The Role of Positioning Infrastructure in Supporting the Millennium Development Goals

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8 Millennium Development Goals

Goal 1: Eradicate extreme poverty and hunger
Goal 2: Achieve universal primary education
Goal 3: Promote gender equality and empower women
Goal 4: Reduce child mortality
Goal 5: Improve maternal health
Goal 6: Combat HIV/AIDS, malaria and other diseases
Goal 7: Ensure environmental sustainability
Goal 8: Develop a Global Partnership for Development

The framework includes 18 targets and
48 indicators enabling the ongoing
monitoring of annual progress

MDG 8: Global Partnership for Development

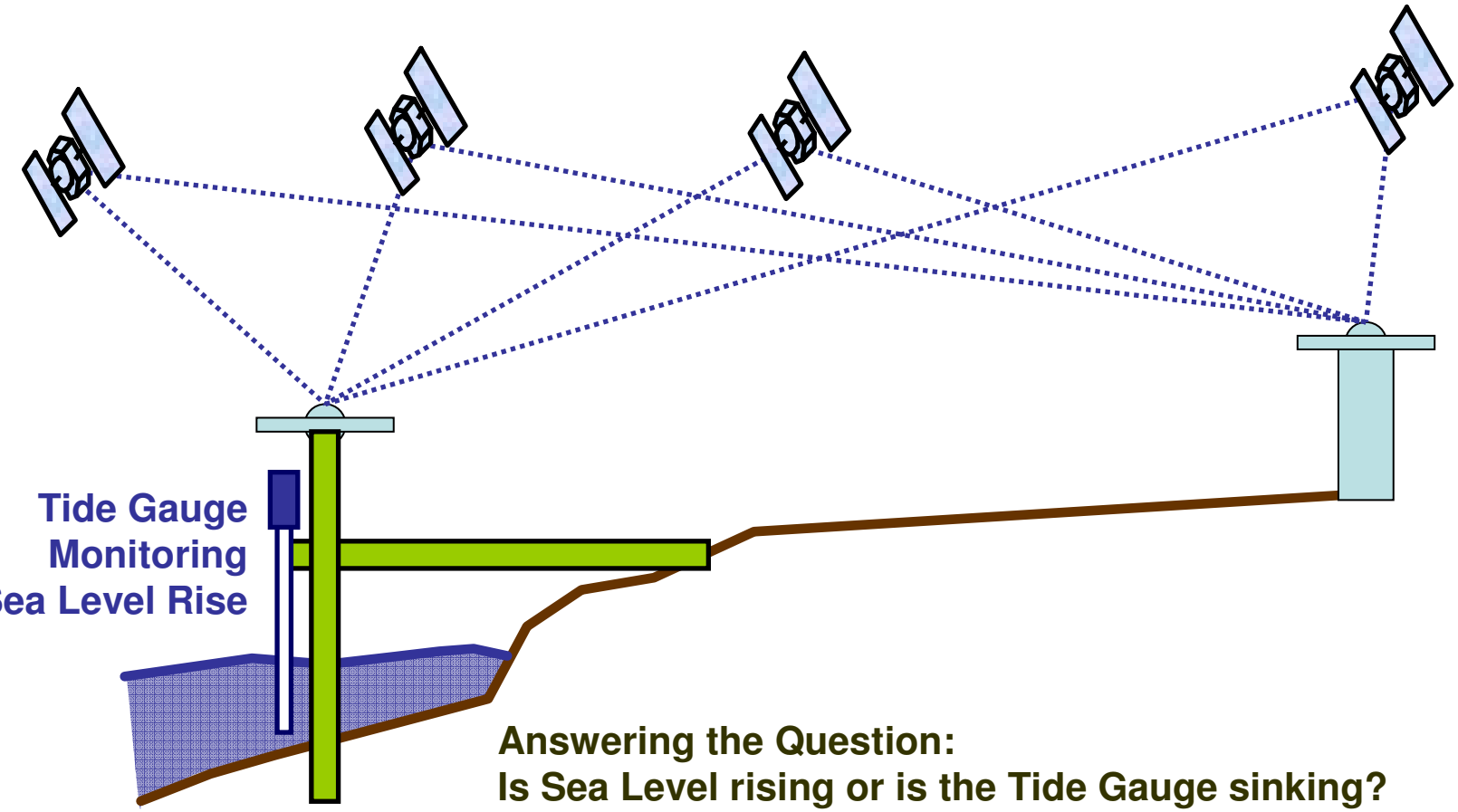
Want	Need
Economic Prosperity	Capital Market
Capital Market	Security for Loans
Security for Loans	Secure Land Tenure
Secure Land Tenure	Land Titling System
Land Titling System	Accurate Surveys & Maps
Accurate Surveys & Maps	Geodetic Reference Frame
Geodetic Reference Frame	GNSS

