The Road to Operational RO

Entering the Mainstream

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Road To Operational RO

Chapter 1: GGI, July 1988

EOS AM
& PM
+ ISS
+ ESA

POD & Geodesy
Ionospheric Mapping
Atmospheric Occultation
“...the innovator will be opposed by all who are now well off, and backed only weakly by those who might gain. This is due partly to...the incredulity of men, who will never admit the merit of any-thing until they have seen it proved.”

— N. Machiavelli, The Prince, Ch. VI, c. 1515

“Build a better mousetrap and the world will beat a path to your door.”

— I. Happyface
Some Avenues Into the Mainstream

1. Crisis requiring action
2. Overwhelming cost advantage
3. Overwhelming performance advantage
4. Unique & essential capability

Must present a demonstrable material advantage
Some Events After Selection of GGI

1. NASA cancels GGI (1992)
2. GPS-MET funded (NSF)
3. GPS-CLIM (NASA-not selected)
4. CHAMP/SAC-C (NASA R&A)
5. GPSOS dropped from NPOESS
6. COSMIC funded (NSPO)
7. Series of mainstream proposals
GPS-GPS Comparison Stats from COSMIC

Climatological Precision (Bias): 0.02 - 0.05 K

Ben Ho (UCAR), Jan 07
Road To Operational RO

TLS Comparison with GPS Sensors
Launched 6 yrs Apart

Corr = 1
Mean(N18_CHAMP - N18_COSMIC) = -0.06
Stddev(N18_CHAMP - N18_COSMIC) = 0.11
Total number = 482

Ben Ho (UCAR), Jan 07

N18 TLS est. from COSMIC v. N18 AMSU TLS est. from CHAMP

Also:
Sean Healy’s astonishing
DFS numbers
Some Climate Requirements:

1. Precision & stability <0.2 K
2. Vertical resolution ~1 km
3. SI traceability
The Actual Storm | Forecast with GPS | Forecast without GPS

54 hrs

78 hrs

102 hrs

Y.-H. Kuo (NCAR), 2007
NOAA
Five-Day Anomaly Correlations
Southern Hemisphere
March-April 2008

- **0.70**
  - NOAA Conven. + AMSU-A
  - *Approx. instrument cost

- **0.75**
  - AIRS
  - $600M*

- **0.78**
  - MHS AMSU-B
  - $300M*

- **0.79**
  - GPS
  - <$3M*
  - ($30M**)

- **0.87**
  - GPS MHS AMSU-B
  - $300M*

*Approx. instrument cost
**Instrument + sats + launch

L. Cucurull, 2009
NOAA/NCEP

October 2009
COSMIC Data Users Workshop
Avenues of Entry (2):

1. Crisis requiring action
   - Loss of climate and SE sensors on NPOESS/GOES-R
   - Destructive weather events
   - Rapid climate change

2. Overwhelming cost advantage
   - Fraction of conventional instrument cost

3. Overwhelming performance advantage
   - 10x – 50x in temp accuracy/stability
   - 10x – 50x in vertical resolution
   - All-weather, etc, etc

4. Unique & essential capability
   - Stable monitoring of long-term temp trends
   - Precise detection of the tropopause
   - 3D mapping of global electron distribution
   - SI traceability, geopotential heights, etc, etc
The Public-Private Solution:

1. Lower implementation cost by ~5x
2. Distribute that cost over ~10 customers
3. Reduce gov’t. financial risk to ZERO
4. Deliver data in greater quantities
5. Deliver data far sooner
6. Data REMAINS FREE TO USERS