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The Strategic Role of Essential Variables in Geodesy

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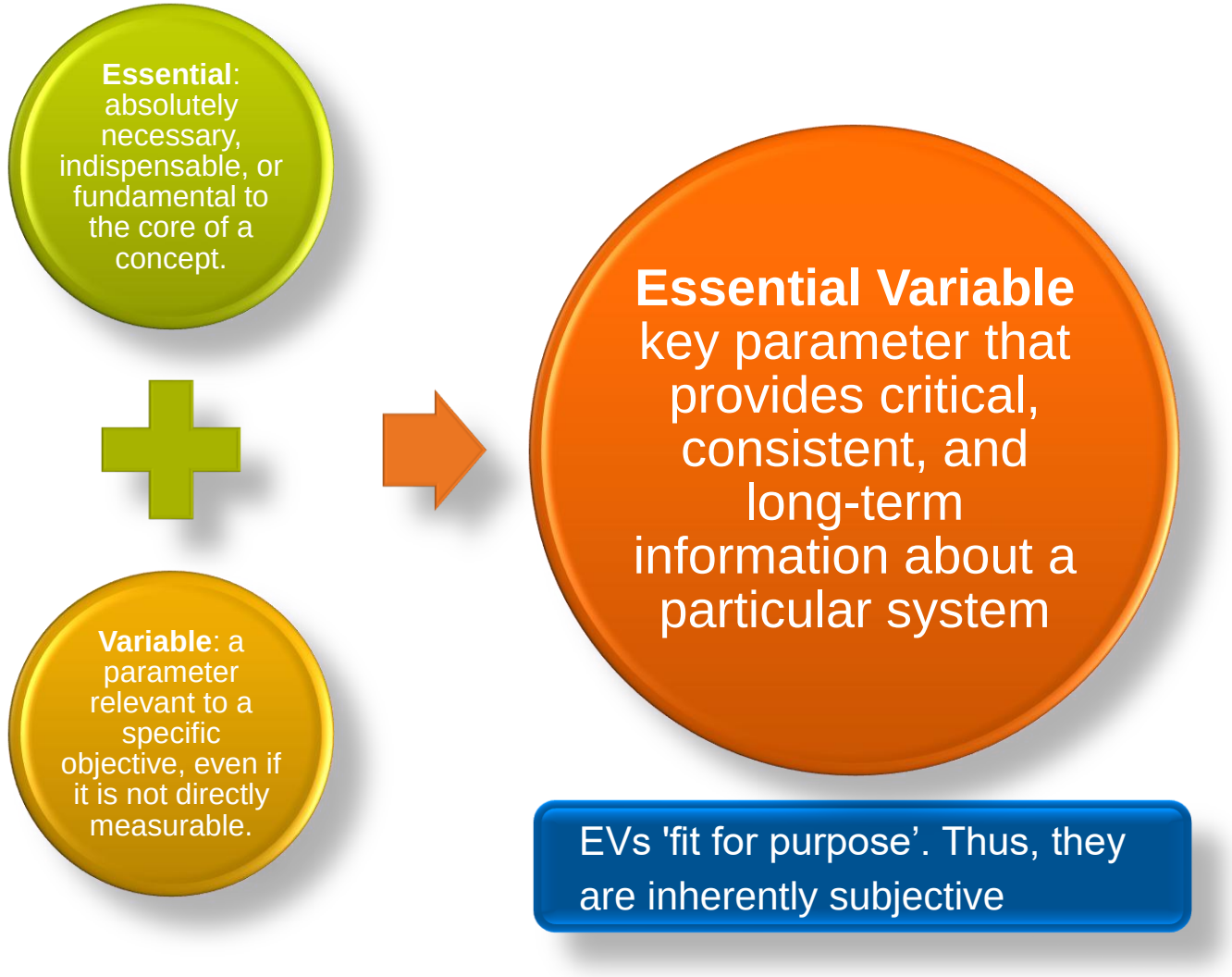
Motivation: Raising awareness of Geodesy