MDG 7: Ensure Environmental Sustainability

- Role of GNSS in structure of Intergovernmental Panel on Climate Change:
  - Understanding – GNSS role in underpinning science;
  - Adaptation – GNSS role in underpinning measurements in applications such as coastal vulnerability;
  - Mitigation – GNSS role in monitoring and reducing carbon footprint.

GNSS for Understanding Climate Change

Tide Gauge Monitoring

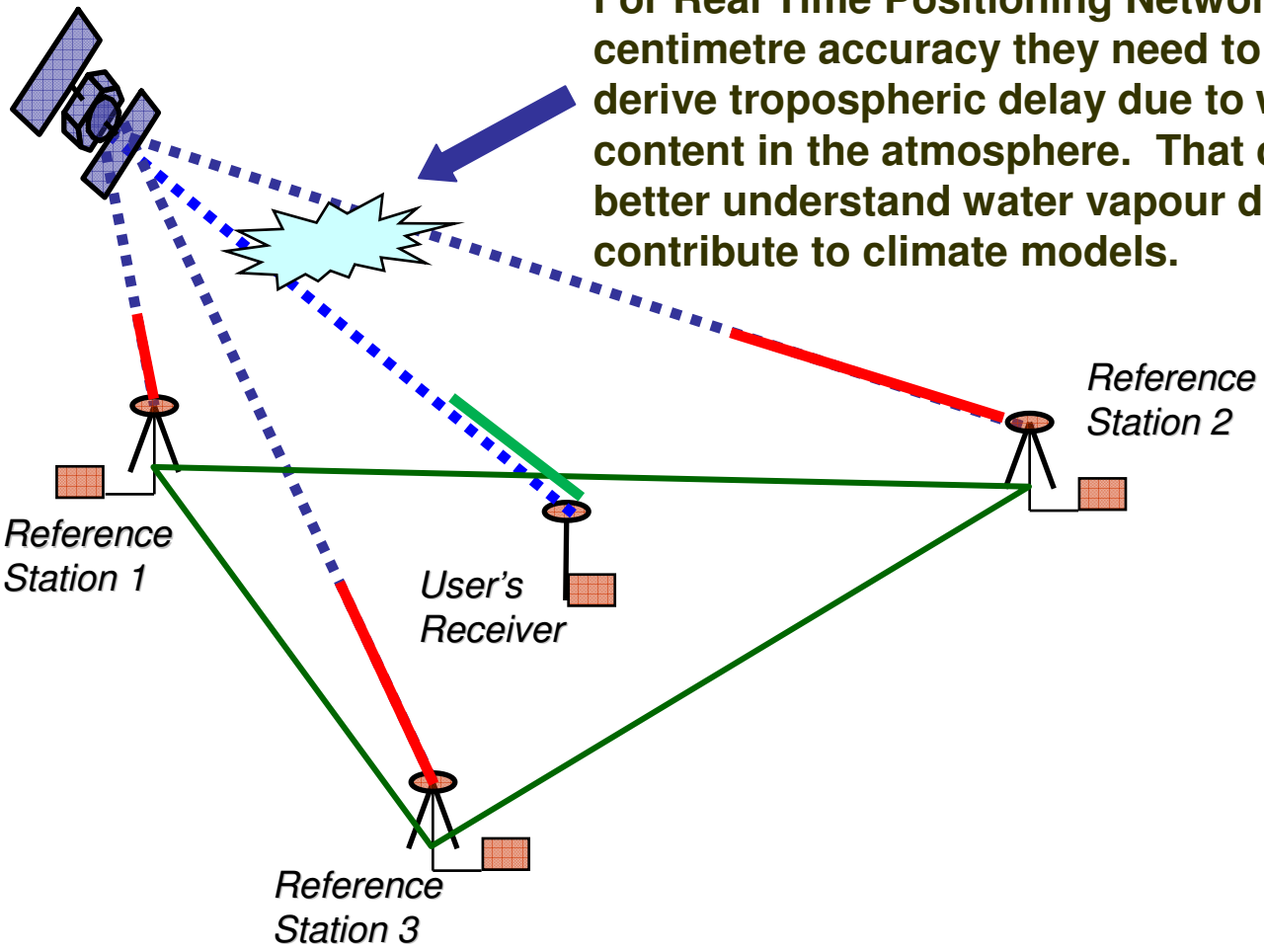


Tide Gauge Monitoring Sea Level Rise

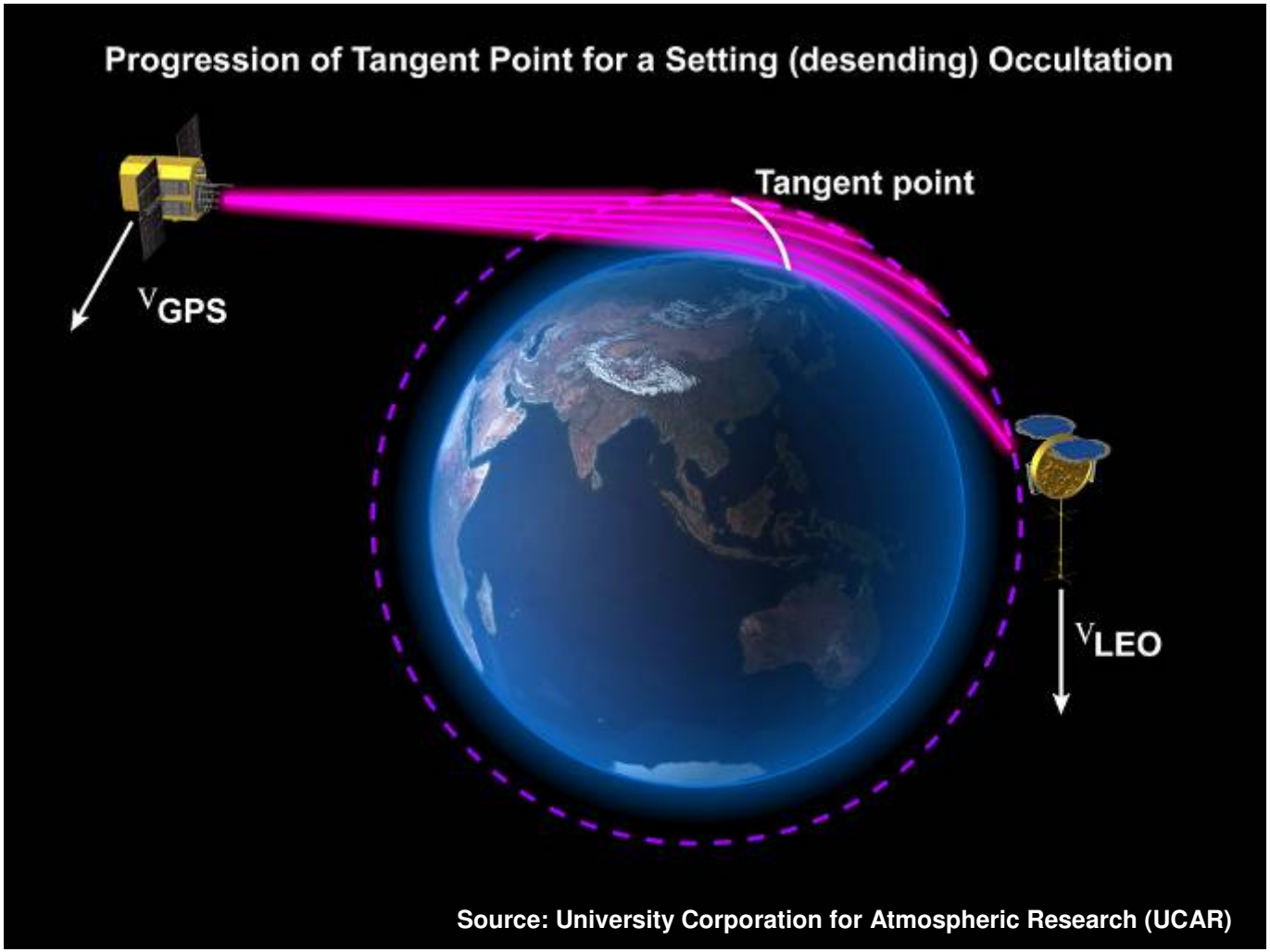
Answering the Question:
Is Sea Level rising or is the Tide Gauge sinking?

