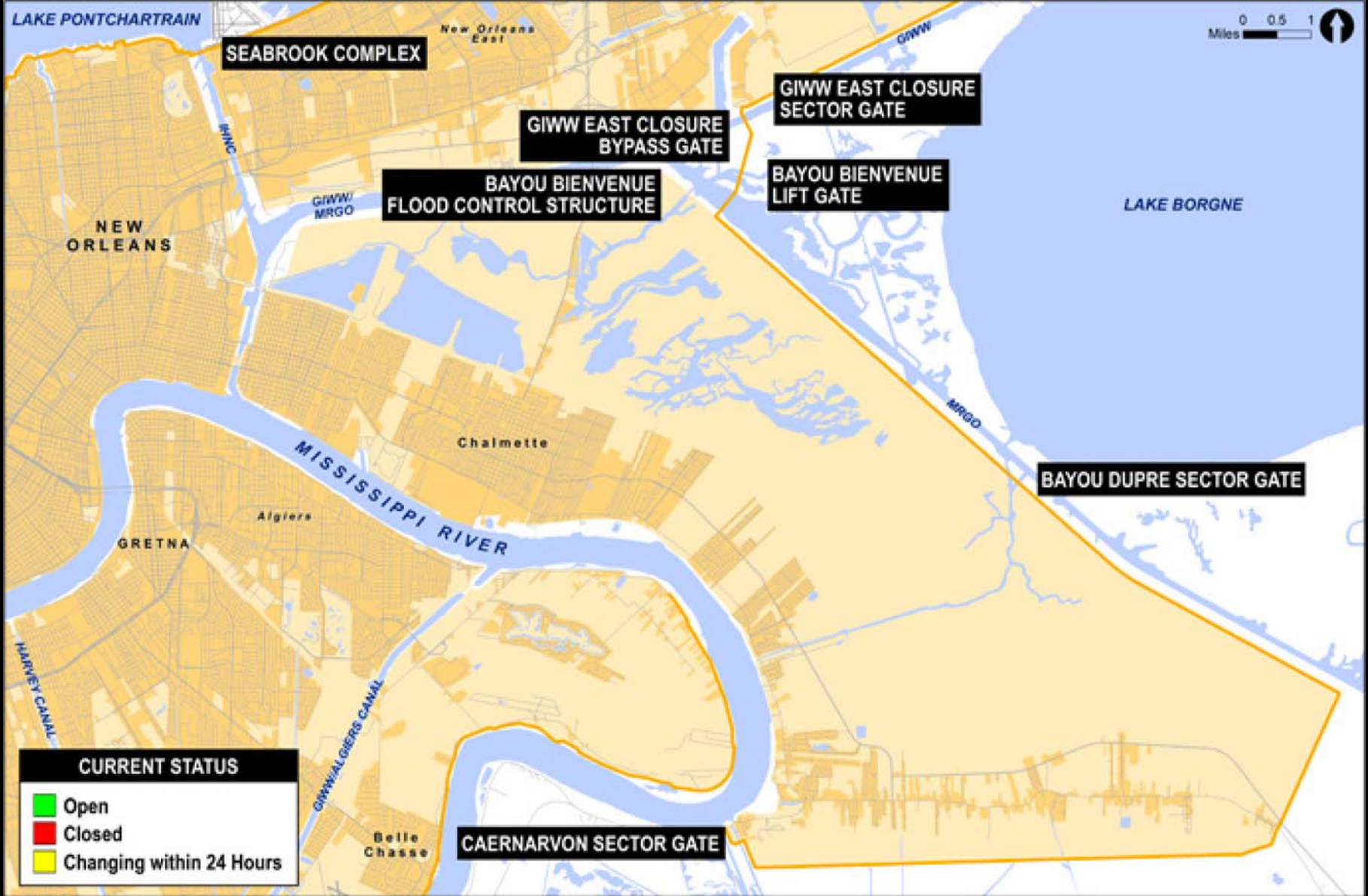
Cliff Mugnier  
Chief of Geodesy  
Center for GeoInformatics  
LOUISIANA STATE UNIVERSITY  
[cjmce@LSU.edu](mailto:cjmce@LSU.edu)

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**SLFPAE-East Resolution No. 08-18-16-10**

