Federal Geodetic Control Subcommittee Update

Ronnie Taylor
Acting Director, National Geodetic Survey
Alternate Chair, Federal Geodetic Control Subcommittee

Federal Geographic Data Committee Coordination Group Meeting
11 January 2011

FederalGeographicDataCommittee

fgdc

Overview

- Geodetic control:
  overview & evolution

- FGDC interactions
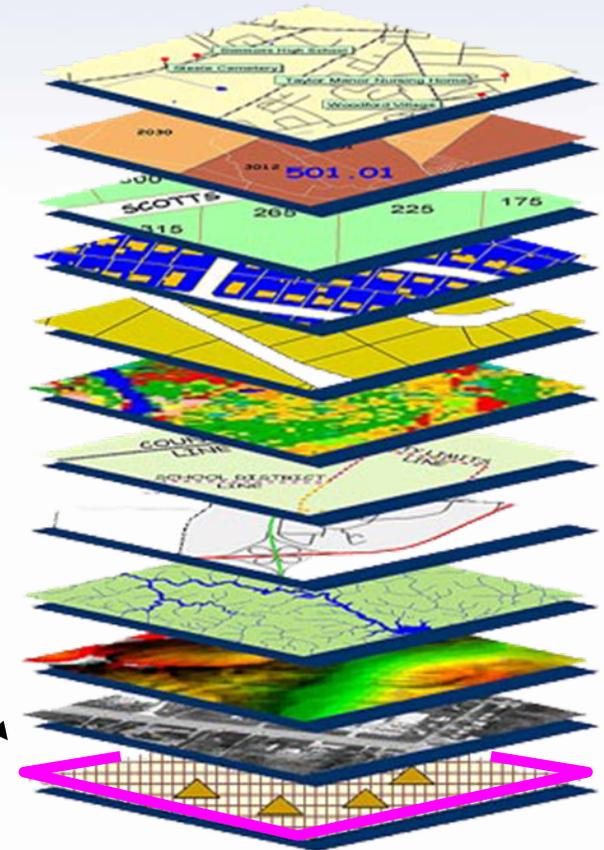
- FGDC opportunities

Coordination begins with good coordinates

<u>Geodetic control</u> is the foundation for all geospatial products.

Geodetic Control is the critical "basemap" layer for GIS applications

Source: Zurich-American Insurance Group

•Geodetic control: overview & evolution

National Spatial Reference System (NSRS)

The NSRS is a consistent coordinate system that defines latitude, longitude, height, scale, gravity, and orientation throughout the United States.

One common datum for all FGDC products (yours too?)

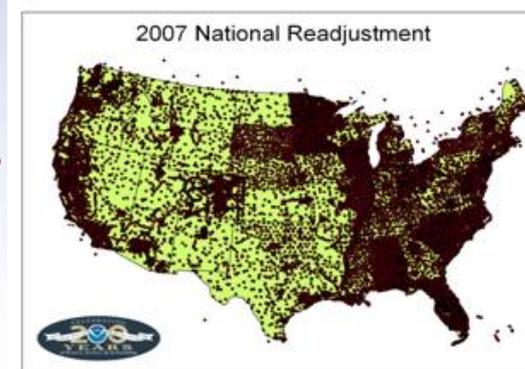**Evolving from passive to active to real-time augmentations→**

•Geodetic control: overview & evolution
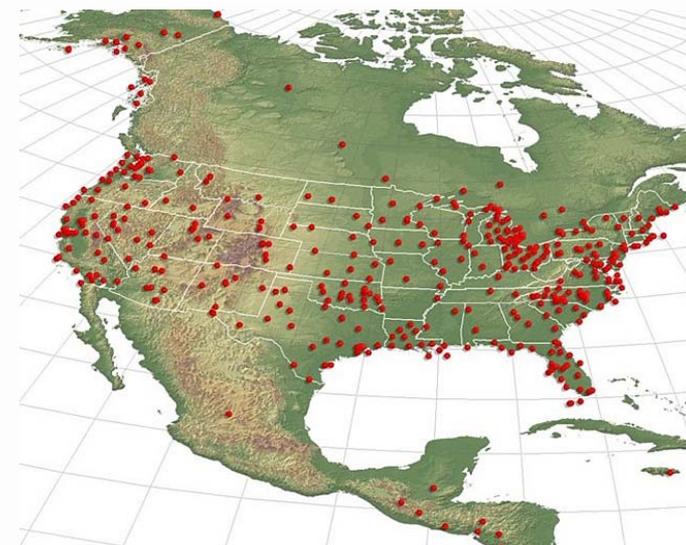
The NSRS has evolved

