Draft Roadmap

Structure:

PREAMBLE: Why? From Whom? For Whom?
ORIGIN OF THE ROADMAP
INTRODUCTION
- *Where we want to go: The goal*
- *Where do we stand?*
- *What is needed in order to get from here to there?*

THE WAY FORWARD: THE MAP
APPENDICES
1: Current limitations
2: Matrix of mission concepts

THE WAY FORWARD: THE MAP
Activity 1: Science developments
Activity 2: Technological developments
Activity 3: Mission implementation
Activity 4: Processing, modeling and applications

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THE WAY FORWARD: THE MAP

Activity 1: Science developments

1.1 Identifying the science questions and application

Describe the science challenges and how they could benefit from gravity, same for applications

1.2 Consolidating and reviewing user and mission requirements

Derive a set of quantitative requirements (resolution, accuracy, latency)

1.3 Meeting the scientific challenges on the road to future gravity missions

Identify the S&T obstacle that limit utilization of gravity observations and describe solutions

1.4 Preparing the interpretation and use satellite gravity observations: Earth system models

Develop concepts and theory for the interpretation of gravity observations in a system context

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THE WAY FORWARD: THE MAP

Activity 2: Technological developments

2.1 Assessment of principles for gravity missions

2.2 Development of improved or new Sensors

2.3 Development of improved or novel mission designs

2.4 Matrix of mission concepts

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THE WAY FORWARD: THE MAP
Activity 3: Mission implementation

3.1 Facilitate the international co-ordination of science and technology activities
Develop organizational structure for coordination and service, consider GEO Tasks, Working Groups, IAG Service (like IGS)
3.3 Inter-agency coordination
Promote coordination between relevant agencies, e.g. on CEOS level
3.4 Agency plans including operation
Support/facilitate (by working with agency representatives, on advisory boards) developments of agency plans

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THE WAY FORWARD: THE MAP
Activity 4: Processing, modeling and applications

4.1 Processing

Develop improved processing algorithms for gravity observations, including assimilation of other observations, joint analyses, and assimilation in models

4.2 Geophysical modeling

Improve geophysical models and their use in analysis of gravity observations

4.3 Science application

Develop public domain frameworks for major science challenges that can be used to utilize the gravity observations for research

4.4 Mass redistribution and climate change

Develop a framework for the interpretation of mass redistribution in terms of climate change (thematic approach)

4.5 Services

Develop and operate specific gravity-based services with geophysically, climatologically, hydrologically and/or societally relevant products delivered in timely manner

Draft Declaration

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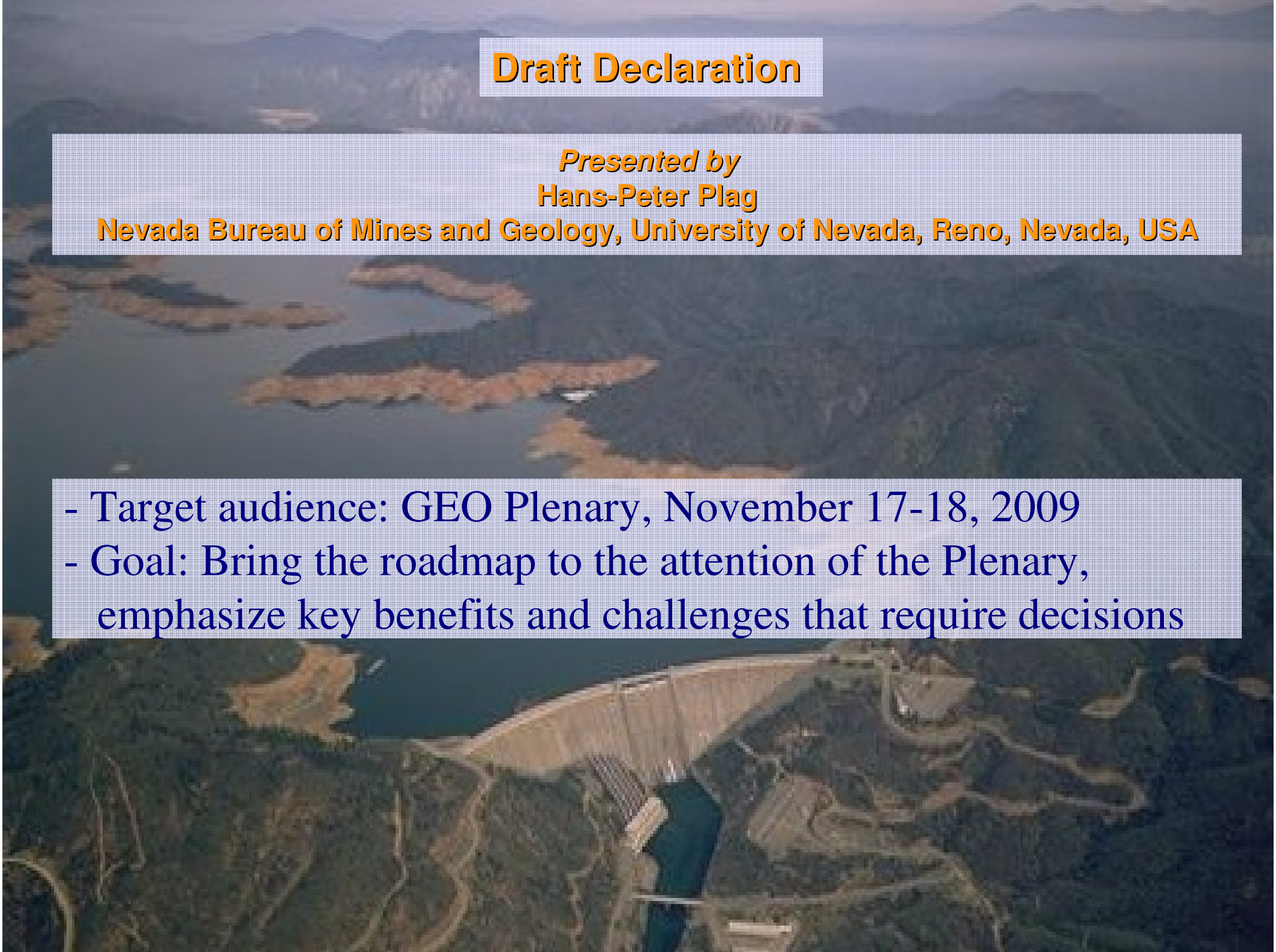
- Target audience: GEO Plenary, November 17-18, 2009
- Goal: Bring the roadmap to the attention of the Plenary, emphasize key benefits and challenges that require decisions