**AGREEMENT WITH LSU C4G FOR THE  
INSTALLATION OF GPS MONITORING  
HARDWARE AND SOFTWARE FOR  
FOUR RECEIVERS**







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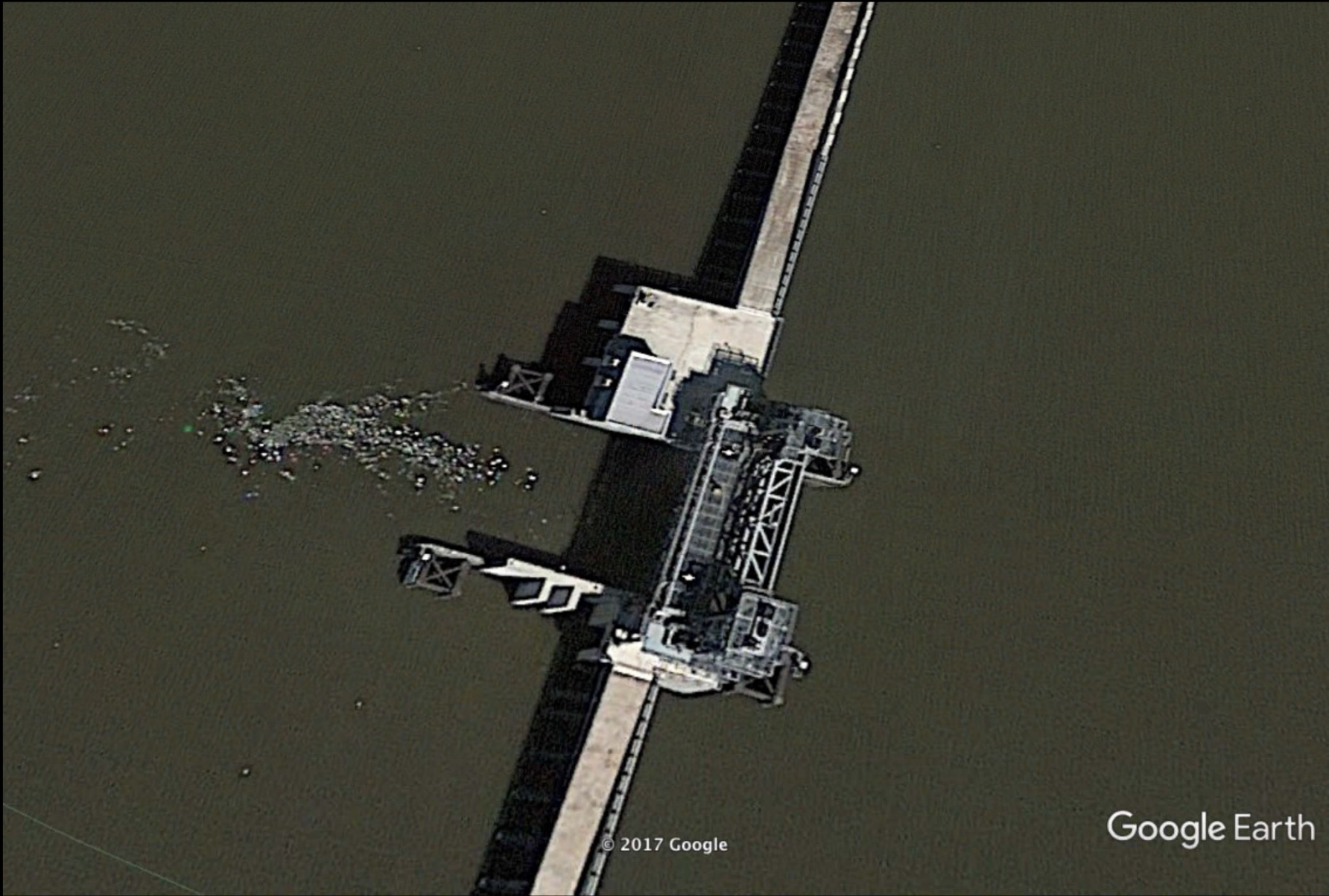


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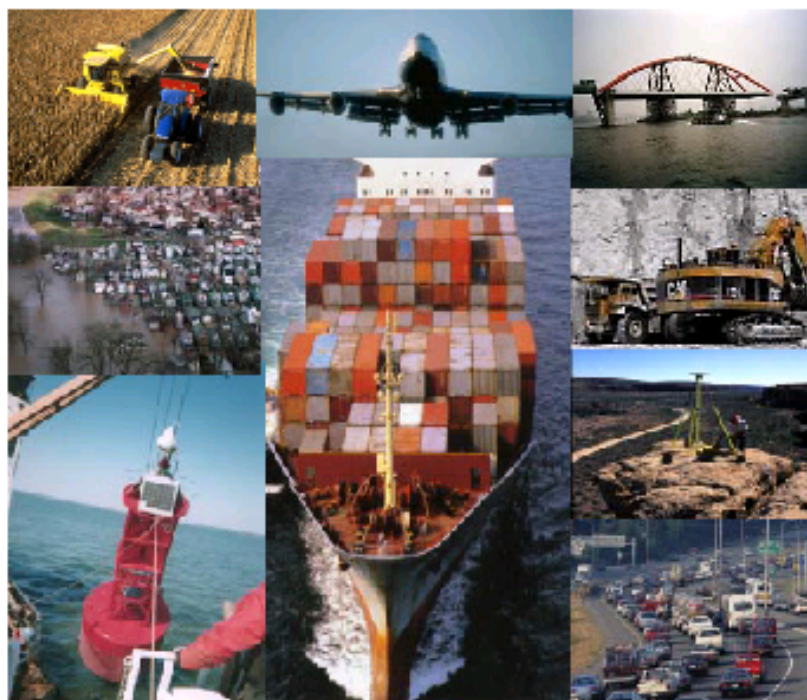