1 Million Monuments
(Separate Horizontal and Vertical Systems)

→

70,000 Passive Marks
(3-Dimensional)

2007 National Readjustment

Passive Marks
(Limited Knowledge of Stability)

→

1,500 CORS
(Time Dependent System Possible; 4-Dimensional)

GPS CORS → GNSS CORS

Global Navigation Satellite System

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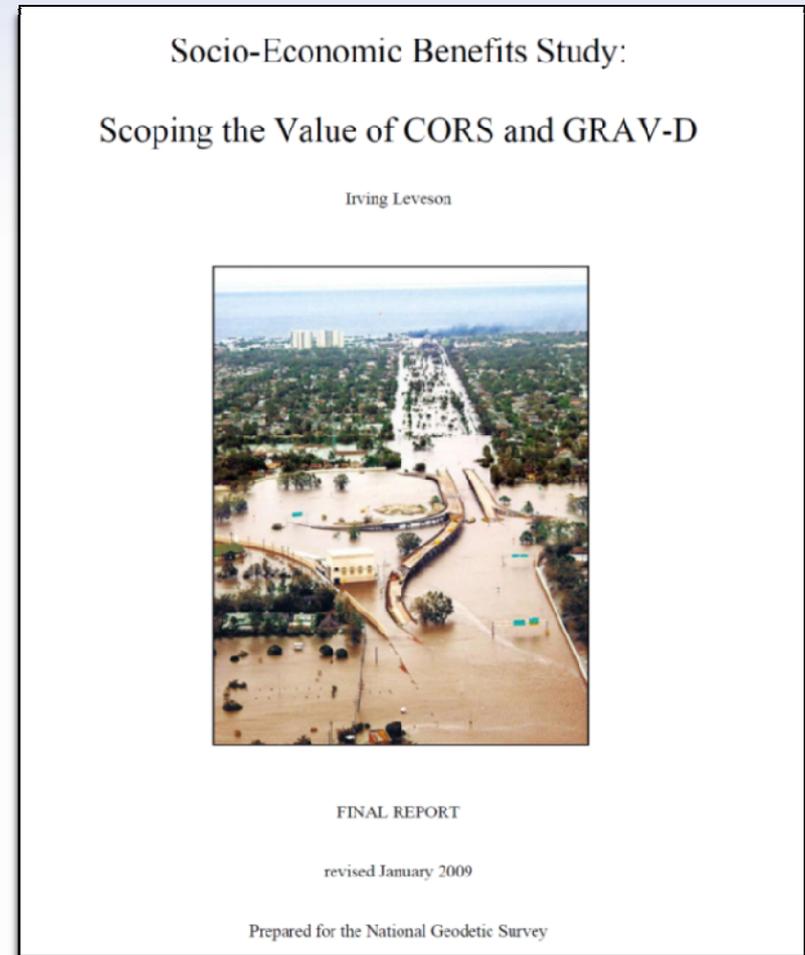
Location, Location, and Elevation!
NGS Positioning Products Worth Billions!

•Rolled-out to Congress June 15, 2009

•**NSRS** worth **$2.4 billion per year, $22 billion over 15 years** at a discounted rate.

•**CORS** worth **$758 million per year**; **$6.9 billion over 15 years** at a discounted rate.

•**GRAV-D** worth **$282 million per year**; **$4.8 billion over 15** years at a discounted rate, which includes $2.2 billion for improved floodplain management.

