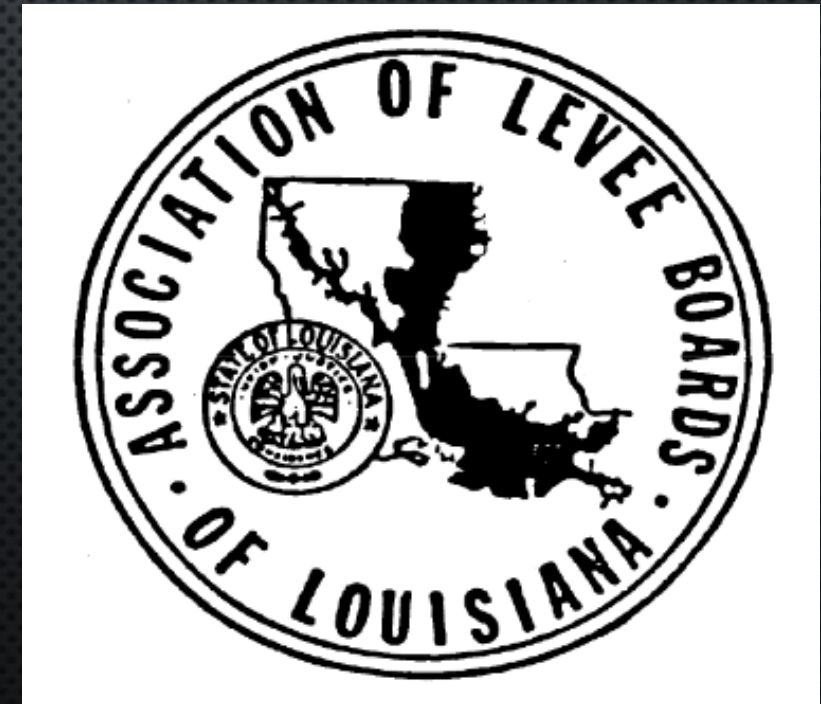


ASSOCIATION OF LEVEE BOARDS OF LOUISIANA

- 82ND ANNUAL MEETING
WEDNESDAY AND THURSDAY, DECEMBER 6-7, 2023
HILTON RIVERSIDE, NEW ORLEANS, LOUISIANA



- LOUISIANA SPATIAL REFERENCE CENTER/
- LSU CENTER FOR GEOINFORMATICS

- [HTTP://C4G.LSU.EDU/](http://C4G.LSU.EDU/)

- J. ANTHONY CAVELL, PLS, CFEDS
STATE GEODETIC COORDINATOR

- JCAVEL1@LSU.EDU

- 225-578-4525



TODAY'S TAKEAWAY -- WE NEED EACH OTHER!

1. IMPORTANCE OF LEVEES - CORRECT HEIGHTS CRUCIAL
2. QUALITY HEIGHTS & C4GNET - SOPHISTICATED GEODESY
3. *VULNERABLE TO LACK OF* FUNDS - A FAMILIAR PROBLEM
4. *A NEW* BETTER DATUM - LEGISLATION REQUIRED

UBINAM GENTIUM SUMUS?



WHERE IN THE WORLD ARE WE?

-- MARCUS TULLIUS CICERO

UBINAM GENTIUM
NUNC SUMUS?



WHERE IN THE WORLD ARE WE **NOW**?

THIS QUESTION MAKES PERFECT SENSE, AND
A RELIABLE ANSWER BRINGS GREAT COMFORT.

PLURALITAS NON EST PONENDA
SINE NECESSITATE.



PLURALITY SHOULD NOT BE POSITED WITHOUT NECESSITY.