- Uneven global coverage, ageing infrastructure, insufficient funding
- Geodetic products on a best-effort basis (no guaranteed long-term operations)
- Declining workforce and limited new talent
- Challenging transition from research to operational services
- Difficulty in translating technical geodetic information into actionable insights for decision-makers and the public
- Low visibility in policy, international initiatives, and other scientific domains

Essential Variables (EVs): A powerful tool to raise awareness globally and across disciplines

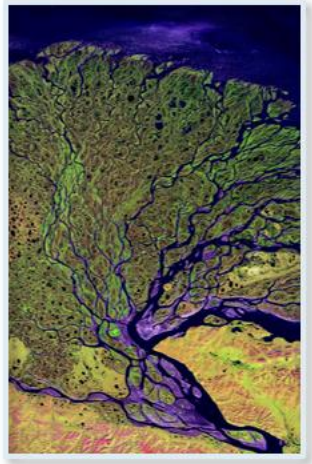
- Encourage scientists and observing systems to place more emphasis on these variables.
- Stimulate the commitment of national and international organisations and funding agencies to support the provision of these variables.
- Enable cross-disciplinary data assimilation and interpretation.
- Facilitate interoperability between science and evidence-based policy.



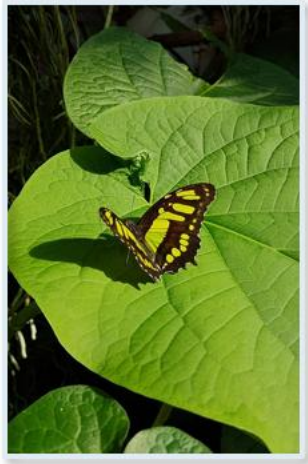
Essential Variables for monitoring Earth and Socio-Economic Systems

ECV–Climate

EOV–Ocean



EWV–Water



EBV–Biodiversity

EGdV–Geodiversity

Essential Variables workflows for resource efficiency and environmental management