Socio-Economic Benefits Study:

Scoping the Value of CORS and GRAV-D

Irving Leveson

FINAL REPORT

revised January 2009

Prepared for the National Geodetic Survey

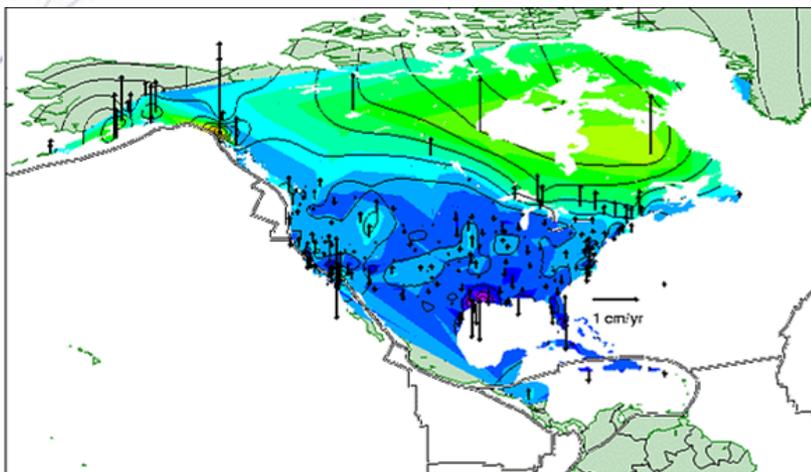•Geodetic control: overview & evolution

Everyone thinks they are a Geodesist

- GPS use has greatly increased

- traditional FGDC products now have multiple uses and scales
  - accuracy is addictive

- network accuracy or local accuracy?
 - what datum are YOU on?

•Geodetic control: overview & evolution

How accurate is the NSRS?

ITRF 00

2.2 meters

NAD 83

NAD83 vs WGS84 vs ITRF
NAVD88 vs gravimetric geoid

Crustal velocities
Passive networks are aging

(instability, accessibility, loss)

•Geodetic control: overview & evolution

Geodetic Control is Evolving:
the NGS 10 year plan

- Approved on 8 January 2008
- Refines mission, vision, and strategy for the future of NGS actions.
- **Emphasis is on building outside capacity**.
- Includes:
  - Modernize the Geometric ("Horizontal") Datum
  - Modernize the Geopotential ("Vertical") Datum
  - Migrate the Coastal Mapping Program Toward IOCM
  - Evolve Core Capabilities
  - Increase Agency Visibility
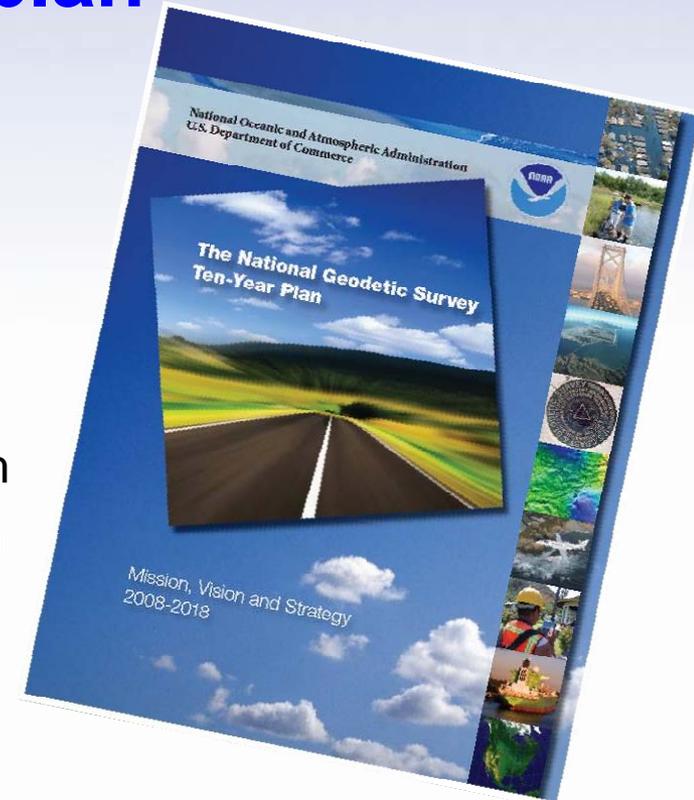
The plan is available on the National Geodetic Survey's home page:
http://www.ngs.noaa.gov

•Geodetic control: overview & evolution

Height Modernization

Accurate heights via GPS, along with traditional leveling, gravity, and modern remote sensing observations. Critical for:

- – Dam, levee safety
- – Evacuation planning
- – Hazard mitigation
- – Flood-plain mapping
- – Subsidence monitoring
- – Determining high-water marks