# National Height Modernization Study

Report to Congress

**Executive Summary**



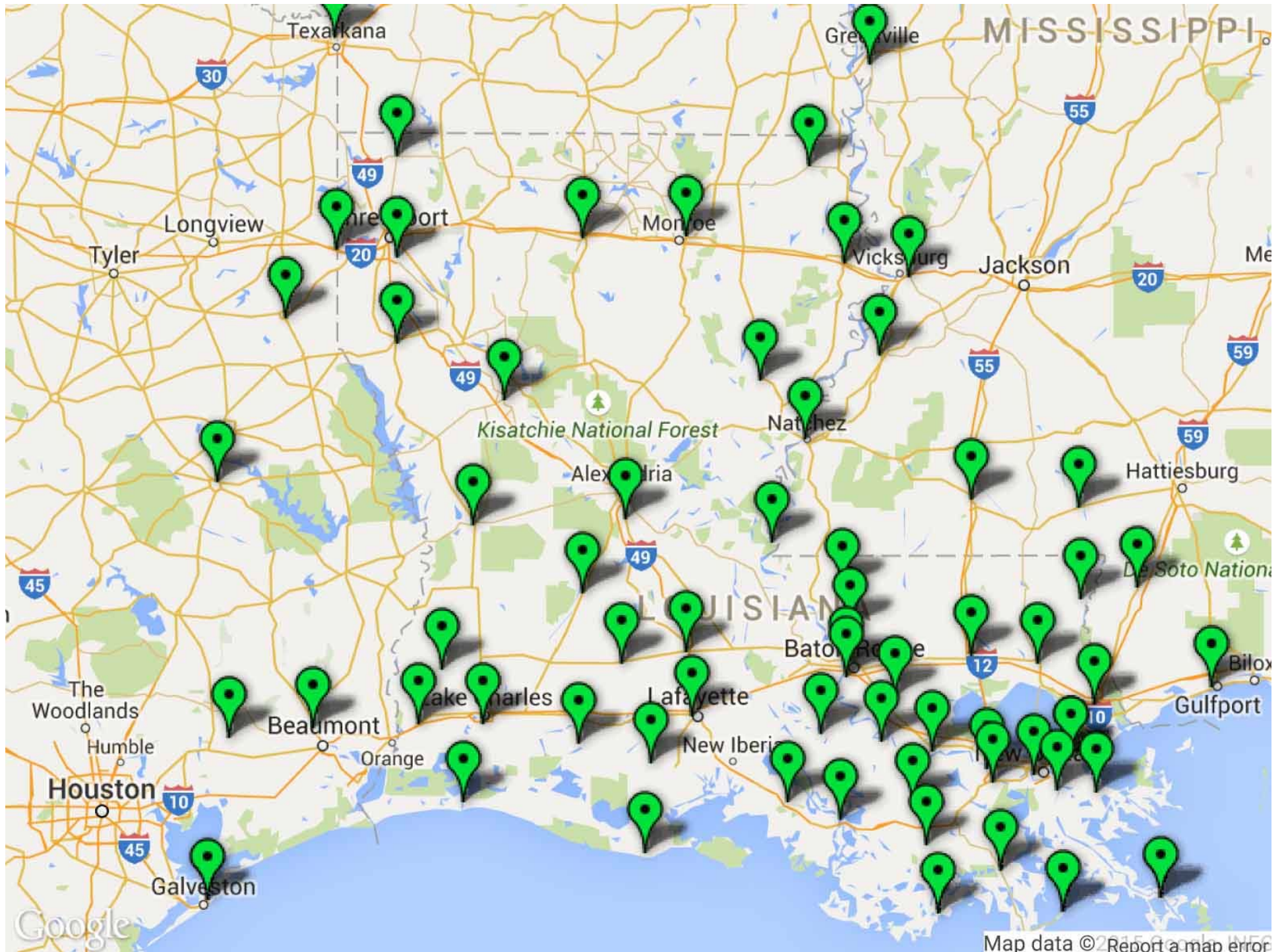
**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
National Ocean Service  
National Geodetic Survey

June 1998

# Subsidence









# FG-5 Absolute Gravity Meter ( $\pm 1\mu\text{gal}$ )



# Absolute Gravity Observed in New Orleans:

March, 1989	979,316,847.7 $\mu$ gals
Sept., 1991	979,316,854.2 $\mu$ gals

(-0.91 centimeters per year)

# Absolute Gravity Observed in New Orleans:

Nov., 1993      979,316,856.3  $\mu$ gals

Aug., 1994      979,316,860.6  $\mu$ gals

(-0.91 centimeters per year)



# Absolute Gravity Observations

- **In 2002:**

- UNO (5<sup>th</sup> time)
- Stennis Space Center (2<sup>nd</sup>)
- Loyola University
- Southeastern Louisiana Univ.
- LSU
- McNeese State Univ.
- Venice-Boothville H.S.
- LUMCON @ Cocodrie
- Oakdale H.S.
- LSU Alexandria
- Old River Aux. Control Structure
- Nicholls State Univ.
- Univ. of Louisiana in Lafayette
- Northwestern State Univ.
- Sicily Island H.S.
- LSU Shreveport
- Louisiana Tech Univ.