Tropospheric Models

For Real Time Positioning Networks to deliver centimetre accuracy they need to continuously derive tropospheric delay due to water vapour content in the atmosphere. That can be used to better understand water vapour distribution and contribute to climate models.



GNSS and LEOs for Radio Occultation



IAG's Global Geodetic Observing System (GGOS)

IAG Services | GGOS Board | Science Council

Working Groups

- Copyright, Data Access Policy, Publishing, Certification
- Data and Info Systems
- Infrastructure: Networks, Communication
- User Linkage: Science, Industry, Authorities, Outreach

International Laser Ranging Service (ILRS)

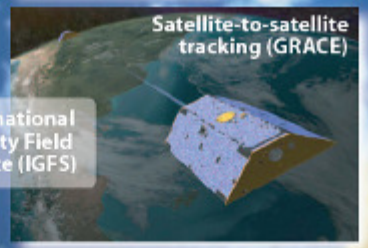
International GPS Service (IGS)

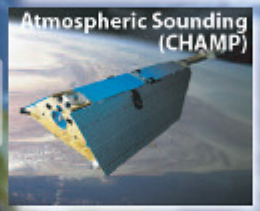
International VLBI Service (IVS)

International Earth Rotation and Reference Systems Service (IERS)

IAG services are based on more than 400 global observation stations.