New! GEOID09

•Geodetic control: overview & evolution

The Future of Height Mod: **GRAV-D**

Gravity for the **R**edefinition of the **A**merican **V**ertical **D**atum

- GRAV-D
  - Airborne gravity survey (10 years)
  - Gravity monitoring into the future
  - Coastal areas surveyed first
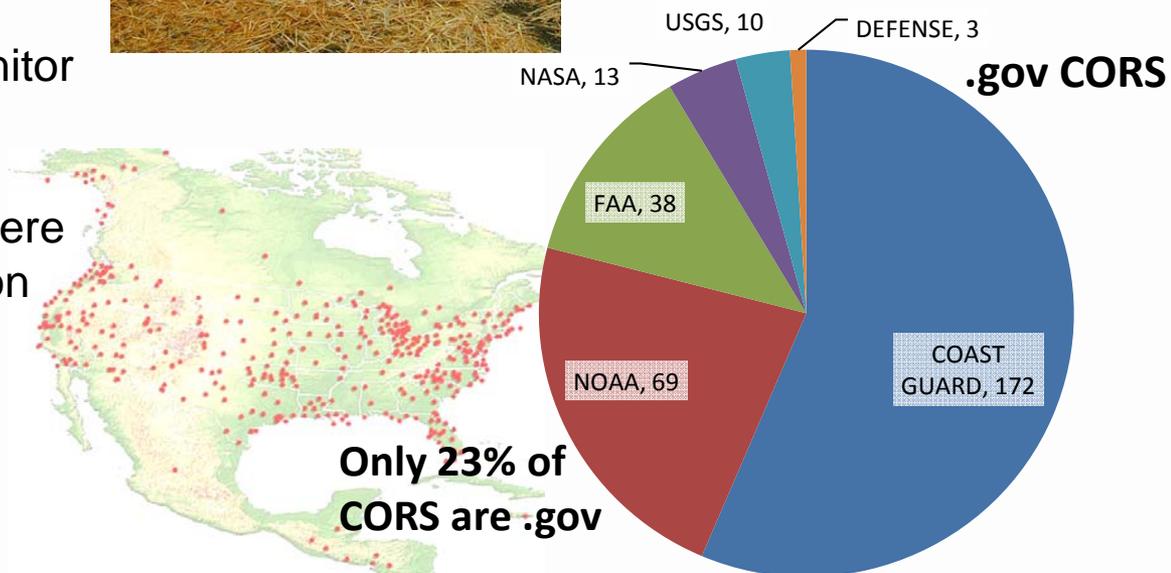 - All USA states and territories
  - **www.ngs.noaa.gov/GRAV-D**

- 2018-2022 Targets:
  - Orthometric heights ("elevations" on maps) good to 2 cm anywhere, anytime from GNSS technology
  - Height changes easily monitored using new vertical datum

- Gravity for the Nation' benefits
  - **Imagery for the Nation**
  - **Lidar for the Nation**
  - **Elevation for the Nation**

The GRAV-D Project:
Gravity for the Redefinition
of the American Vertical Datum

A NOAA contribution to the
Global Geodetic Observing System (GGOS)
component of the Global Earth Observation
System of Systems (GEOSS)

National Oceanic and Atmospheric Administration · National Ocean Service · National Geodetic Survey