EAV–Agricultural

ETIV–Transport and Infrastructure

EUV–Urban

EREV–Renewable Energy

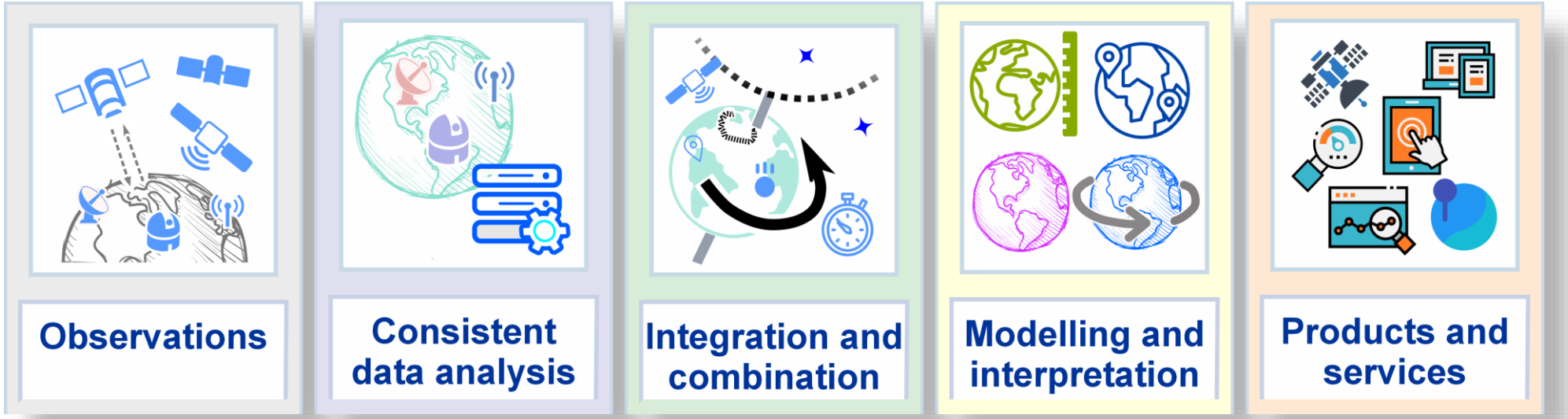
EMV–Mineral

EHV–Health

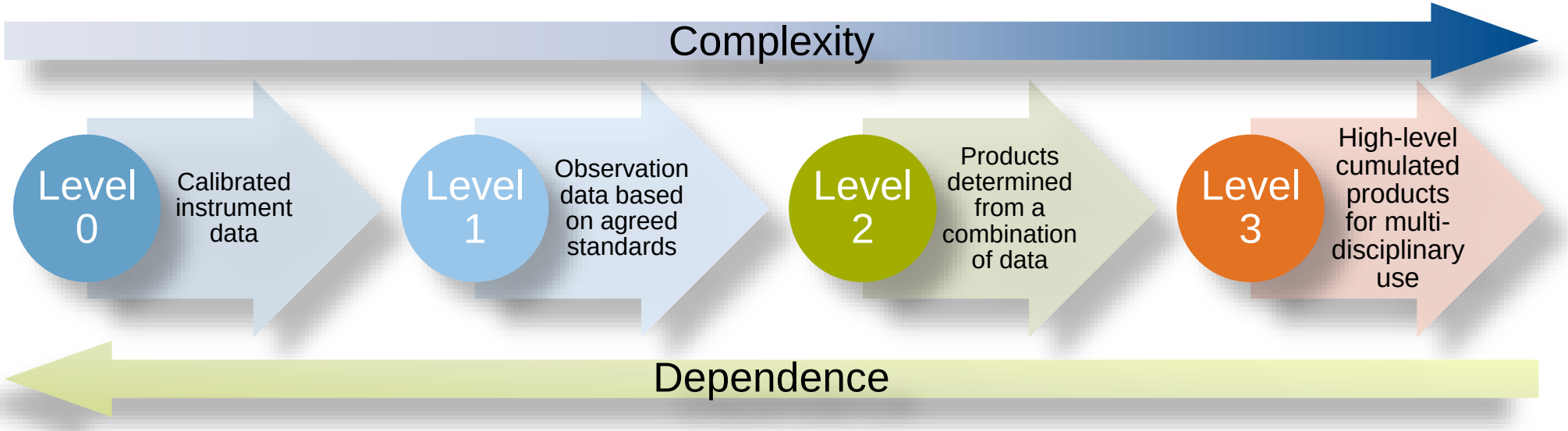
ESV–Social

Essential Variables in the workflows of geodesy

From geodetic observations to Earth system modelling