-- WILLIAM OF OCKHAM... OCKHAM'S RAZOR

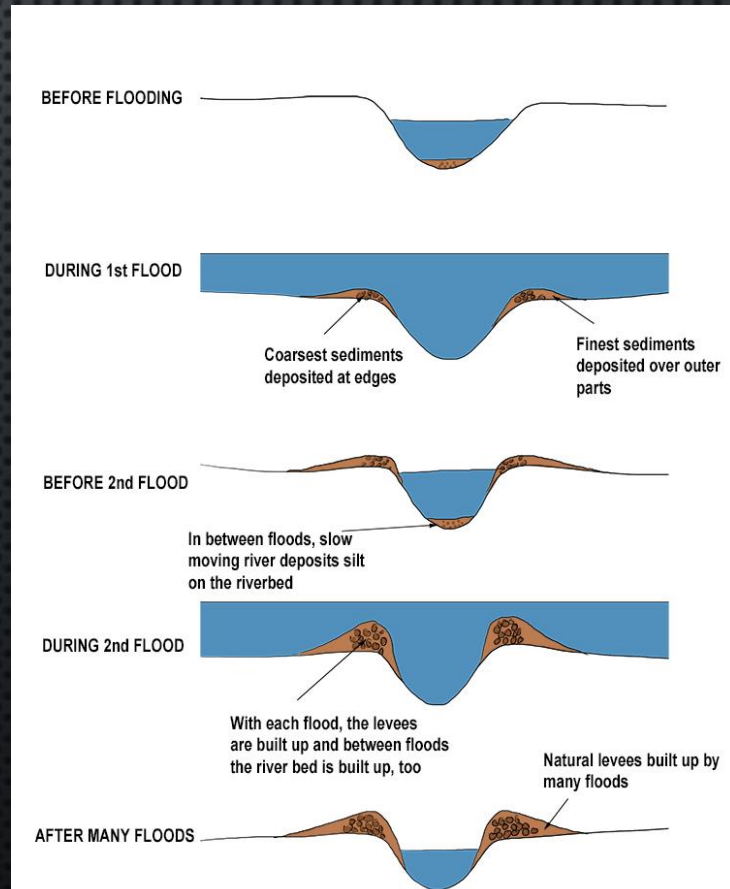
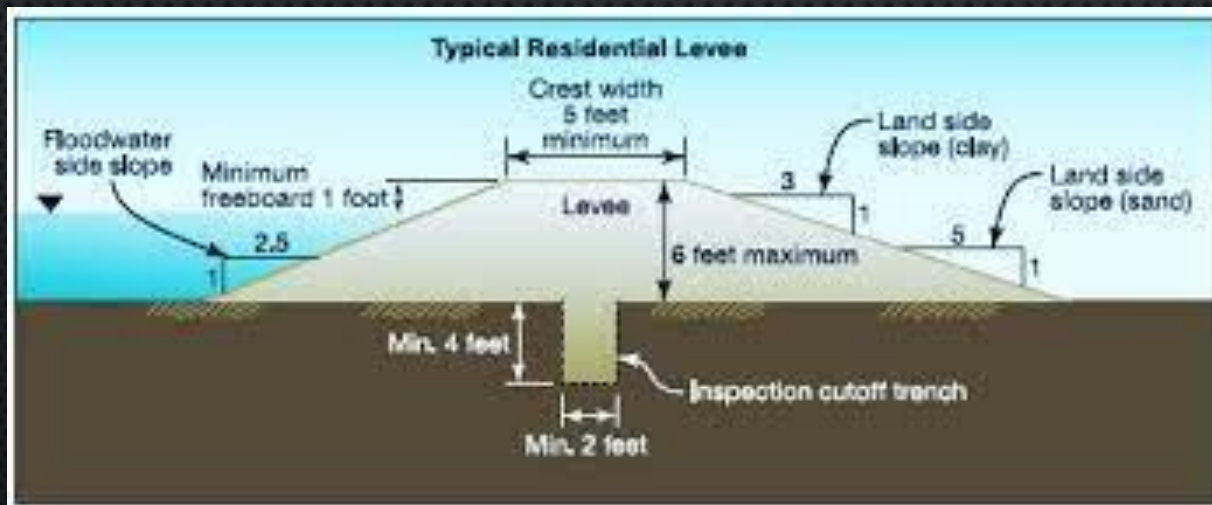


THE K.I.S.S. PRINCIPLE



WHAT IS A LEVEE?

- A **BARRIER** BETWEEN INUNDATING WATER AND OCCUPIED LAND.
 - NEEDS COMPLEX DESIGN AND FOUNDATIONS
 - THE **KISS** SIMPLICITY IS “**HOW HIGH IS IT NOW?**”



WHAT IS THE **LSU CENTER FOR GEOINFORMATICS (C4G)**?

WHAT IS THE **LA. SPATIAL REFERENCE CENTER (LSRC)**?

- THE **C4G** IS CENTER FOR SCIENCE AND TECHNOLOGY ADDRESSING GEOGRAPHY, CARTOGRAPHY, GEOSCIENCES AND RELATED SCIENCE & ENGINEERING.
- THE **C4GNET** IS A RESOURCE, A **GNSS SERVICE** THAT PERMITS FAST, ACCURATE POSITIONS (**HEIGHTS**)!
 - THE **KISS** SIMPLICITY IS **IT WORKS!**
- THE **LSRC** DOES THE SCIENTIFIC PART
 - NEEDS COMPLEX DESIGN, RESEARCH, AND EXECUTION.





LEVEES

- FOUNDATIONS
- ELEVATIONS
- MAINTENANCE



VULNERABILITIES

C4G

- PERSONNEL
- EQUIPMENT
- FUNDING



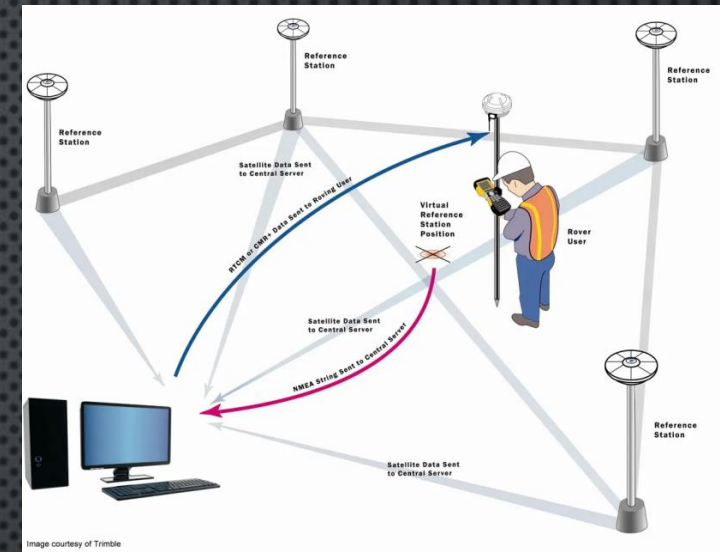
Surveying is a bit like making sausage.