Draft Declaration: Societal Motivation

Little or no water scarcity

Not estimated

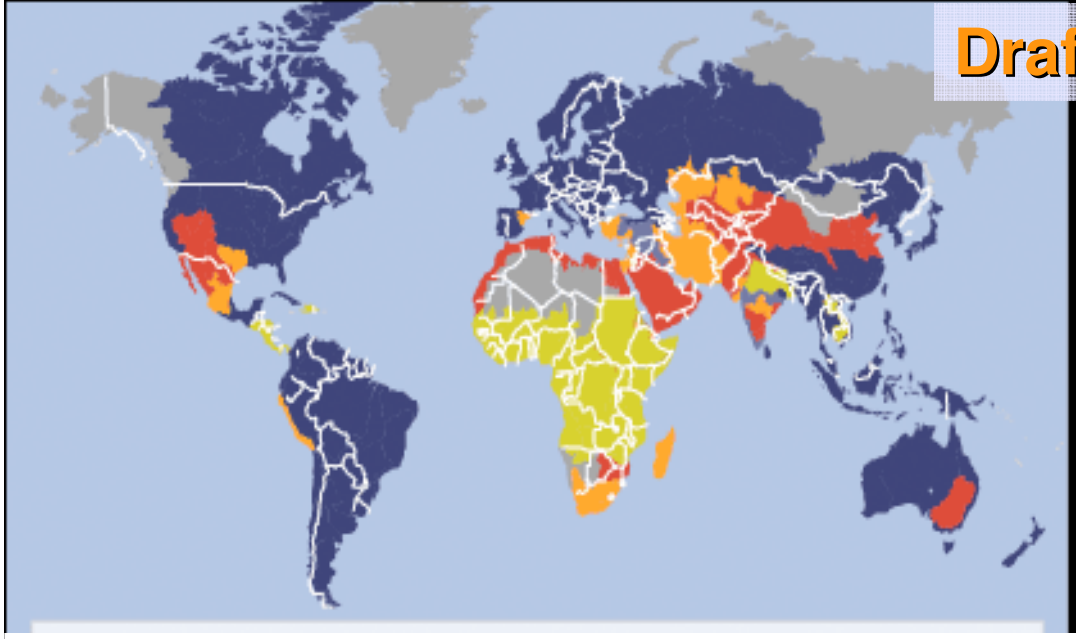
Approaching physical water scarcity

Physical water scarcity

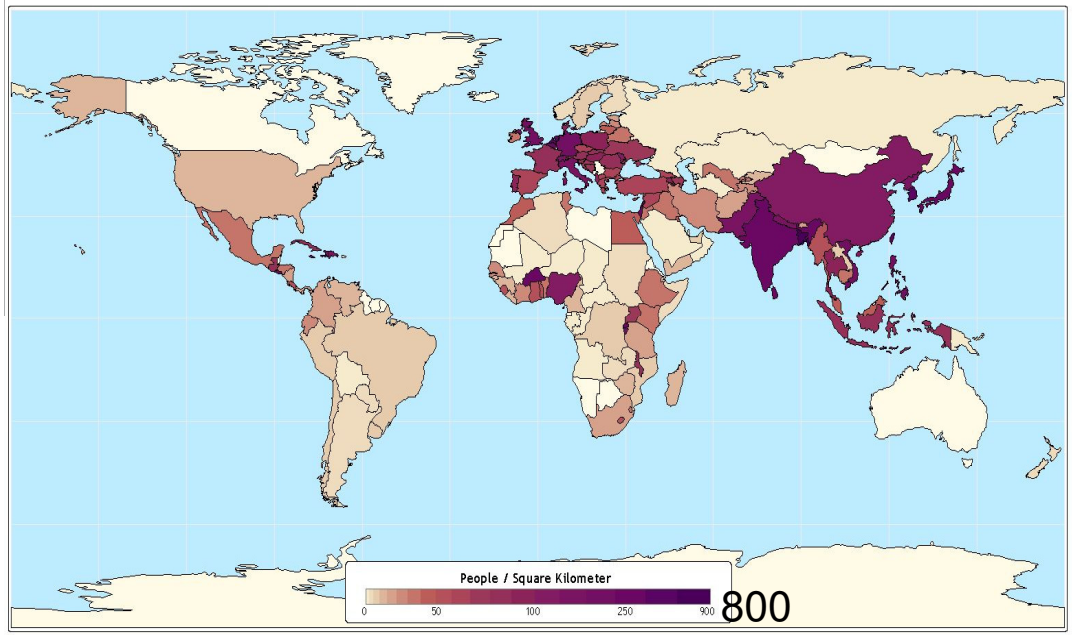
Economic water scarcity

Source: International Water Management Institute

Draft Declaration: Societal Motivation



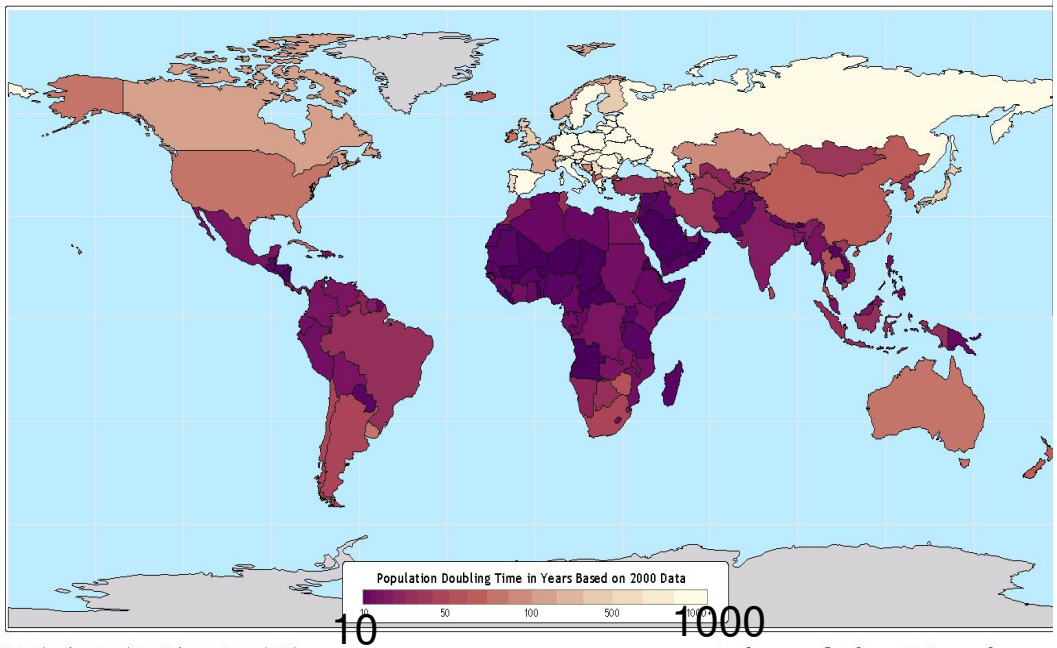
Population Density by Country



Data taken from: ESRI (2000)

Atlas of the Biosphere
Center for Sustainability and the Global Environment
University of Wisconsin - Madison

Population Doubling Time



Data taken from: Population Reference Bureau (2000)

Atlas of the Biosphere
Center for Sustainability and the Global Environmen
University of Wisconsin - Madiso