Geodetic Space Techniques

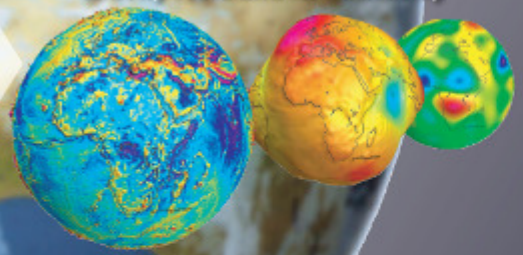




Products

Geometry and Kinematics

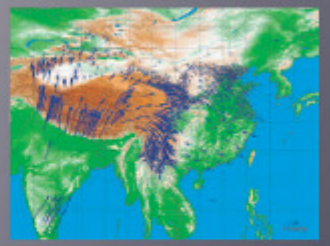
Gravity Field and its Variability



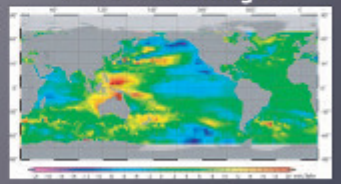
Earth Orientation and Rotation

Applications

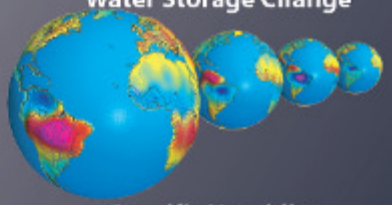
Positions and Velocities



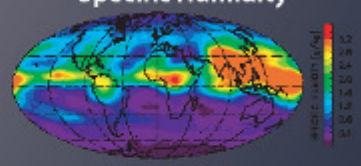
Sea Level Changes



Water Storage Change



Specific Humidity



Geo-hazards

Ice Mass Balance

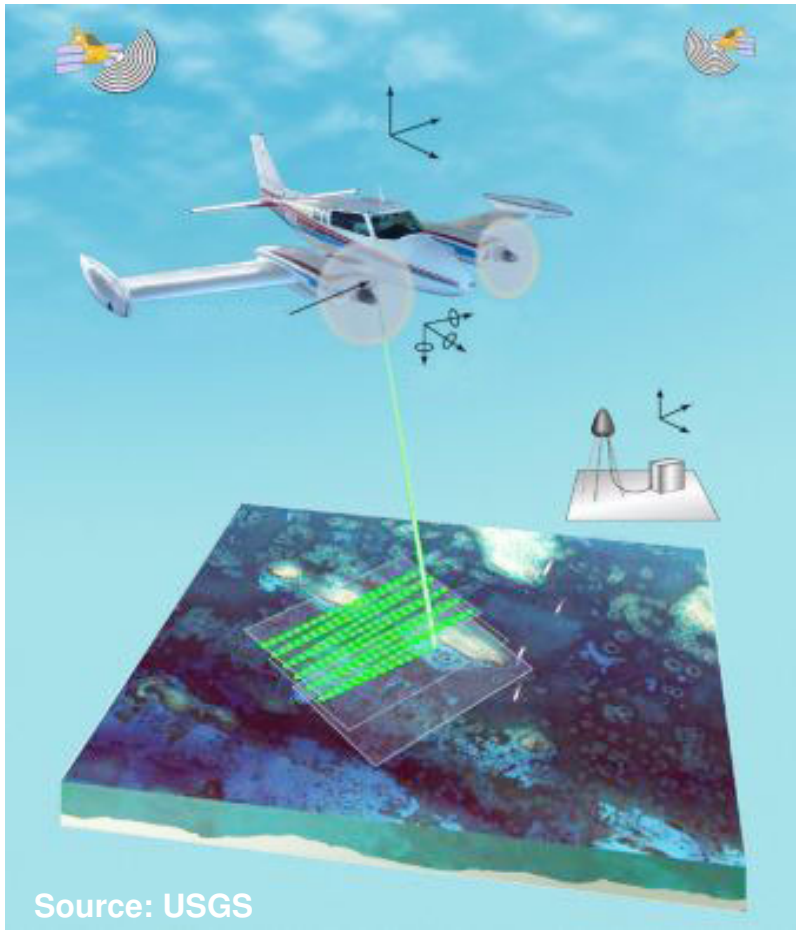
GGOS
http://www.ggos.org

GNSS for Adapting to Climate Change

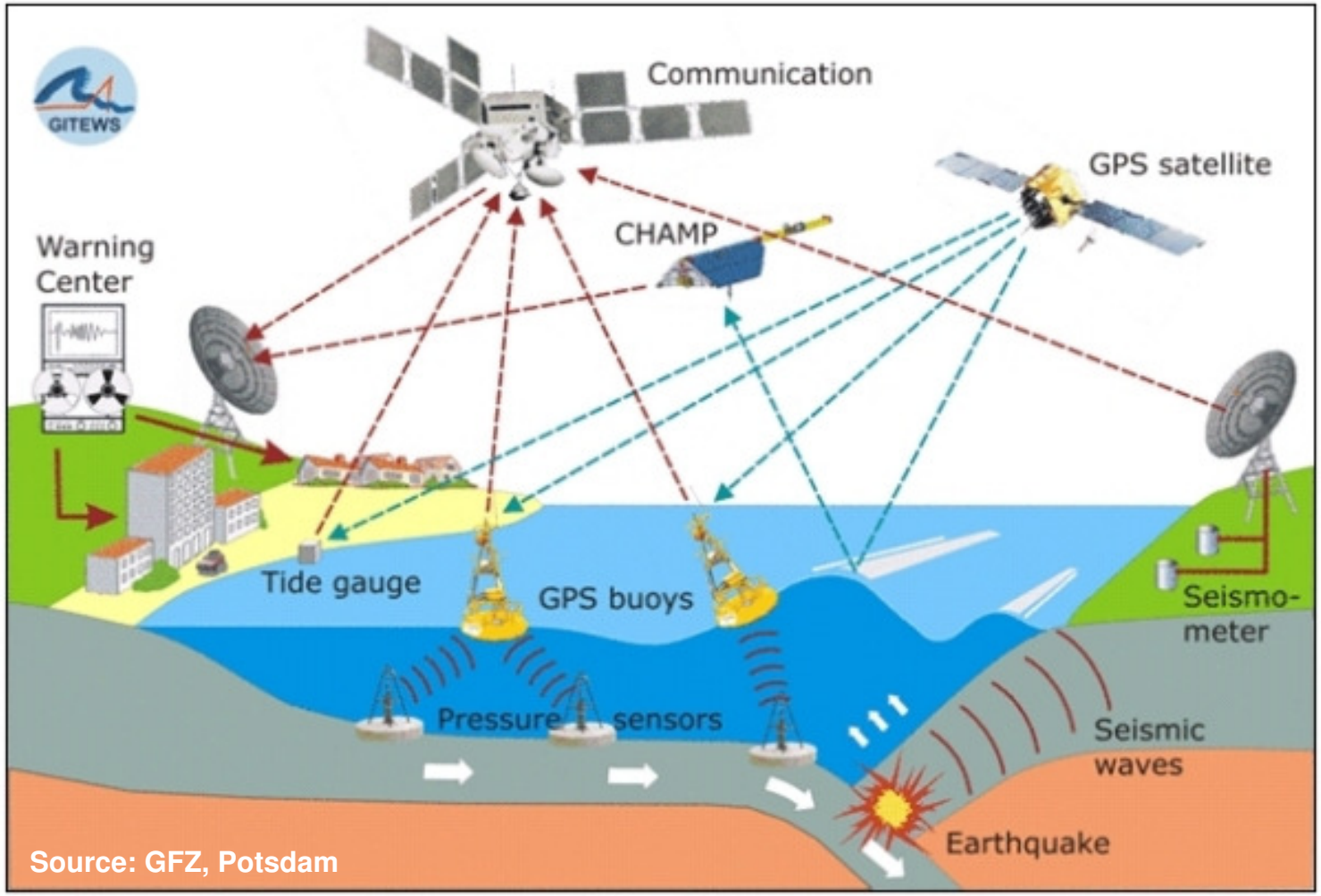
Adaptation refers to the adjustments we can make to help us cope better with changes in our climate.