You don't want to know how it's done...

but it sure is satisfying when it's done well!

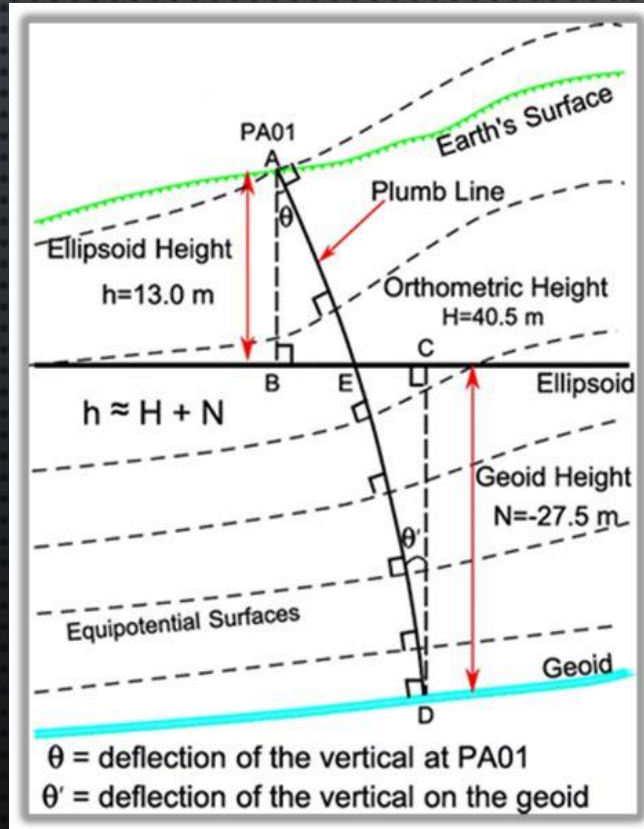


<= BEFORE & AFTER =>



CHALLENGE

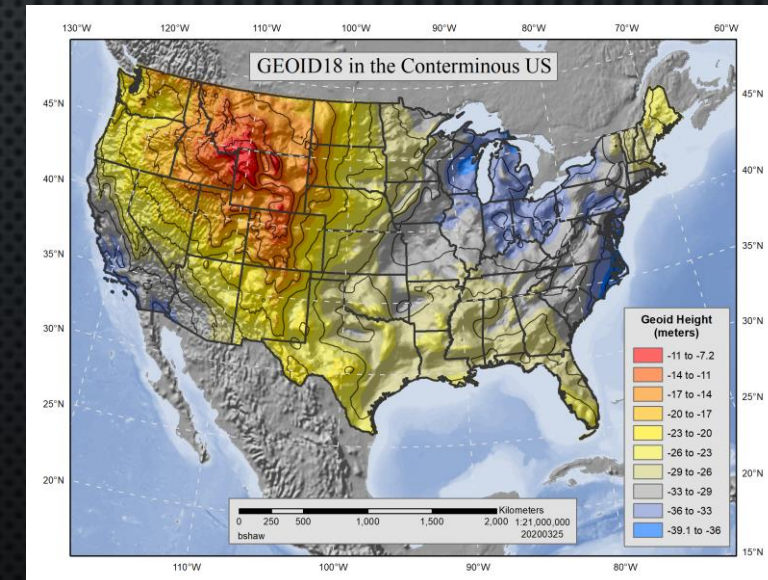
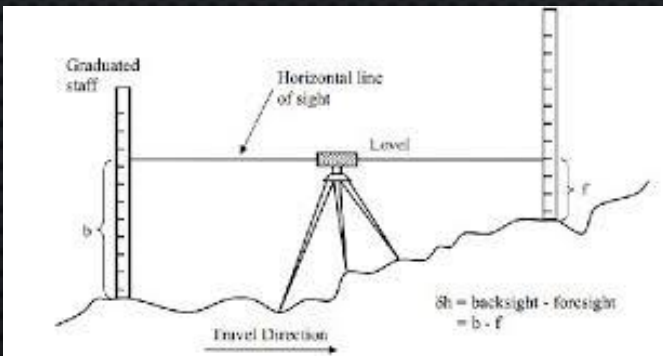
- ELEVATION
 - TIME CONSUMING
 - EXPENSIVE
 - COMPLEX FIELD OPERATION