•Geodetic control: overview & evolution
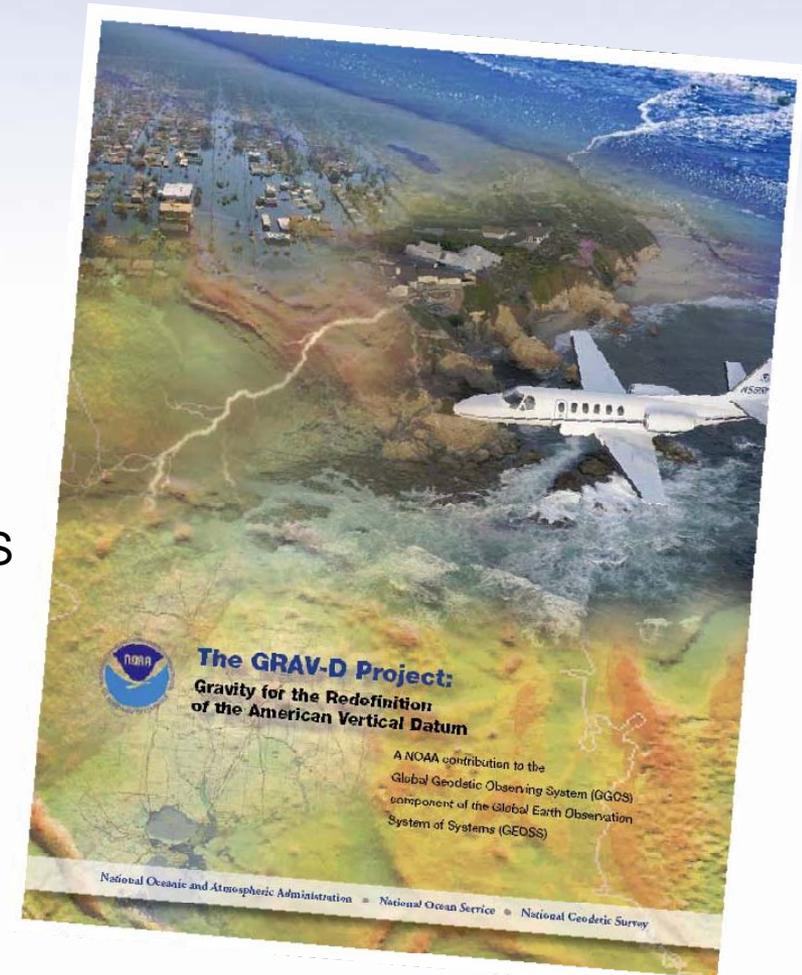
FGDC members provide CORS

Continuously Operating Reference Stations (CORS)

- Continuous GPS data for post-processing augmentations.

- Provide accurate interface between land and ocean observing systems.

- CORS data are also used to monitor and predict the distribution of moisture in the atmosphere, improving our ability to predict severe weather events, and the distribution of electrons in the atmosphere, to determine space weather.

- A socioeconomic scoping study realized $6.9 billion in socio-economic benefits over 15 years

Only 23% of CORS are .gov

Pie chart: USGS, 10; DEFENSE, 3; NASA, 13; FAA, 38; NOAA, 69; COAST GUARD, 172; **.gov CORS**

- FGDC agency interactions

FGDC members use OPUS

**Online Positioning
User Service (OPUS)**

- GPS data processed using
  NGS computers and software.

- Your position via e-mail

- 1-2 centimeters accuracy

- Over 1 million positions served

- Rapid-Static now uses
  15 minutes of data versus 2-4 hours

- New publishing feature;
  acceptable replacement for bluebook?

**OPUS**: Online Positioning User Service

upload   view   about

compute an accurate position for your GPS data file

COMING: On 11/02, OPUS will begin using GEOID09 to compute orthometric height. The current GEOID model will be available via the OPTIONS page.