Draft Declaration: Societal Motivation

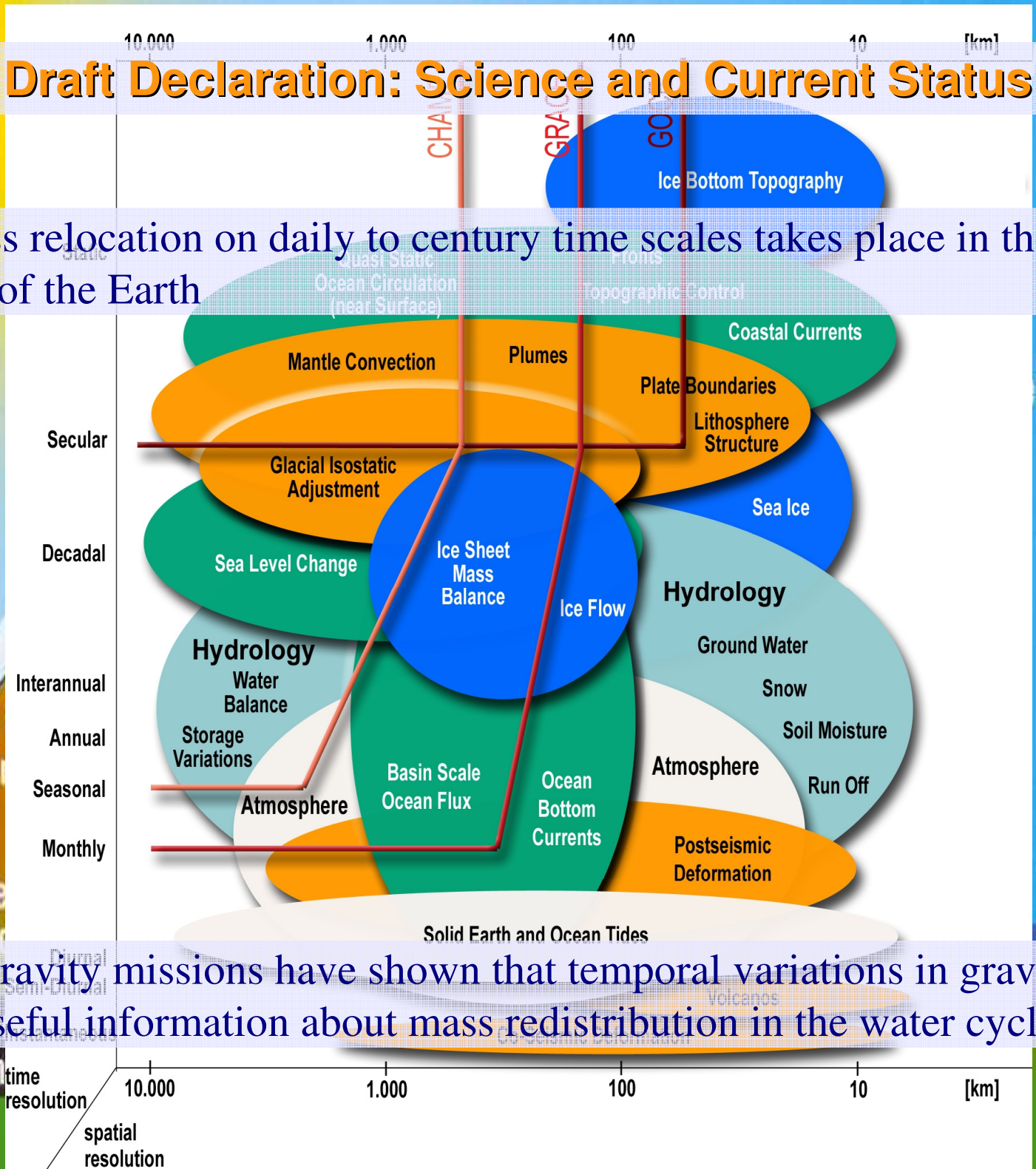
- Pressure on water resources is rising (food, energy, industry, urban uses);
- climate change and human interference are changing the water cycle, with potentially major impacts (droughts, floods, sea level rise, ...);
- 1 billion people without access to sufficient drinking water,
- United Nations Water Report (2006): Access to water is not so much a problem of abundance but of governance
- Important for governance: understanding of water cycle, quantitative information

Little or no water scarcity
Not estimated
Approaching physical water scarcity
Physical water scarcity
Economic water scarcity

Source: International Water Management Institute

Draft Declaration: Science and Current Status

- Most mass relocation on daily to century time scales takes place in the fluid envelope of the Earth



- satellite gravity missions have shown that temporal variations in gravity changes contain useful information about mass redistribution in the water cycle

Draft Declaration: What could be done and achieved

Steps towards major benefits:
- uninterrupted sequence of satellite gravity missions
- scientific and technological developments to support better understanding and quantification of the water cycle;
- virtual constellation for mass relocation;

What we want/hope for:
- bring the roadmap to the attention of the GEO Plenary;
- a major international effort to implement the roadmap, i.e.
  * facilitate the science and technology development;
  * realize the missions.