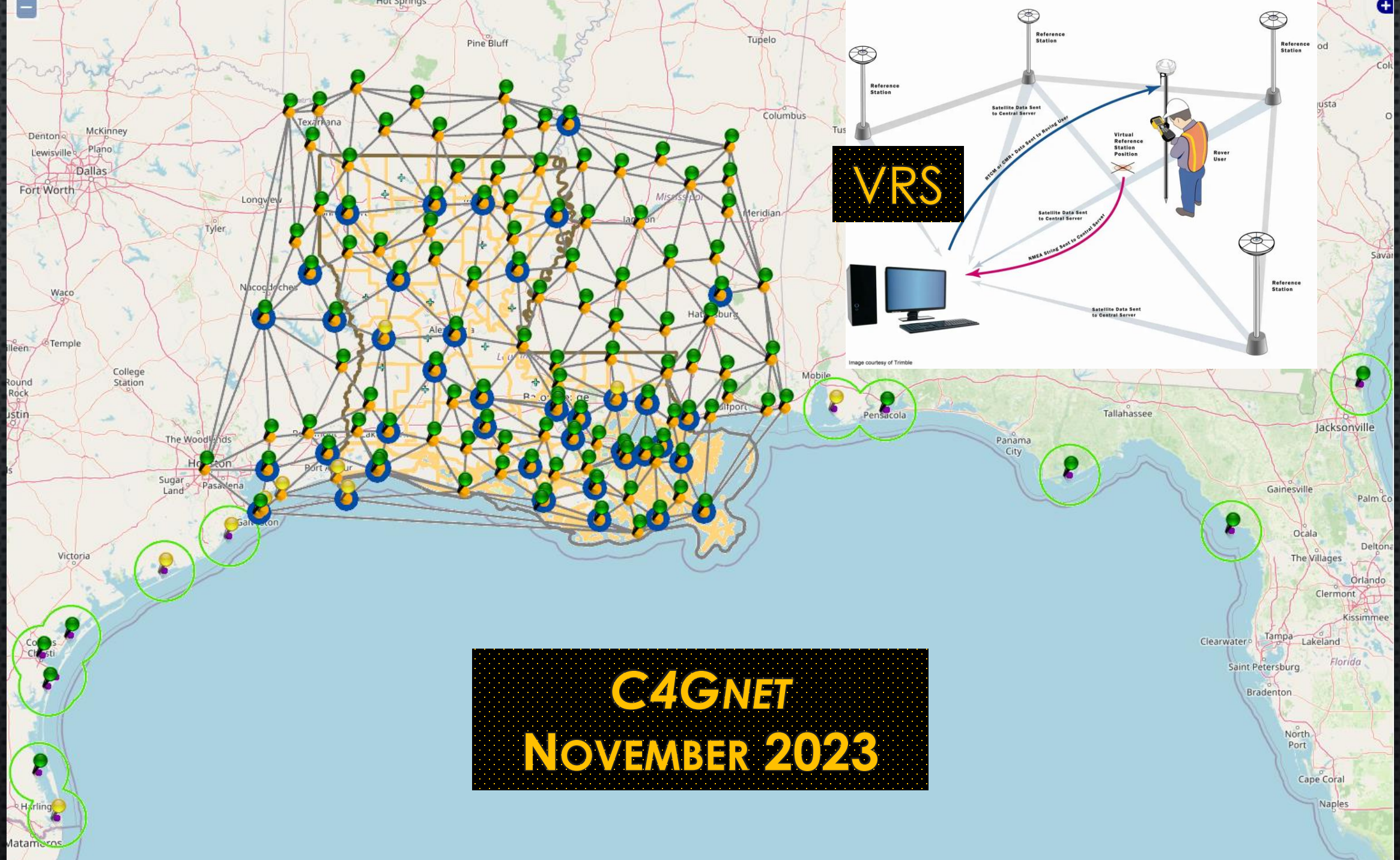


C4GNET SOLUTION

ELEVATION

- VERY FAST
- ECONOMICAL
- MINIMAL FIELD OPERATION





VRS

C4GNET
NOVEMBER 2023

WE'RE A LEAN, MEAN, GEODETIC MACHINE, BUT... ... THE C4G IS VULNERABLE!

- THE C4G PROVIDES A RESOURCE THAT SERVES ALL OF LOUISIANA
- THE C4G IS HOME TO THE LSRC
- THE LSRC/C4G IS SELF-FUNDED!
 - SUBSCRIPTIONS AND SCIENTIFIC GRANTS
 - NEEDS COMPLEX DESIGN, RESEARCH, AND EXECUTION
 - QUALITY DOESN'T COME CHEAP.



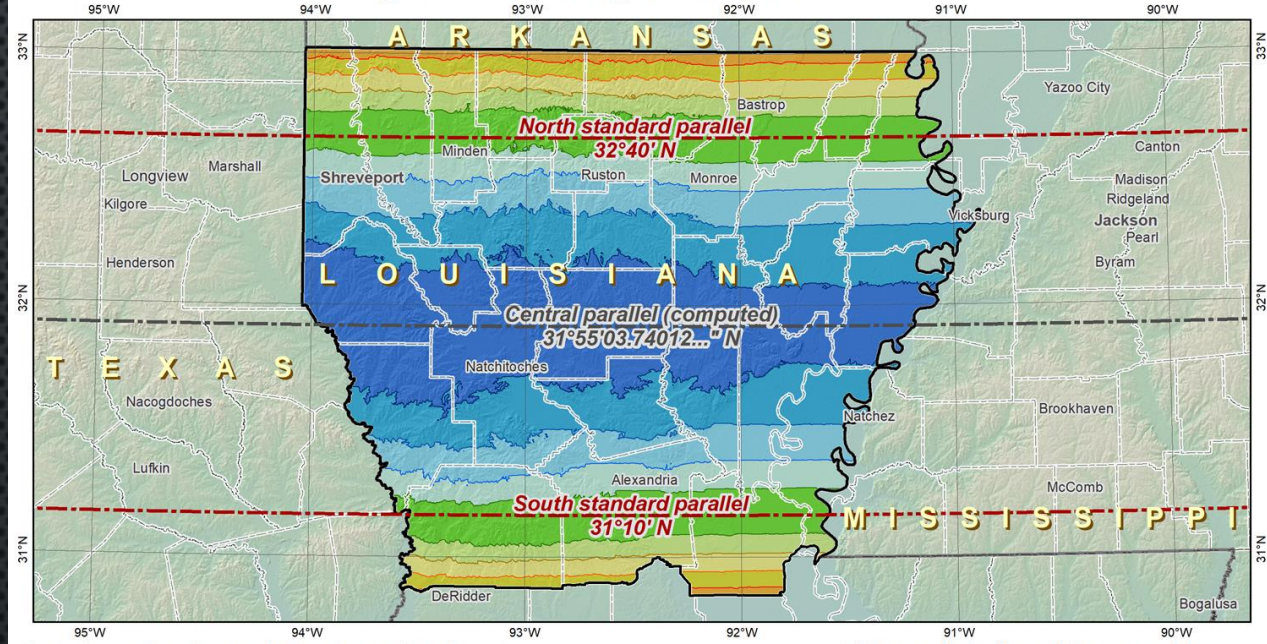
MY LAST POINT:

NEW DATUMS ARE COMING!

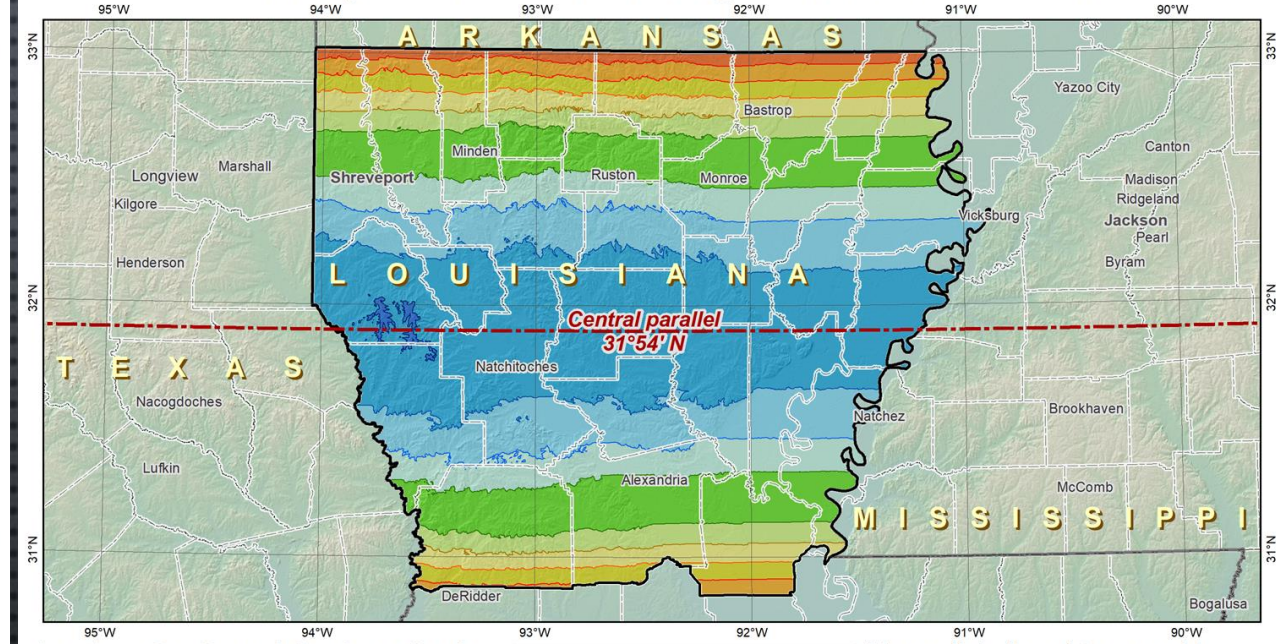
- **NGS** IS REFINING OUR **REFERENCE DATUMS**.
- **LOUISIANA** NEEDS TO DEFINE ITS OFFICIAL REFERENCE SYSTEM **STATUTES**.
- **LEGISLATION** IS BEING PREPARED NOW.
- 3 STATE PLANE ZONES
 - NORTH
 - SOUTH
 - (SPECIAL USE) STATEWIDE

Louisiana North Zone

Existing SPCS 83 design: Louisiana North Zone



Preliminary SPCS2022 default design: Louisiana North Zone



Lambert Conformal Conic projection
North American Datum of 1983
Central parallel: 31° 55' 03.7...'' N
Central parallel scale: 0.999 914 741...

Distortion values (ppm)
Entire zone:
Min = -99 Range = -196
Max = +97 Mean = -33
Weighted mean = -32
(weighted by population)
Cities and towns:
Min = -97 Range = 190
Max = +93 Mean = -33

Linear distortion at topographic surface (parts per million)

<-100	±20	to +120
to -100	to +40	to +140
to -80	to +60	to +160
to -60	to +80	to +180
to -40	to +100	>+180

0 25 50 75 100 125 150 km
Created 7/15/2020 (Nagendra Paudel)

Lambert Conformal Conic projection
North American Terrestrial Reference Frame of 2022
Central parallel: 31° 54' N
Central parallel scale: 0.999 93 (exact)

Distortion values (ppm)
Entire zone:
Min = -84 Range = -202
Max = +118 Mean = -17
Weighted mean = -16
(weighted by population)
Cities and towns:
Min = -81 Range = 195
Max = +114 Mean = -17

Linear distortion at topographic surface (parts per million)