1. enter your email address

2. attach your DATA file

3. select your antenna type
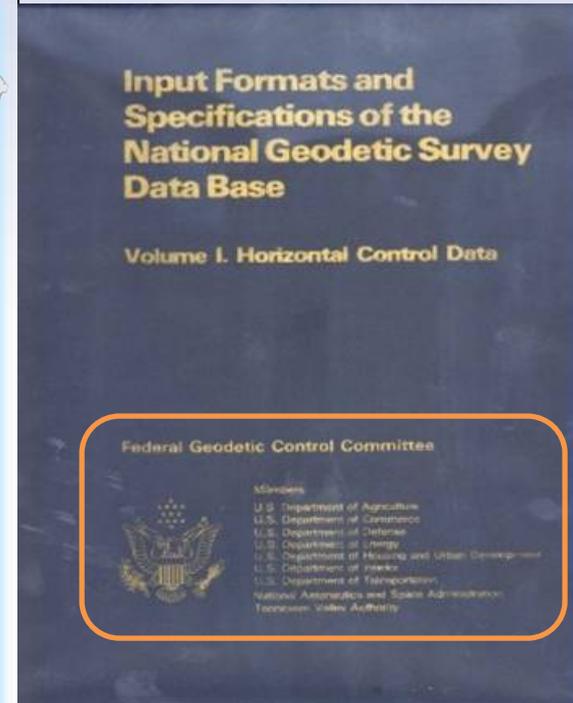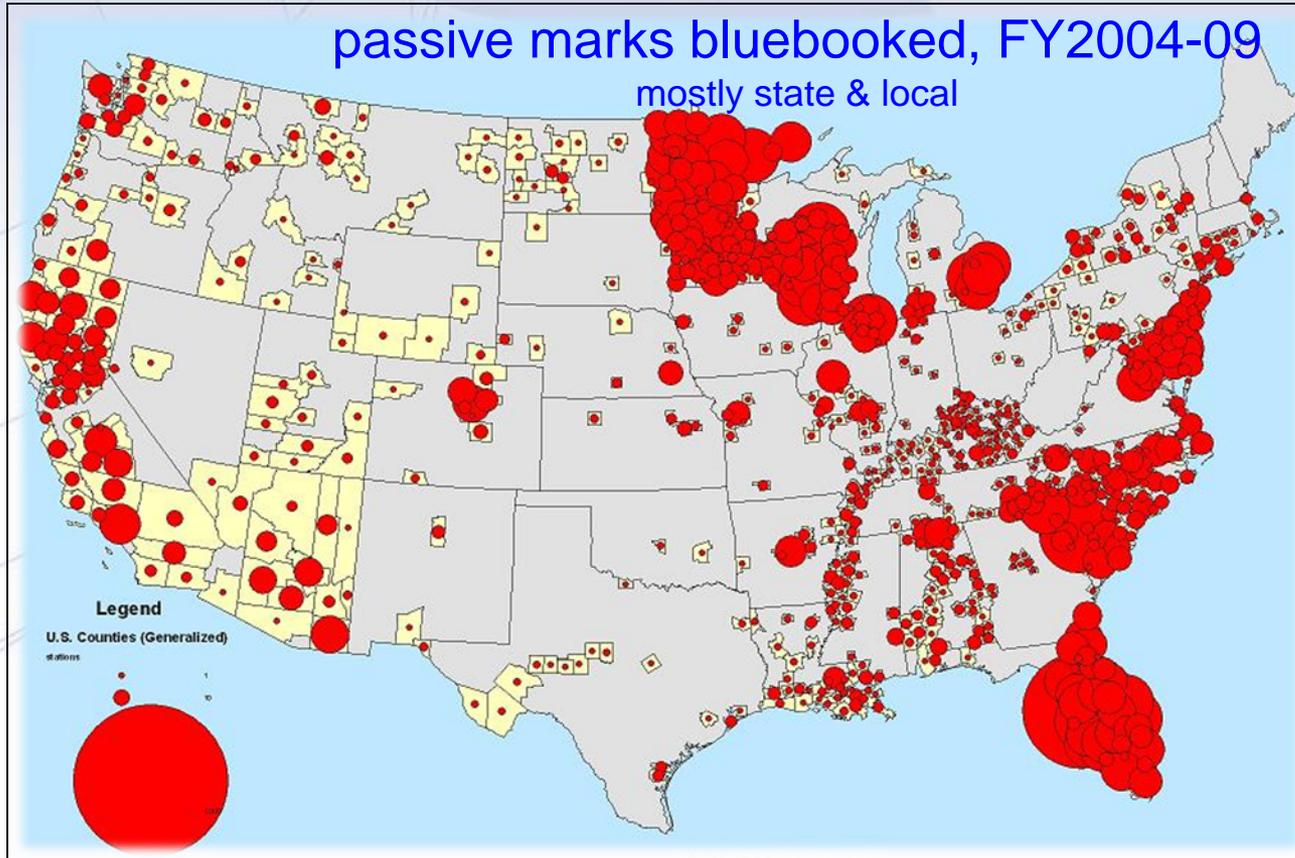   NONE   no ante

4. add your antenna height
   0.0   meters

NOAA privacy policy You
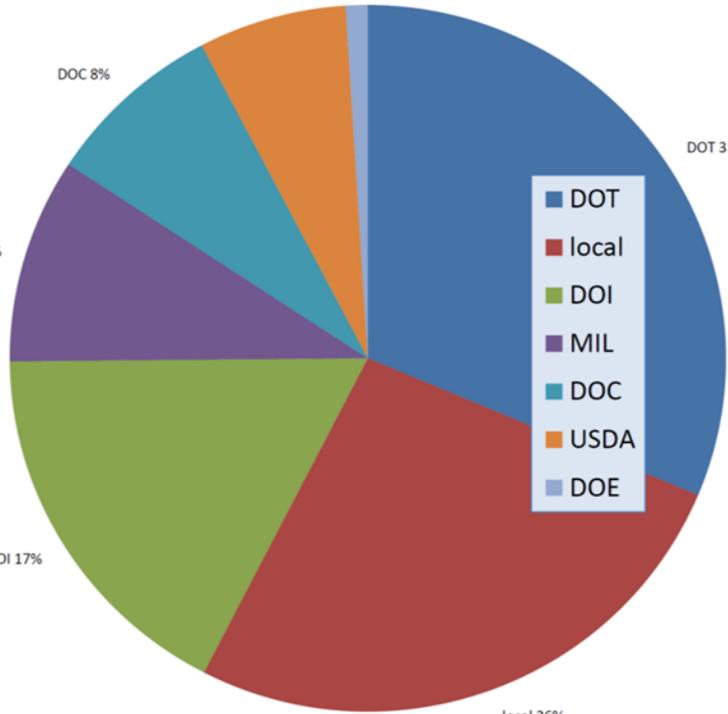
Pie chart legend: DOT, local, DOI, MIL, DOC, USDA, DOE

