

South Carolina Geodetic Survey

Dr. Lewis A. Lapine

Marine Transportation

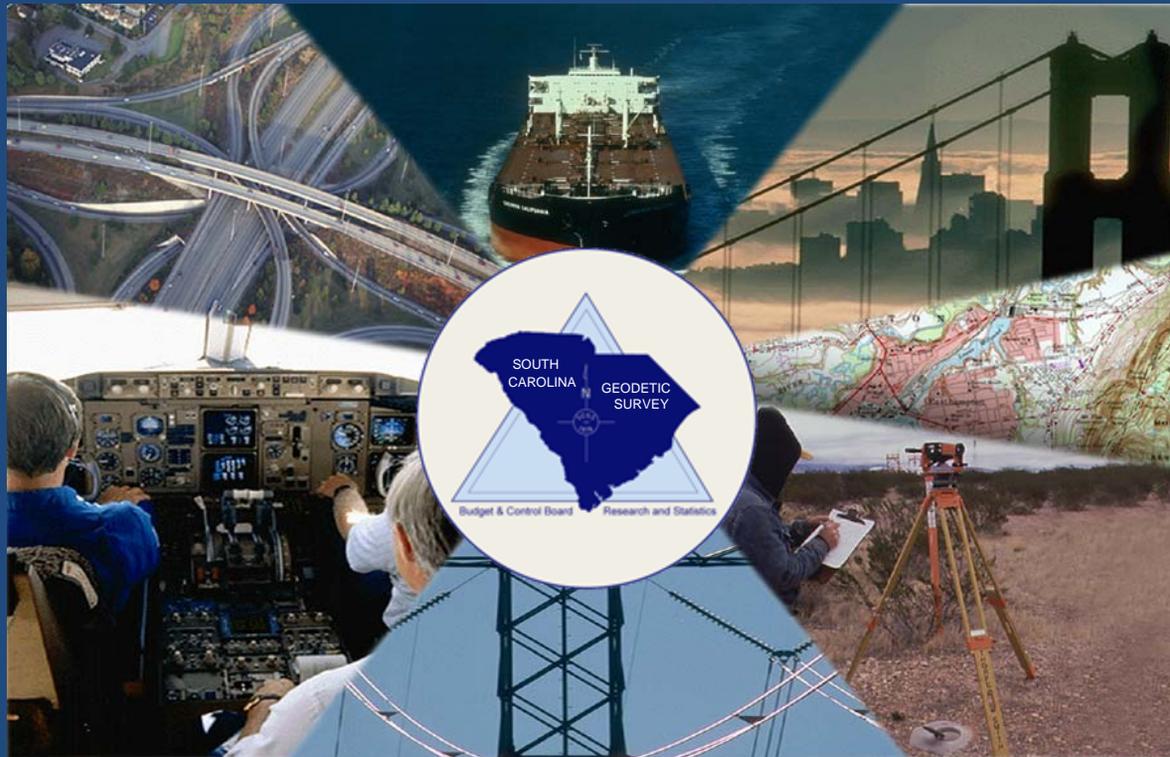
Highway
Construction

Infrastructure

Mapping

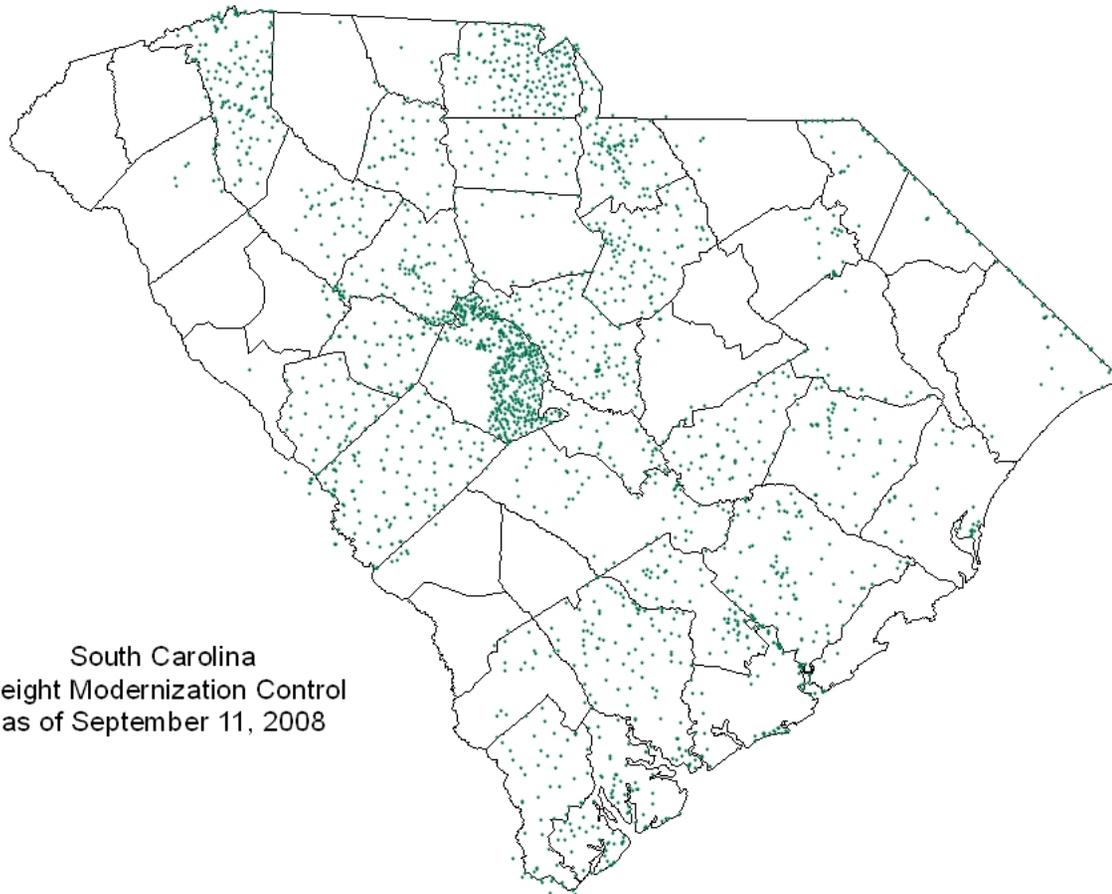
Obstruction
Charting

Surveying
Engineering



Utilities

SC Height Modernization Network



South Carolina
Height Modernization Control
as of September 11, 2008