<-100	±20	to +120
to -100	to +40	to +140
to -80	to +60	to +160
to -60	to +80	to +180
to -40	to +100	>+180

0 25 50 75 100 125 150 km
Created 7/15/2020 (Nagendra Paudel)

Current Mean = 33 ppm

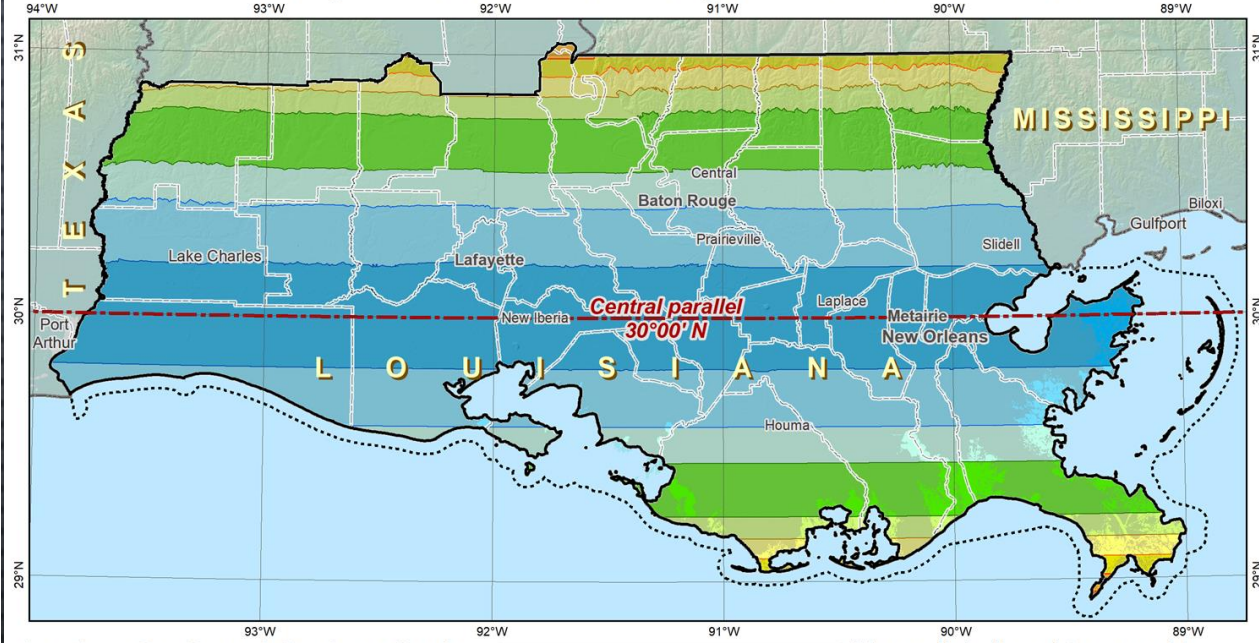
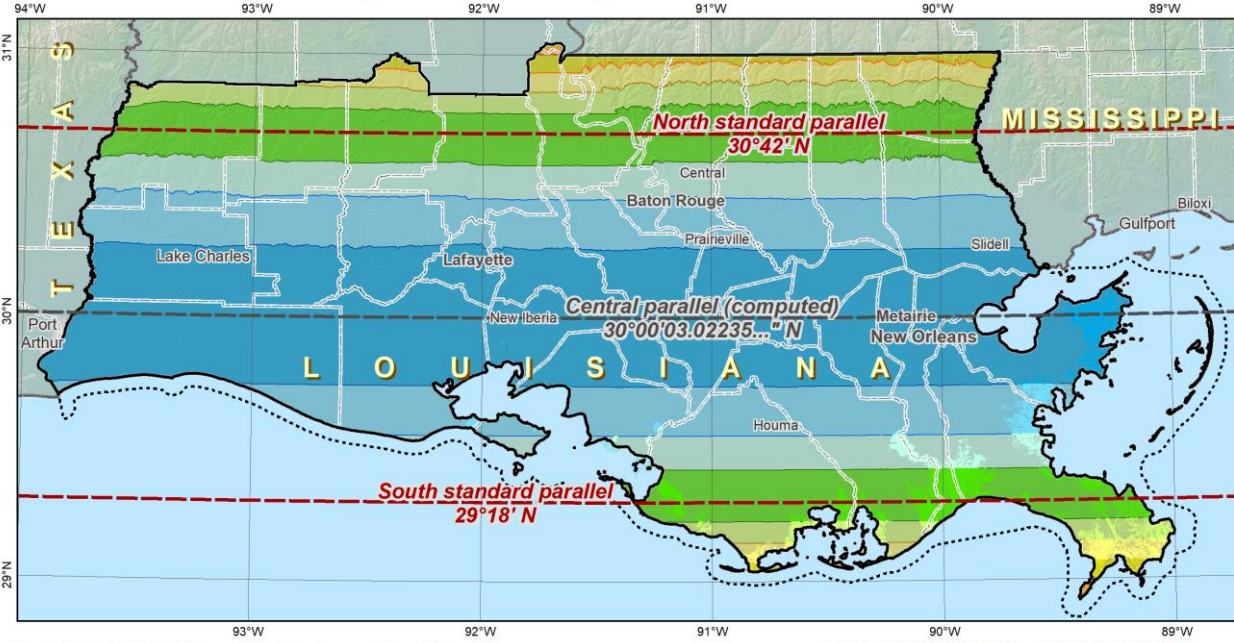
Proposed Mean = 17 ppm



Louisiana South Zone

Existing SPCS 83 design: Louisiana South Zone

Preliminary SPCS2022 default design: Louisiana South Zone



Lambert Conformal Conic projection

North American Datum of 1983

Central parallel: 30° 00' 03.0...'' N

Central parallel scale: 0.999 925 745...