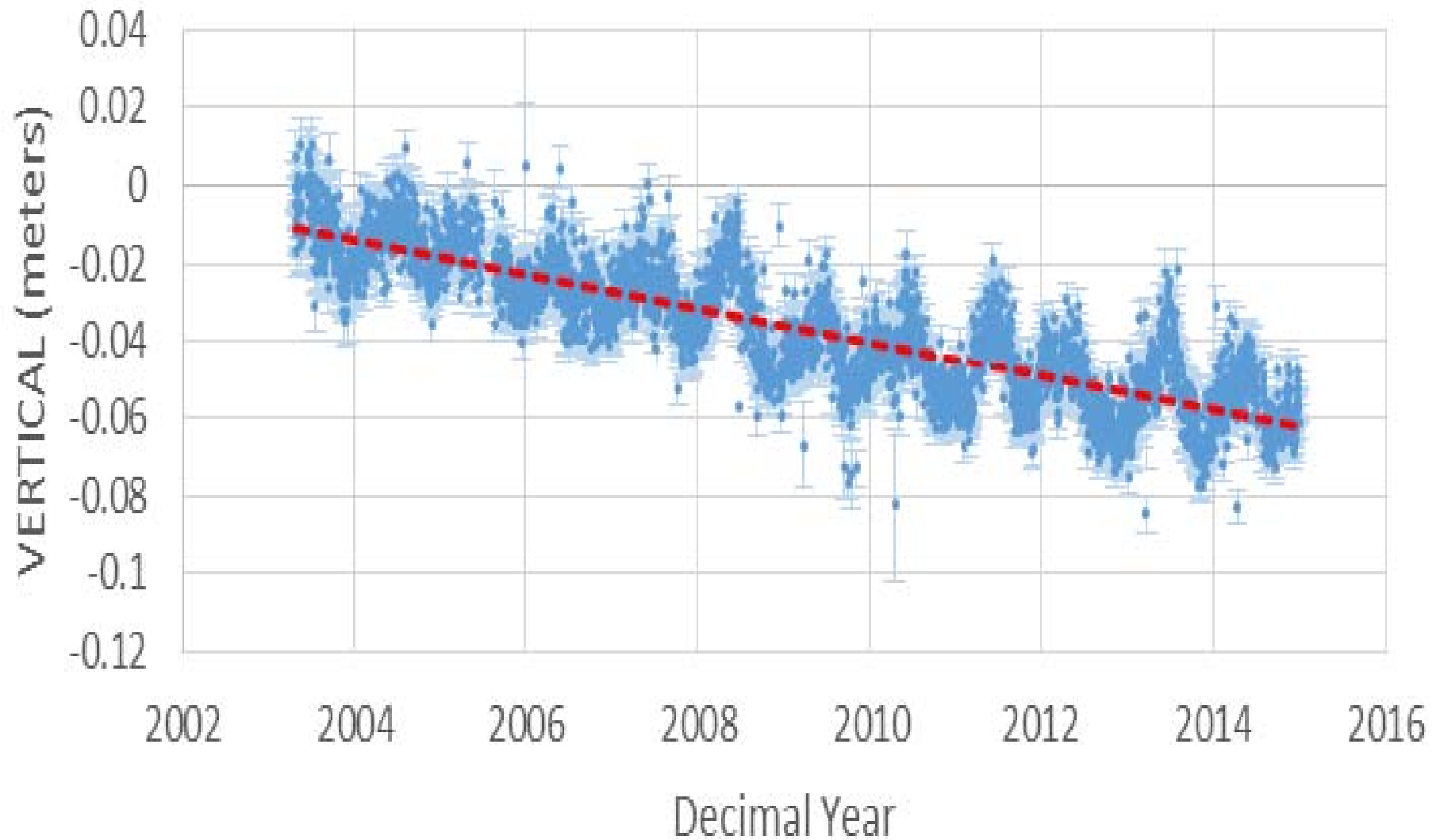
- **In 2006:**

- UNO (6<sup>th</sup> time)
- Stennis Space Center (3<sup>rd</sup>)
- Loyola University (2<sup>nd</sup>)
- Southeastern Louisiana Univ. (2<sup>nd</sup>)
- LSU (2<sup>nd</sup>)
- McNeese State Univ. (2<sup>nd</sup>)
- Venice-Boothville H.S. (2<sup>nd</sup>)
- LUMCON @ Cocodrie (2<sup>nd</sup>)
- Oakdale H.S. (2<sup>nd</sup>)
- LSU Alexandria (2<sup>nd</sup>)
- Old River Aux. Control Structure (2<sup>nd</sup>)
- Nicholls State Univ. (2<sup>nd</sup>)
- Univ. of Louisiana in Lafayette (2<sup>nd</sup>)
- Grand Isle U.S.C.G. Station
- Lamar Univ. in Beaumont
- Univ. of Mississippi in Hattiesburg

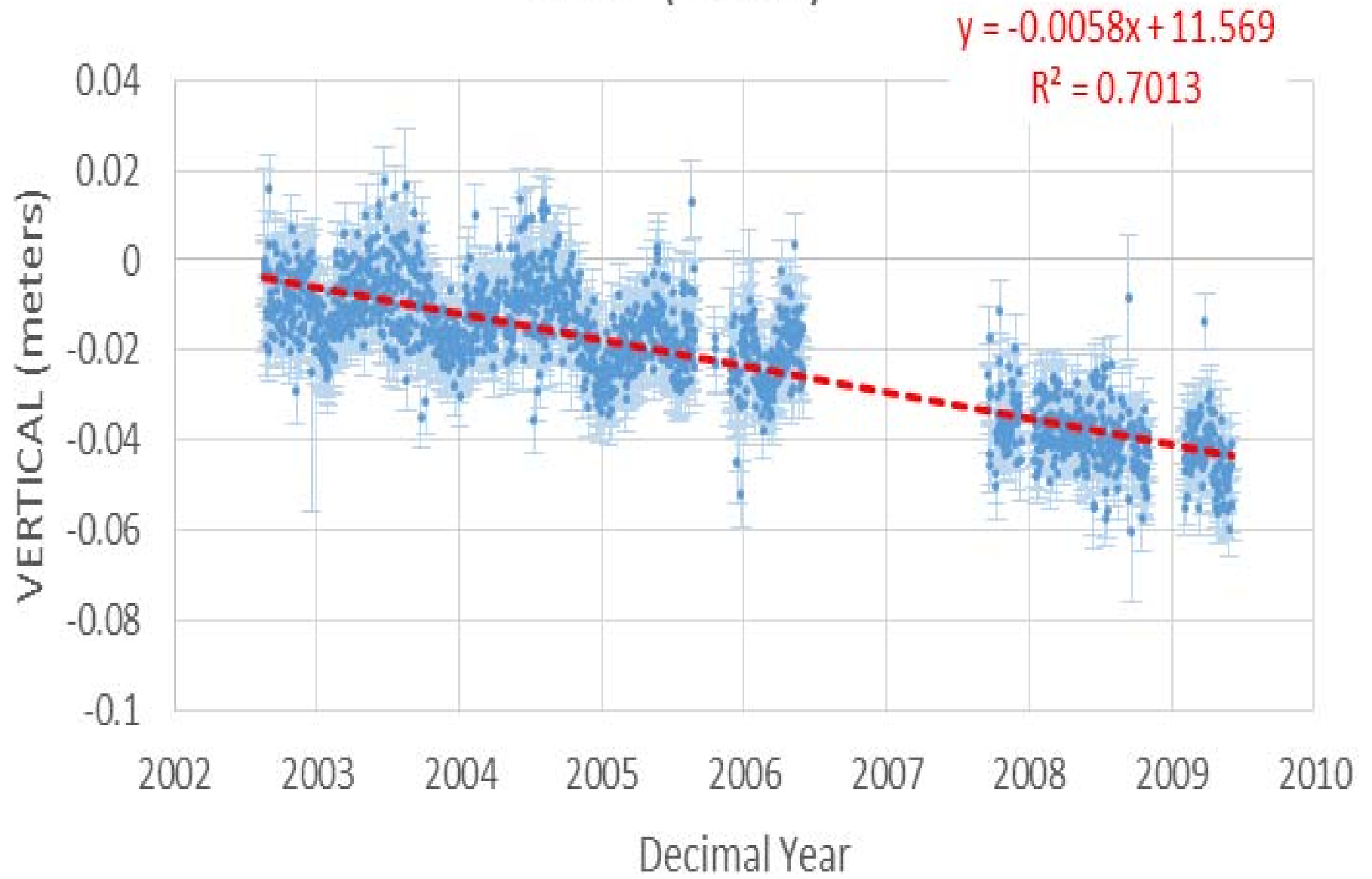
1LSU (IGS08)