GNSS Underpins Imagery and LIDAR

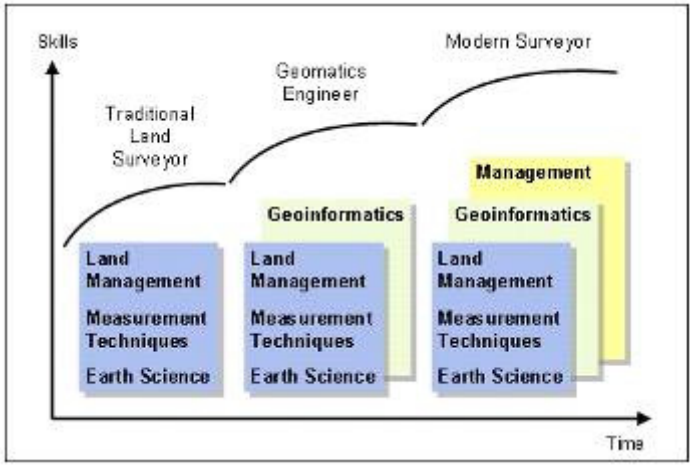
- Effective Climate Change Adaptation requires airborne Imagery and LIDAR for DEMs Orthophotos etc;
- Efficiency and Accuracy of airborne Imagery and LIDAR is underpinned by GNSS;
- For example, the major aerial capture companies in SE Qld rely on GNSS data from DERM's SunPOZ network rather than run their own Reference Station.

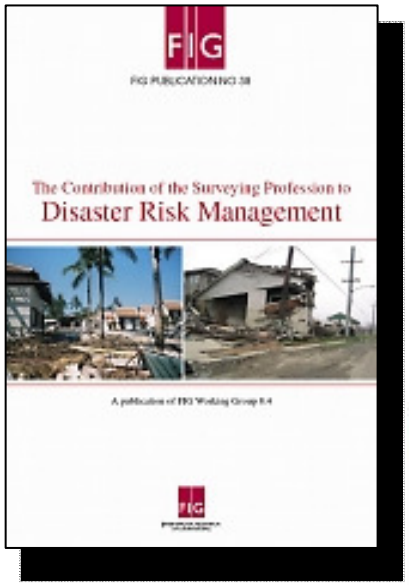


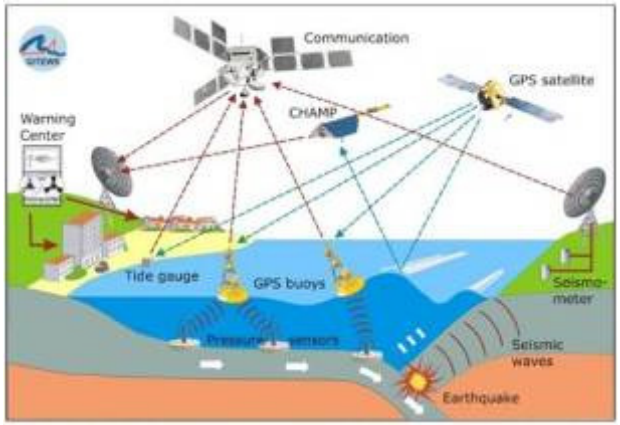
GNSS Buoys for Storm Surge and Tsunami Warnings