Areas within ±75 ppm distortion

(1:13,333 = ±0.40 ft per mile):

100.0% of population

100.0% of all cities and towns

99.8% of entire zone area

Distortion values (ppm)

Entire zone:

Min = -74

Max = +103

Weighted mean = -34

(weighted by population)

Cities and towns:

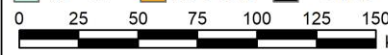
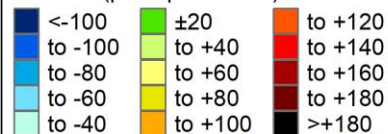
Min = -71

Max = +69

Range = 140

Mean = -39

Linear distortion at topographic surface (parts per million)



Created 11/8/2020 (Michael Dennis)

Lambert Conformal Conic projection

North American Terrestrial Reference Frame of 2022

Central parallel: 30° 00' N

Central parallel scale: 0.999 93 (exact)



Areas within ±75 ppm distortion

(1:13,333 = ±0.40 ft per mile):

100.0% of population

100.0% of all cities and towns

99.7% of entire zone area

Distortion values (ppm)

Entire zone:

Min = -70

Max = +108

Weighted mean = -47

(weighted by population)

Cities and towns:

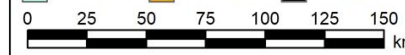
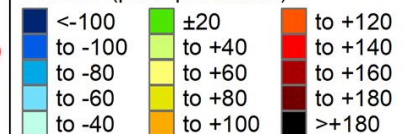
Min = -67

Max = +74

Range = 141

Mean = -35

Linear distortion at topographic surface (parts per million)