$$y = -0.0045x + 8.9105$$

$$R^2 = 0.7419$$

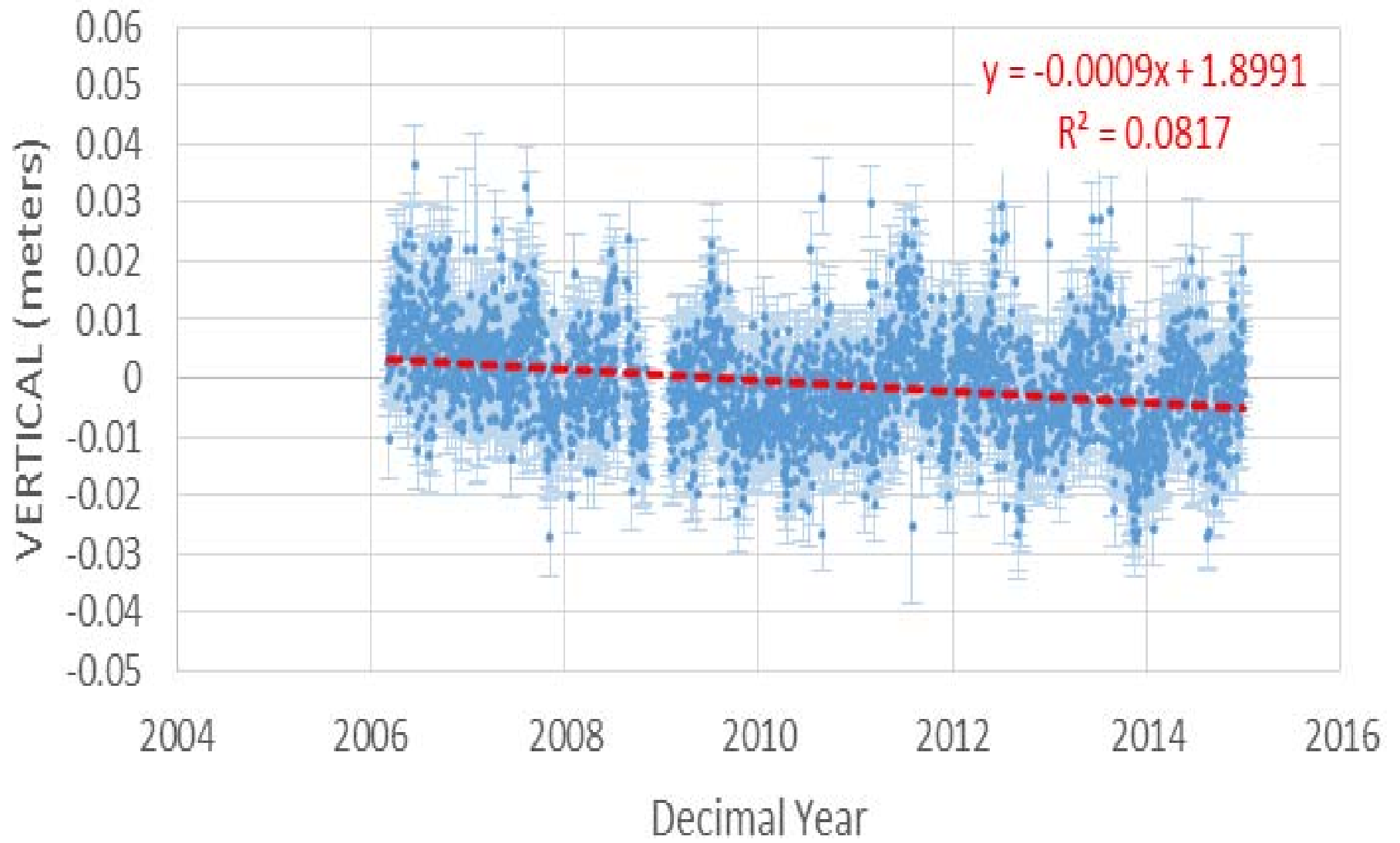


# BVHS (IGS08)