RTN Concept

Started with a clean sheet of paper

Determined an optimal spacing would be under 100KM

Required redundancy in case up to 5 non-adjacent stations are inoperative

Requirement to be operational during and after a post hurricane event

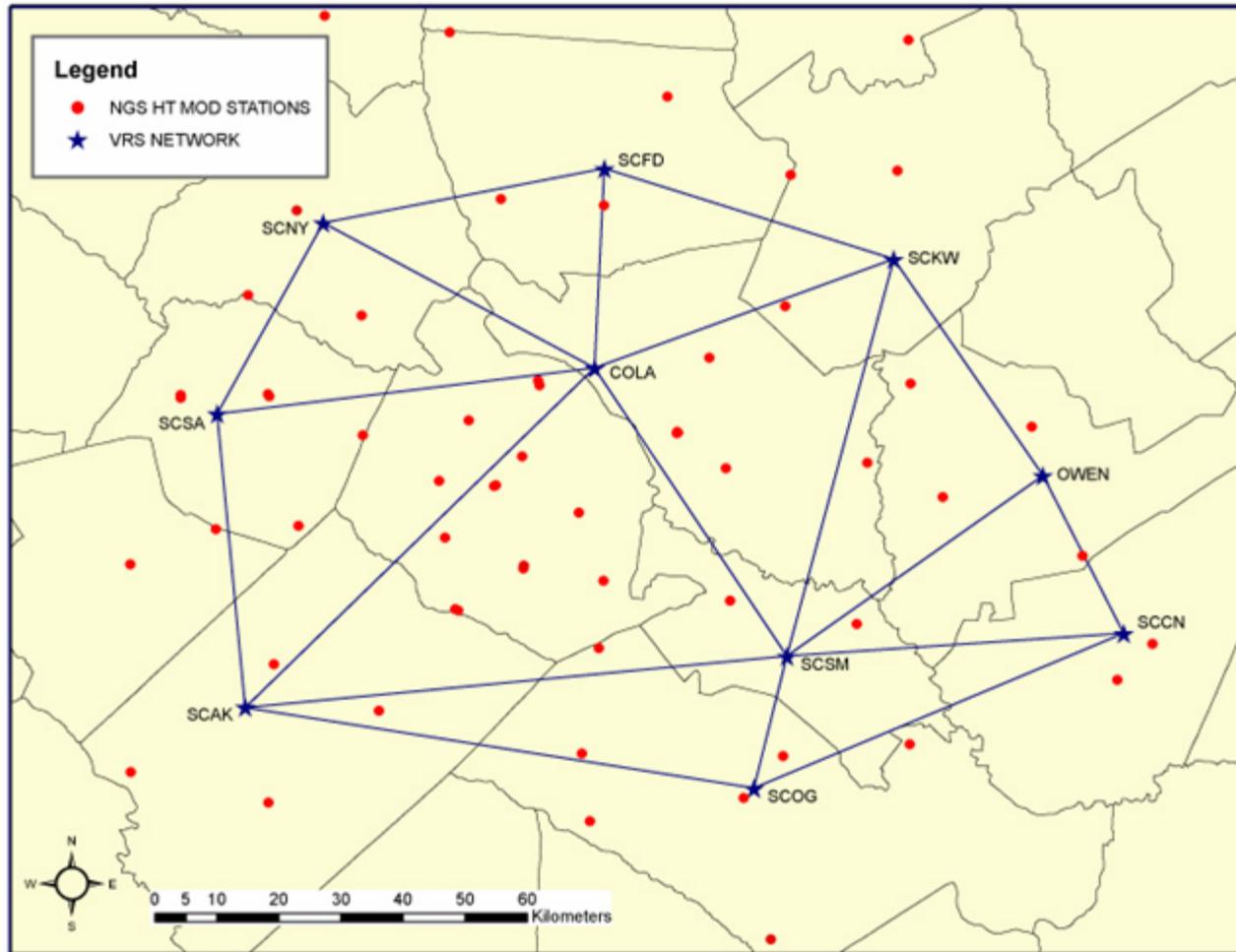
31 stations will marginally cover the state, we operate 38 and eventually 45