Essential Geodetic Variables Levels



Example: Workflow for the ITRF

Level 0 — Calibrated instrument data

Level 1 — Observation data based on agreed standards

Level 2 — Products determined from a combination of data

Level 3 — High-level cumulated products for multi-disciplinary use

Infrastructure

Observations

Standards

- VLBI contribution
- SLR contribution
- GNSS contribution
- DORIS contribution

Station position time series

Some (by-)products related to the Earth System

TEC

ZPD

Atmosphere

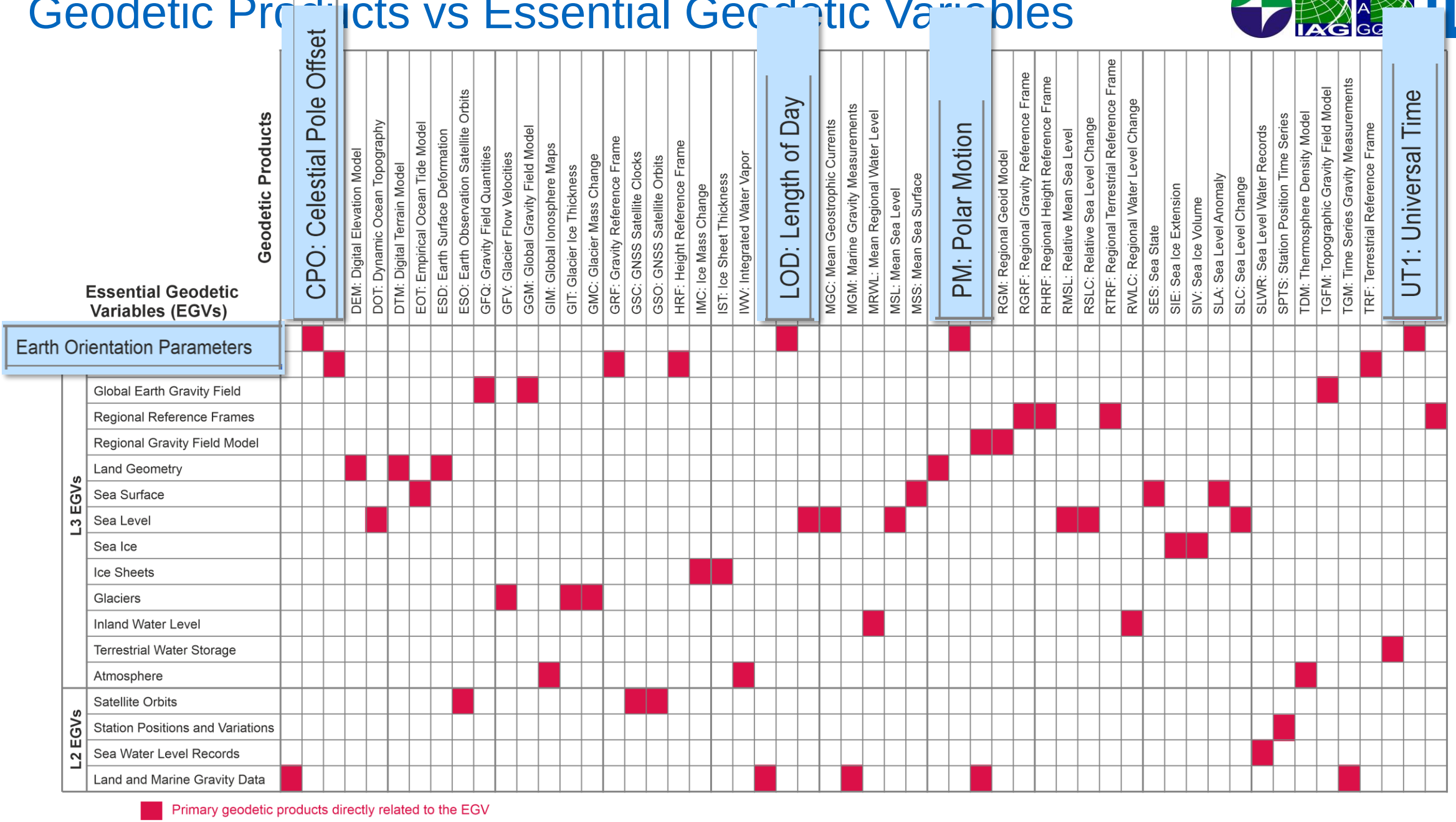
Plate kinematics