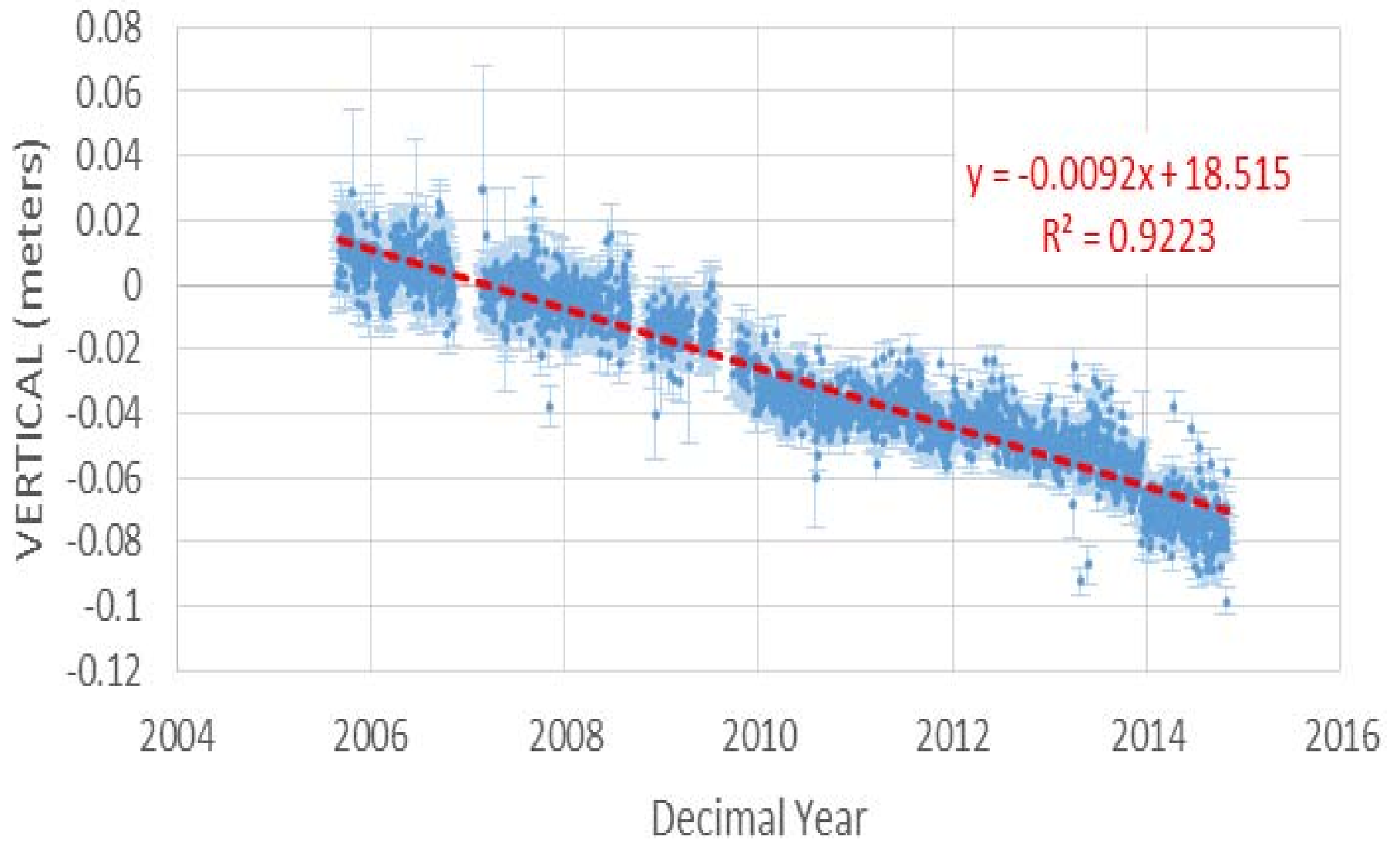




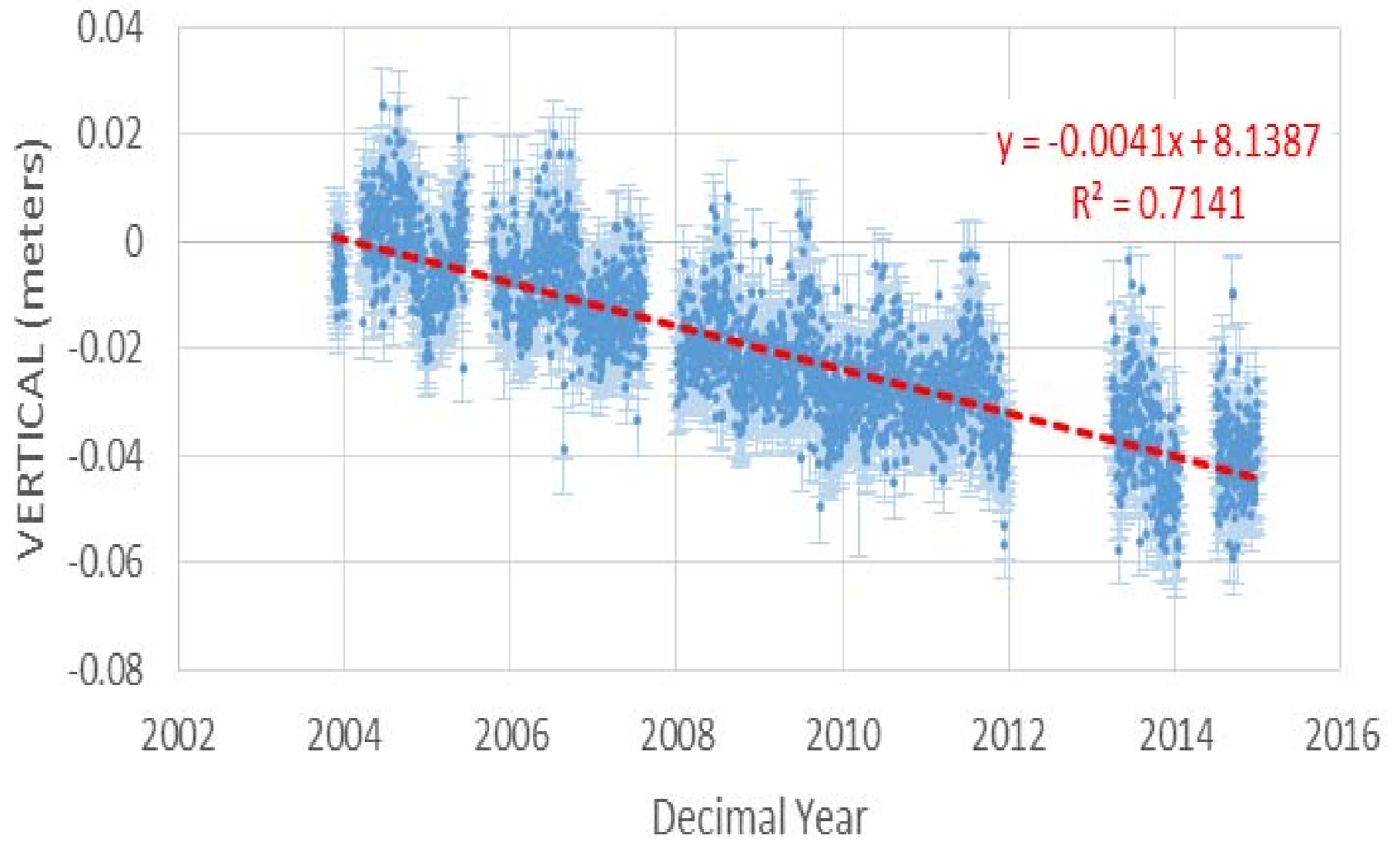
# DSTR (IGS08)