DOT 31%, local 26%, DOI 17%, MIL 10%, DOC 8%, USDA 7%, DOE 1%

•FGDC agency interactions
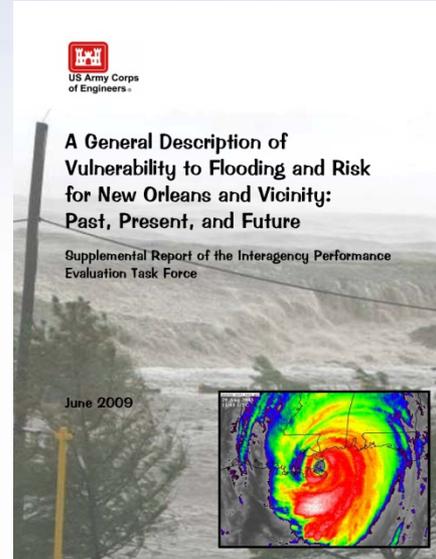
NGS Integrated Database

. . . time to improve passive control archiving and change
how passive control is used!

•FGDC agency interactions

United States Army Corps of Engineers (USACE) Levee Inventory

- Working with the Army Corps to utilize a common datum (NAVD88) on all 12,000 miles of levees.

- Advocating the use of VDatum for accurate water levels and geodetic data.

- Writing procedures for obtaining heights at various accuracy needs.

- Developing training materials for Army Corps personnel.

A General Description of Vulnerability to Flooding and Risk for New Orleans and Vicinity: Past, Present, and Future

Supplemental Report of the Interagency Performance Evaluation Task Force

June 2009

SURVEY DATASHEET (Version 1.0)
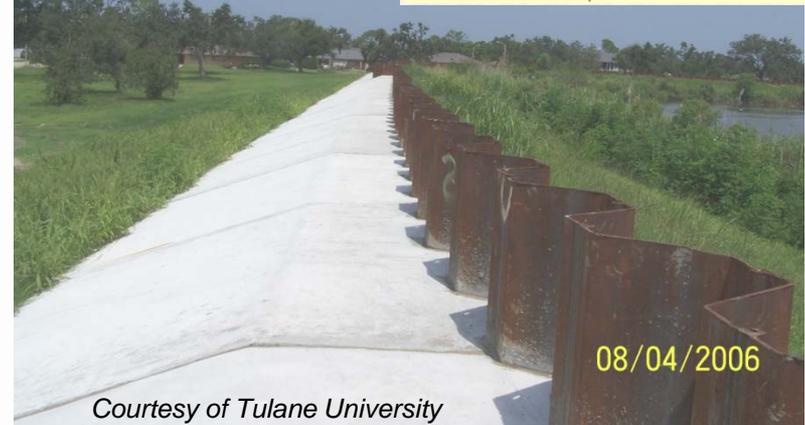
Courtesy of Tulane University

•FGDC agency interactions

IOCM – New Products and Tools Required by Ocean and Coastal Geospatial Data Users

- Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM)

- Coordination of ocean and coastal mapping data and activities

- Partnerships for resource synergies

- Integrated products and services

Goal: Increase efficiency and improve coordination of many Federal mapping agencies.