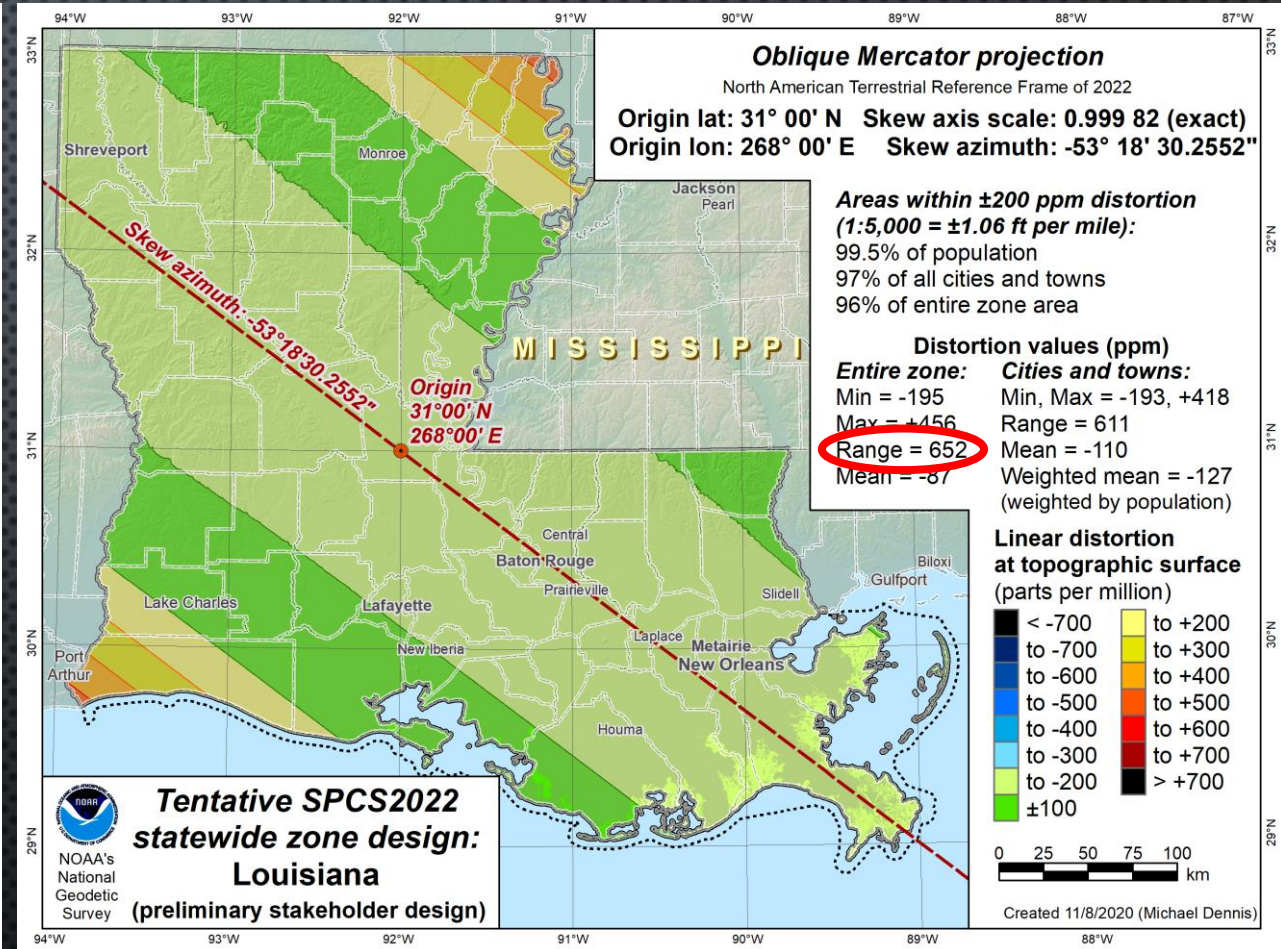
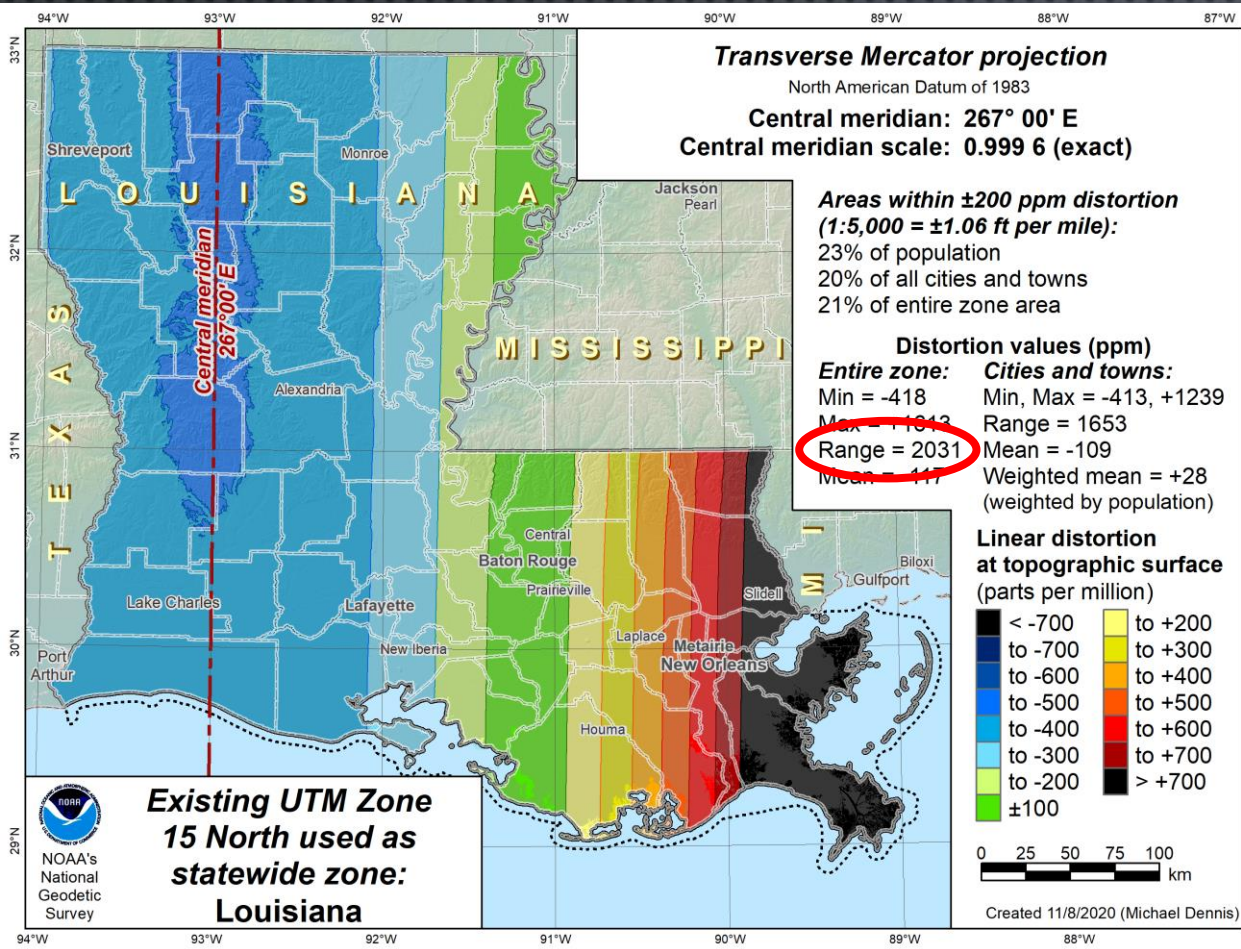


Created 11/8/2020 (Michael Dennis)

Current Mean = 34 ppm

Proposed Mean = 30 ppm

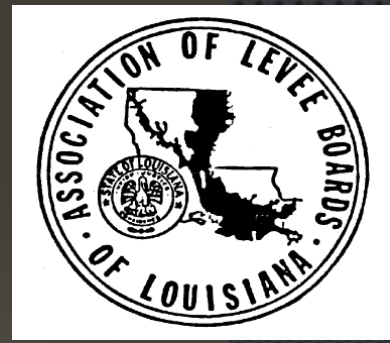
Louisiana Statewide Zone (Special Use Zone)



Current Range = **2,031 ppm!**

Proposed Range = **852 ppm**

"ELEVATION - THE SALVATION FROM INUNDATION."



Thank You!