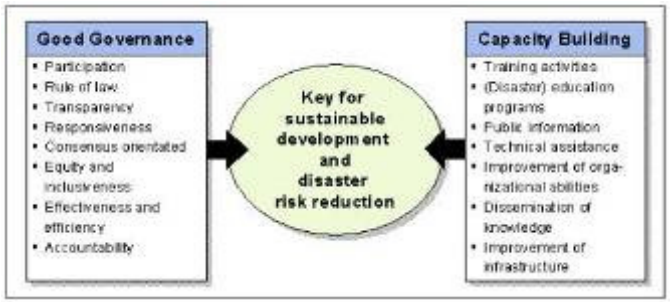


Disaster Management









FIG's Response

GNSS for Mitigating Climate Change

Mitigation refers to interventions designed to reduce the sources of emissions or interventions that can increase the absorption of emissions

Benefits from Precise Positioning

- Recent study by Allen Consulting Group estimated the benefits across Australia;
- Found productivity gains with potential cumulative benefit of ***$73 to $134 billion over next 20 years*** - in agriculture, construction and mining alone;
- Significant proportion of that benefit comes from Fuel Savings
  - ***52% less fuel in Wheat farming;***
  - ***43% less fuel in Road construction***
- **Less Fuel = Less Carbon Footprint.**

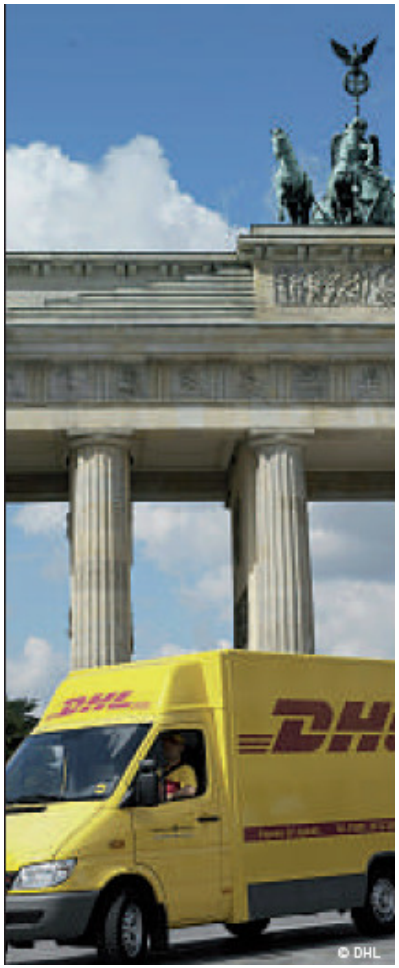
Reduced Carbon Footprint for Agriculture

Australia					
	Million Ha	CO_2-e Kg/Ha	Tonnes	$/Tonne	Traded Value
Total	25	89	2,225,000	$20	$44,500,000

From latest research (including carbon to produce fertilizers and pesticides and less soil disturbance) could be more like 300kg/Ha. So triple these benefits!