- FGDC agency interactions

Work Groups/Membership

Active:

Vertical Reference Systems

Dormant:

Fixed-Reference Stations

Instruments

Methodology

Spectrum

membership of FGCS

STATE, 2   DOT, 1

DHS, 4

USDA, 2

DEFENSE, 4

COMMERCE, 17

INTERIOR, 7

EPA, TVA, FCC, 1 each
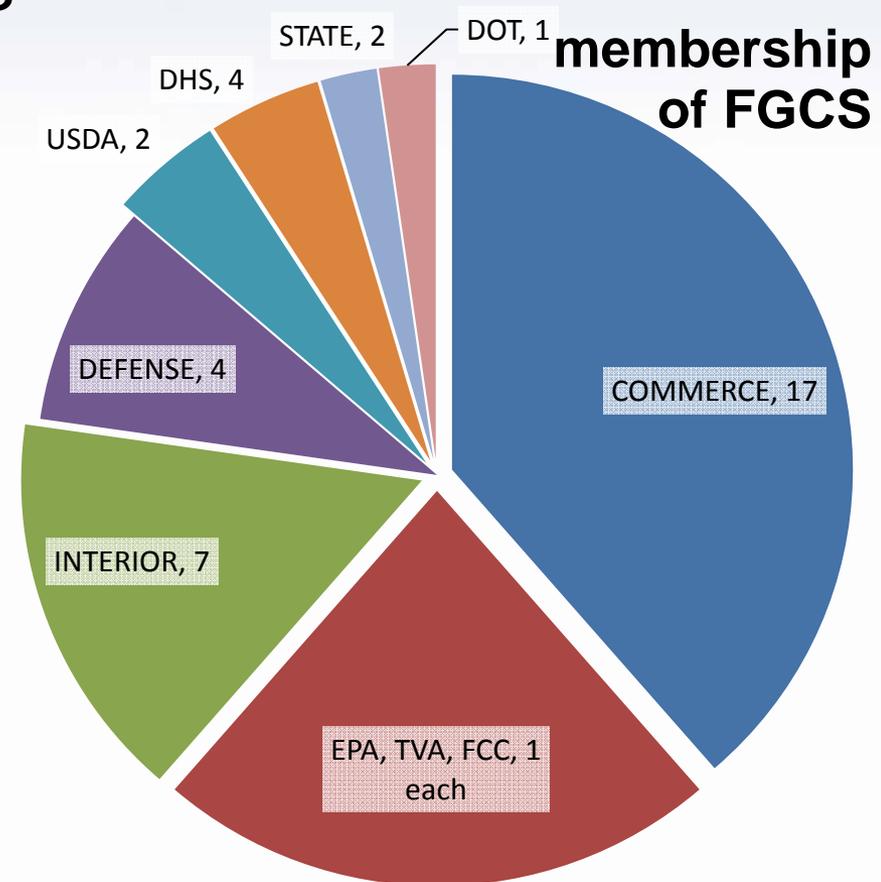
•Agency interactions

Opportunities for Cooperation

GRAV-D: aircraft, crew, expertise, and funding needed to collect aerial gravity data, to produce a new national vertical datum.

2022 DATUMS: preparing products & users for coordinate and height shifts.

PILOT PROJECTS: testing the impact of replacing the NAVD 88 and NAD 83 datums in NC.

BLUEBOOK: improving the bluebooking process to make it easier for our customers.

STANDARDS: include datum and accuracy tags in metadata.

IBC and IWBC: Canadian and Mexican borders.

• FGDC opportunities

Summary of Accomplishments

Held Federal Geospatial Summit in May 2010 to discuss plans to redefine datums.

Height Modernization:

- Survey Projects : IGLD, Southern Louisiana
- Pilot projects: NC/FEMA project
- Collaboration with USGS, USACE to update water gage datums
- Texas leveling and GPS to validate the geoid model

Project Managers for new Datums

Mark Eckl – Geopotential datum

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301-713-3176 x117

Joe Evjen – Geometric datum

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301-713-3194 x109

Summary of FY11 Actions Planned

Continue to engage our Federal partners and stakeholders into our planning process for the new datums

- Subcommittee meetings scheduled for tomorrow and again in July
- Reorganize our subcommittee work groups to align with our focus on the planning and implementation of the new datums

Engage our Federal partners and stakeholders in the definition of the issues related to moving from an NSRS defined by passive monuments to one based on real-time GNSS observations and the geoid

Share draft guidelines for Real-Time Networks (for input)

Submit user guidelines for Real-Time Networks for FGCS approval

Plan for 2012 Federal Geospatial Summit