Future activities include sharing RTN stations with NC

IT involvement would be critical to our success

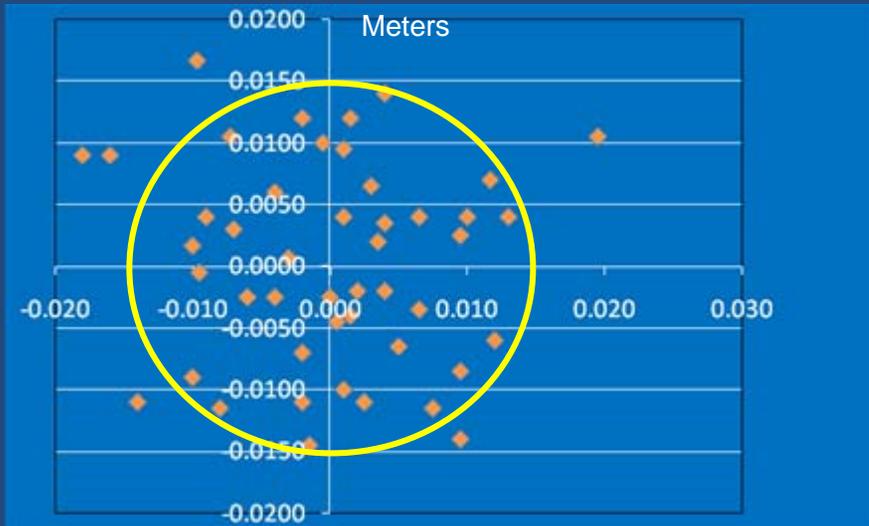
Test Network

11 Counties, 6700 Sq Mi, 10 VRS Base Stations, 50 NGS Ht Mod Control Pts



VRS Absolute Accuracy

Comparison of VRS and NGS Height Mod Control
Absolute Accuracy



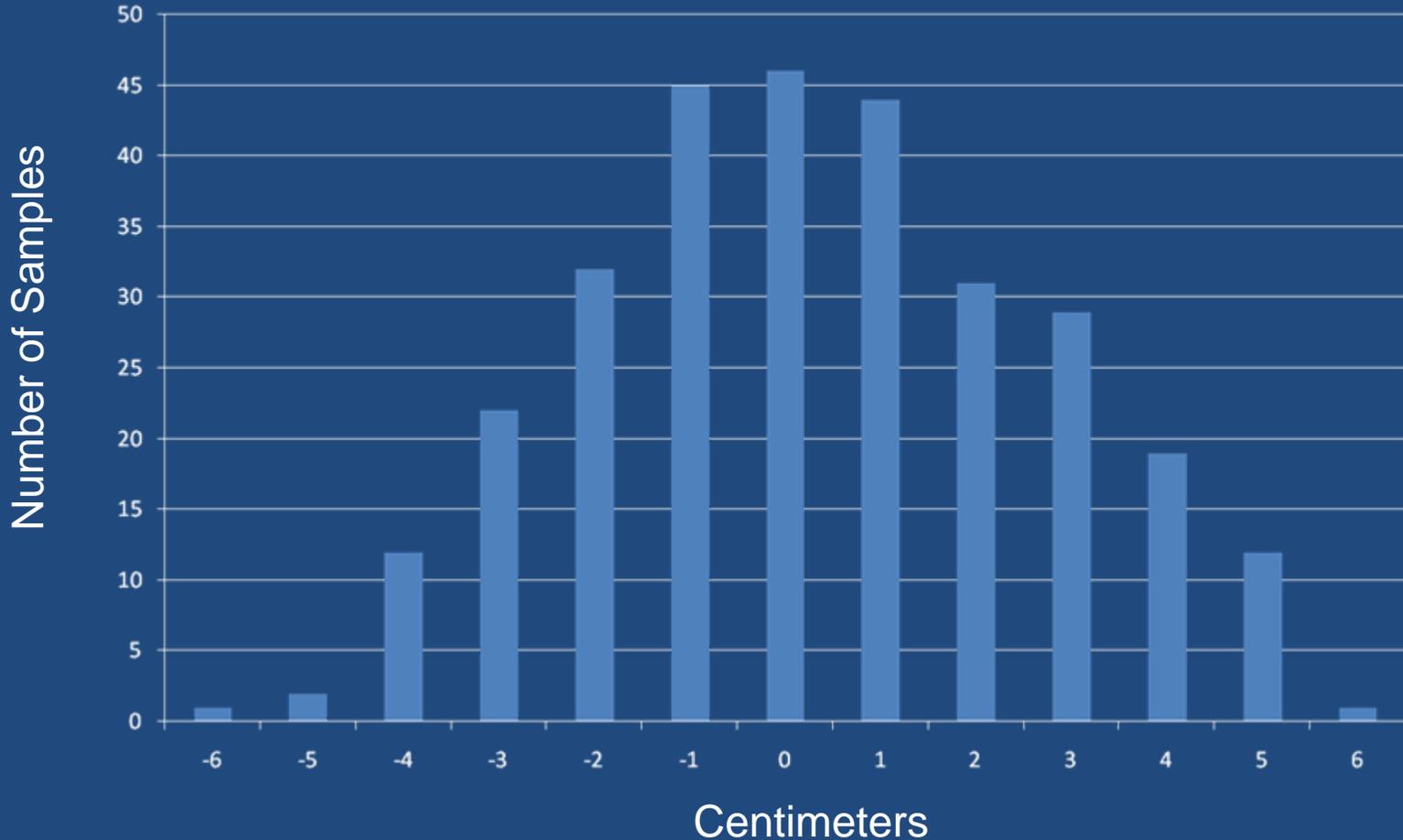
Time (sec)	300	60	5
Horizontal (cm)	1.98	2.40	2.41
Vertical (cm)	2.25	2.39	2.40

$$\text{Allowable 2-D RMSE}_r \text{ 95\%} = 1.7308 * \text{RMSE}_r = \\ (2.0*2.0 + 0.3*0.3 + 1.2*1.2)^{1/2} = \mathbf{2.4 \text{ cm}^*}$$

$$\text{Allowable 1-D RMSE}_v \text{ 95\%} = 1.9600 * \text{RMSE}_v \\ = \\ (2.0*2.0 + 0.3*0.3 + 2.4*2.4)^{1/2} = \mathbf{3.1 \text{ cm}^*}$$