Deformation models

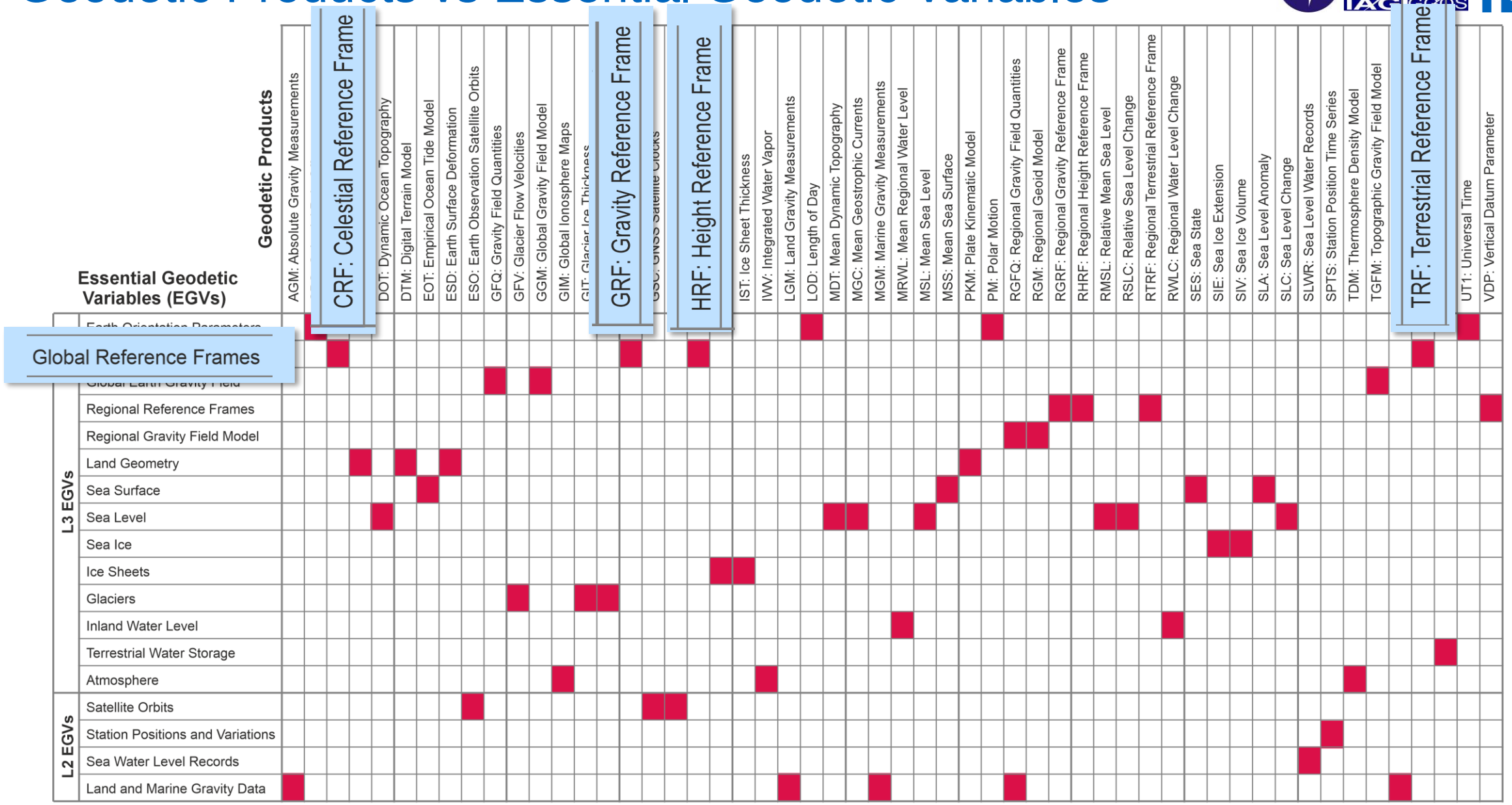
Vertical land motion

Land geometry

Geodetic Products vs Essential Geodetic Variables



Geodetic Products vs Essential Geodetic Variables



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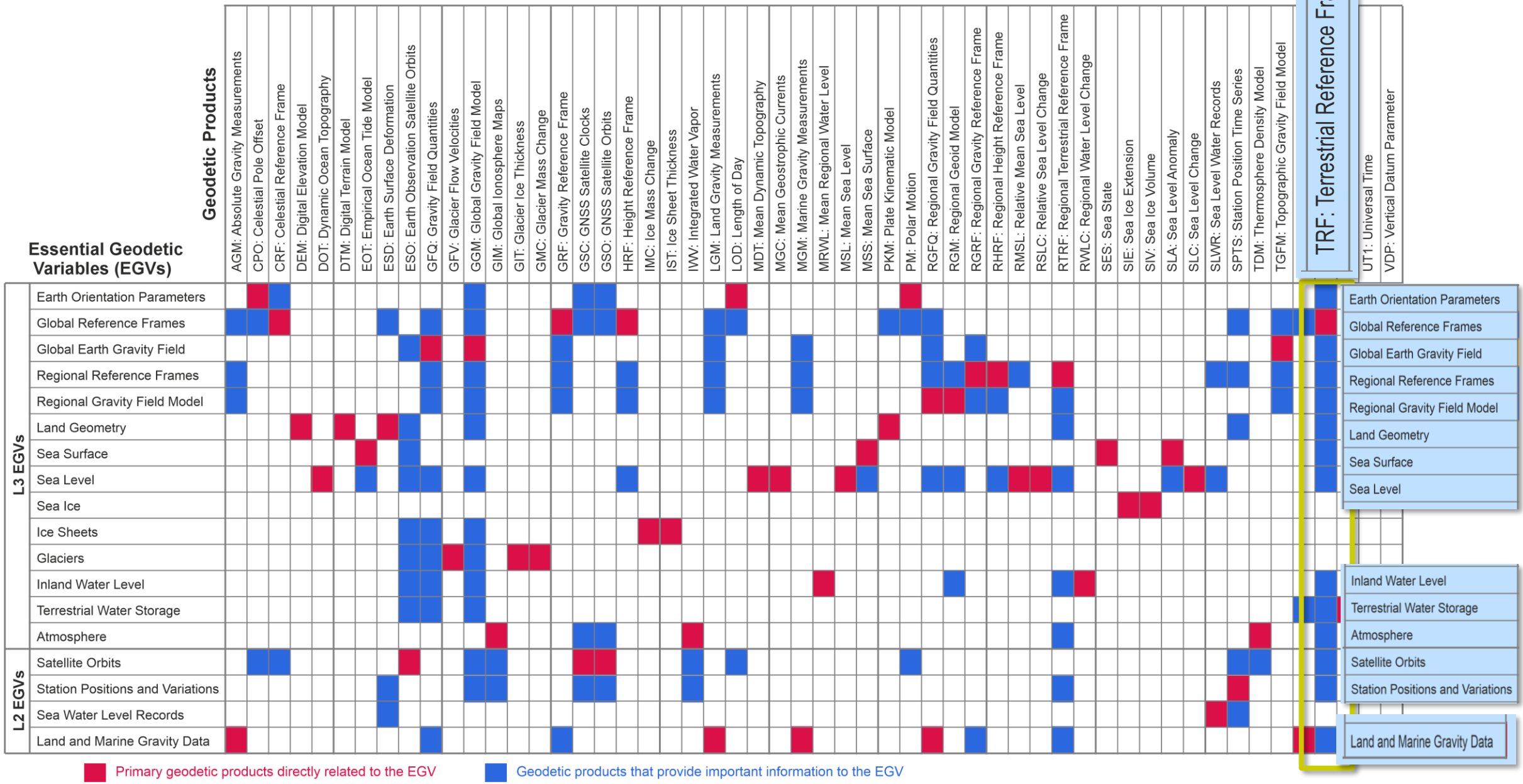