# GRIS (IGS08)

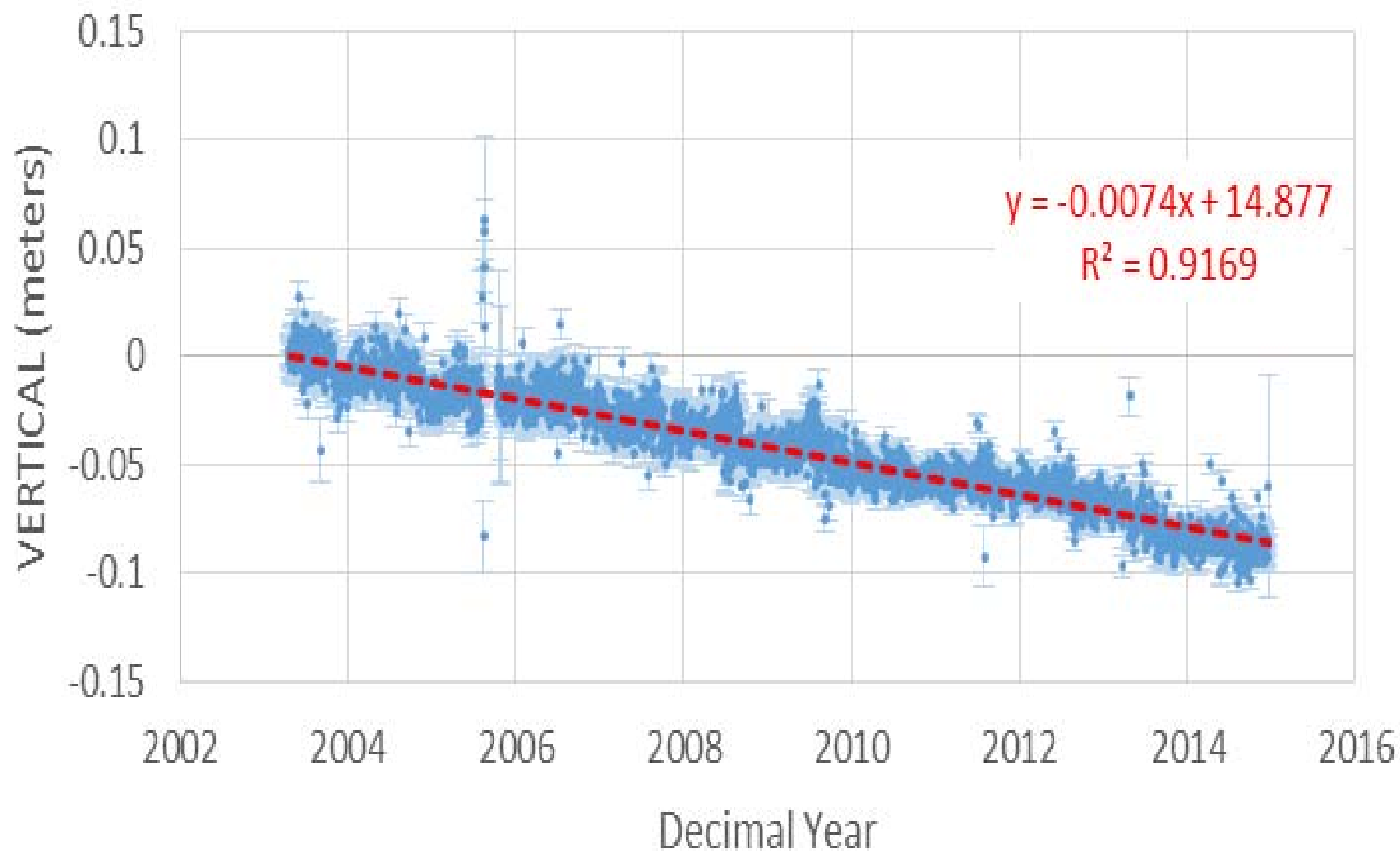


# HOUM (IGS08)

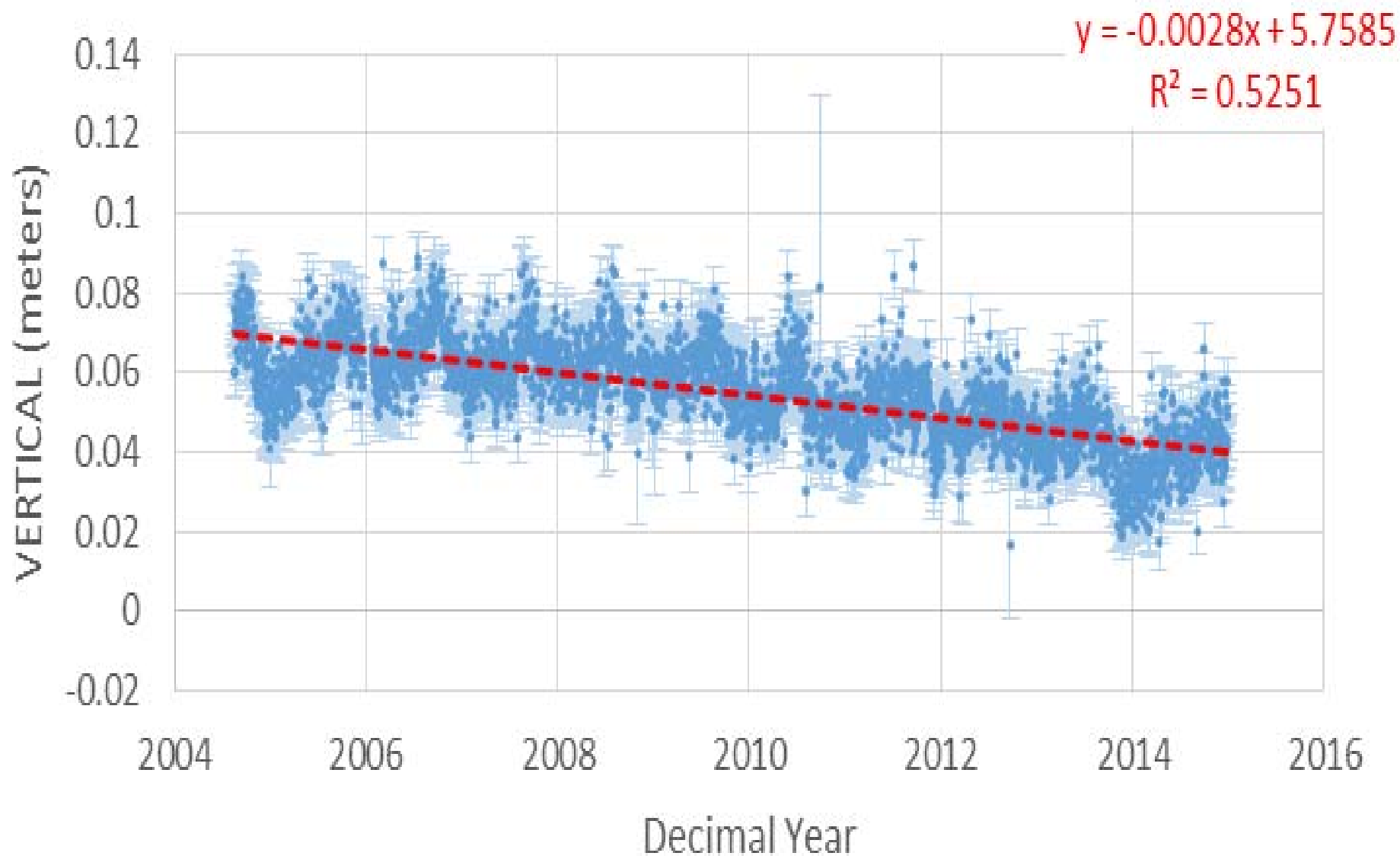




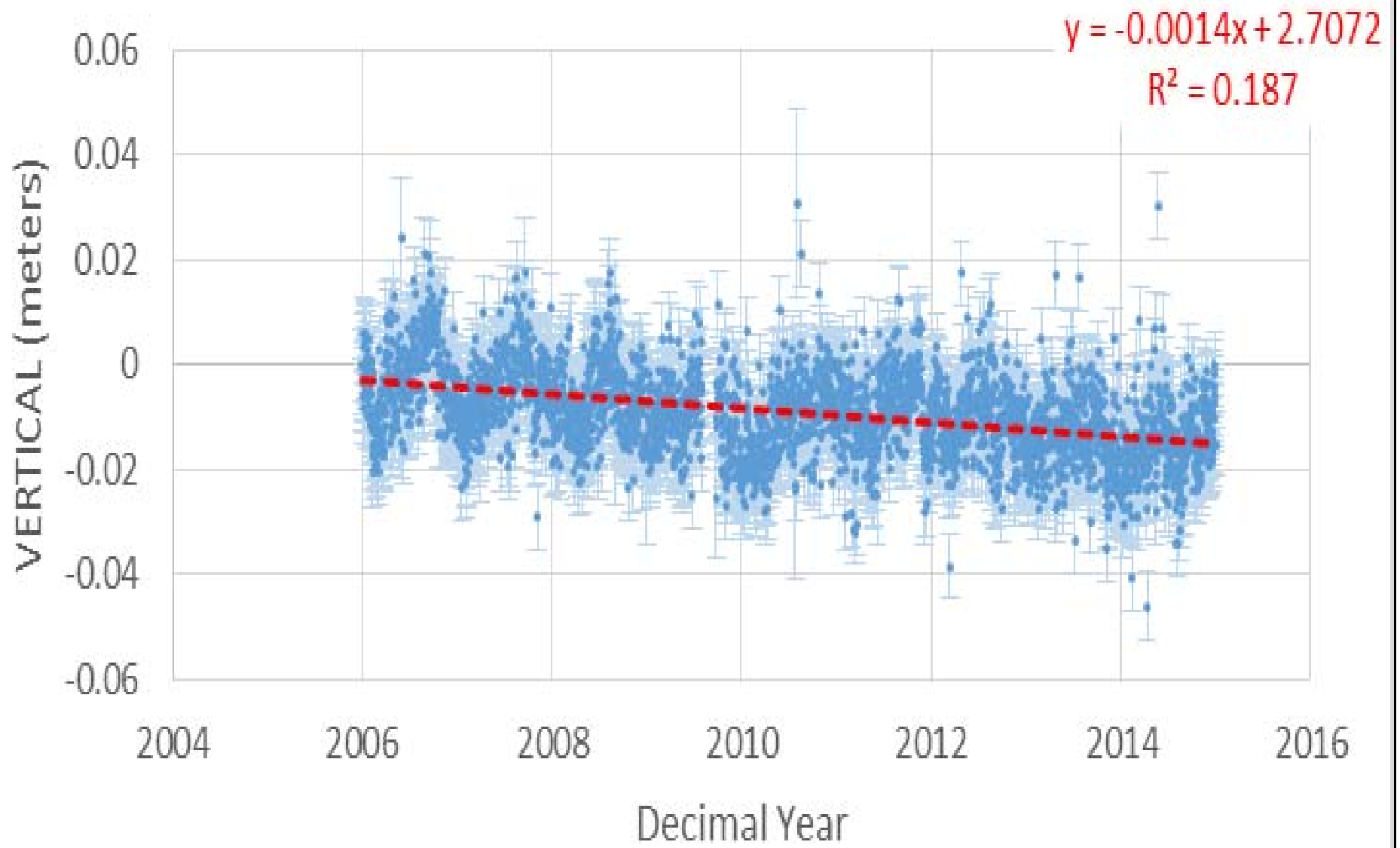
# LMCN (IGS08)



# SHRV (IGS08)



# SIHS (IGS08)





# 4-D Real-Time Monitoring

- 1. Resolution = Equipment & Supplies
- 2. Needed:
  - Personnel
  - Installation
  - Maintenance
  - Monitoring & Analysis
  - Reporting

Questions?

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