* $(\text{Local Accuracy}^2 + \text{Eccentricity}^2 + \text{System Design}^2)^{1/2}$

Difference Between Published and VRS Elevations



Sample = 298

Mean = 3mm

StdDev = 25mm

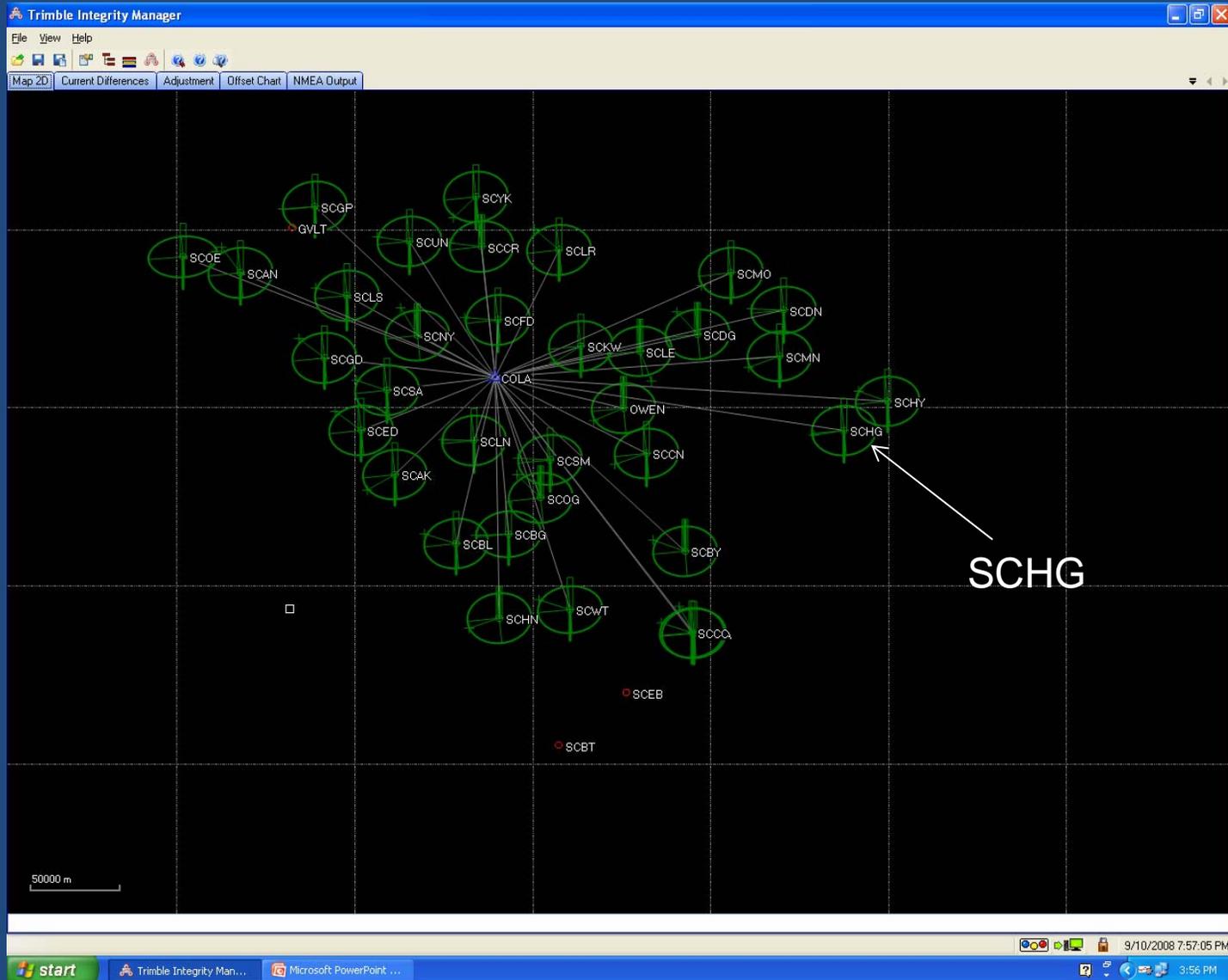
60 second observation period

67% < +/-25mm

84% < +/-35mm

96% < +/-50mm

Integrity Monitor – Network Motion



Network Motion 9/3 – 9/10/08