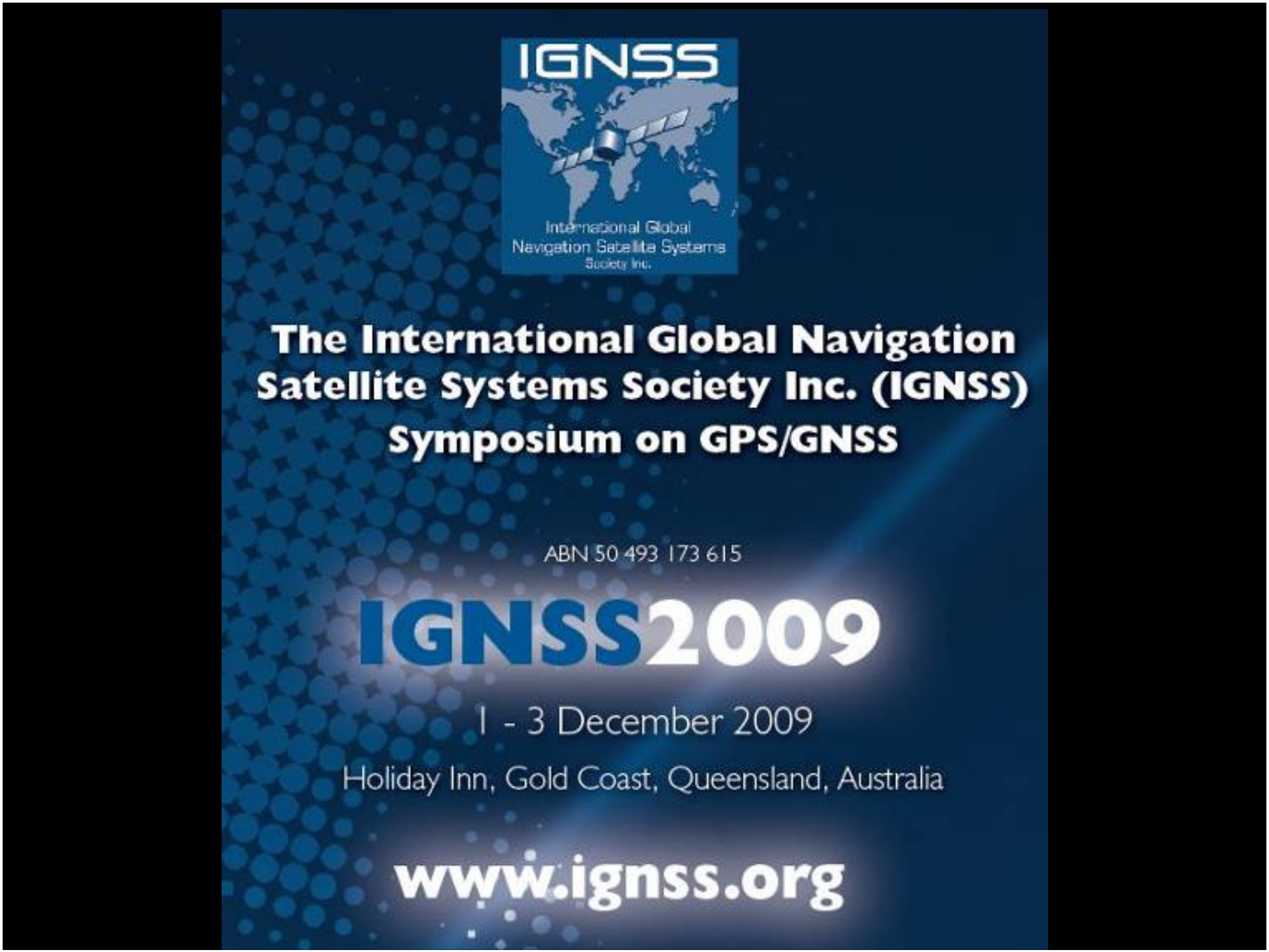
GNSS and Carbon Savings in Transport

- A number of studies have found that the use of GNSS for fleet management significantly led to significant efficiencies. For example, Marketwire reports:
  - 25% reduction in idle times
  - 32% increase in fleet utilization
  - 22% decrease in fuel costs and a 31% drop in daily mileage
  - 23% boost in workforce productivity
- Even greater efficiencies are possible with live traffic data.



GNSS and Carbon Savings in Transport

- **European Satellite Navigation Competition**
  Recent entries with innovative use of GNSS;
- **Carbon Hero**: A mobile based application that tells its user their personal environmental impact due to travel. A keyring sized sensor is used to pick up the location and speed of the user and deduce their mode of transport and associated carbon footprint;
- **GreenDrive**: A driver-vehicle application that helps drivers develop smart, smooth, and safe driving techniques that lead to an average fuel savings of 15-25% while contributing to environmental protection. GreenDrive's purpose is to minimise fuel consumption by suggesting the most economical driving speed to the driver along the way;
- **EcoDrive**: Using position and height information manage the fuel efficiency of a vehicle. For example, a refrigerated truck can use less fuel if it only runs the refrigeration unit on flat ground or going down hill.


IGNSS
International Global
Navigation Satellite Systems
Society Inc.
The International Global Navigation Satellite Systems Society Inc. (IGNSS) Symposium on GPS/GNSS
ABN 50 493 173 615
IGNSS2009
1 - 3 December 2009
Holiday Inn, Gold Coast, Queensland, Australia
www.ignss.org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Conclusion

- Global Navigation Satellite Systems are playing a diverse and important role in relation to MDGs;
- Two examples discussed were:
  - MDG 8 on Global Partnership for Development;
  - MDG 7 on Environmental sustainability especially in Understanding, Adapting to and Mitigating Climate Change.

Thanks for your attention… Questions?

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