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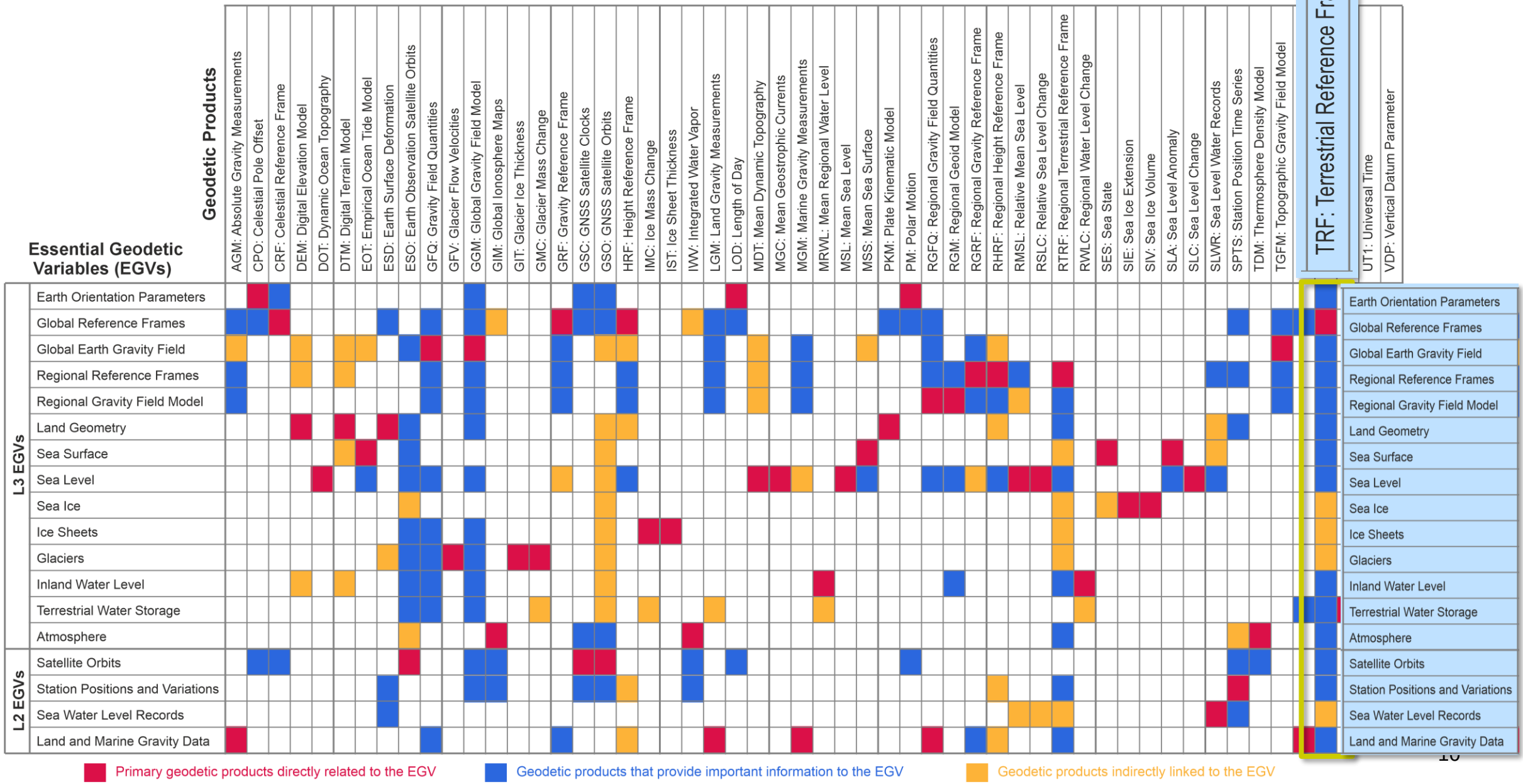


Proposed Essential Geodetic Variables

Domain	Subdomain: Geometric	Subdomain: Physical	Subdomain: Geometric/Physical
Global	Earth Orientation Parameters; Satellite Orbits; Station Positions and Variations	Global Earth Gravity Field; Atmosphere	Global Reference Frames
Land	Land Geometry	Terrestrial Water Storage	Ice Sheets; Glaciers; Inland Water Level
Ocean	Sea Surface; Sea Ice; Sea Water Level Records	Sea Level	
Land/Ocean		Regional Gravity Field Model; Land and Marine Gravity Data	Regional Reference Frames

54 geodetic products

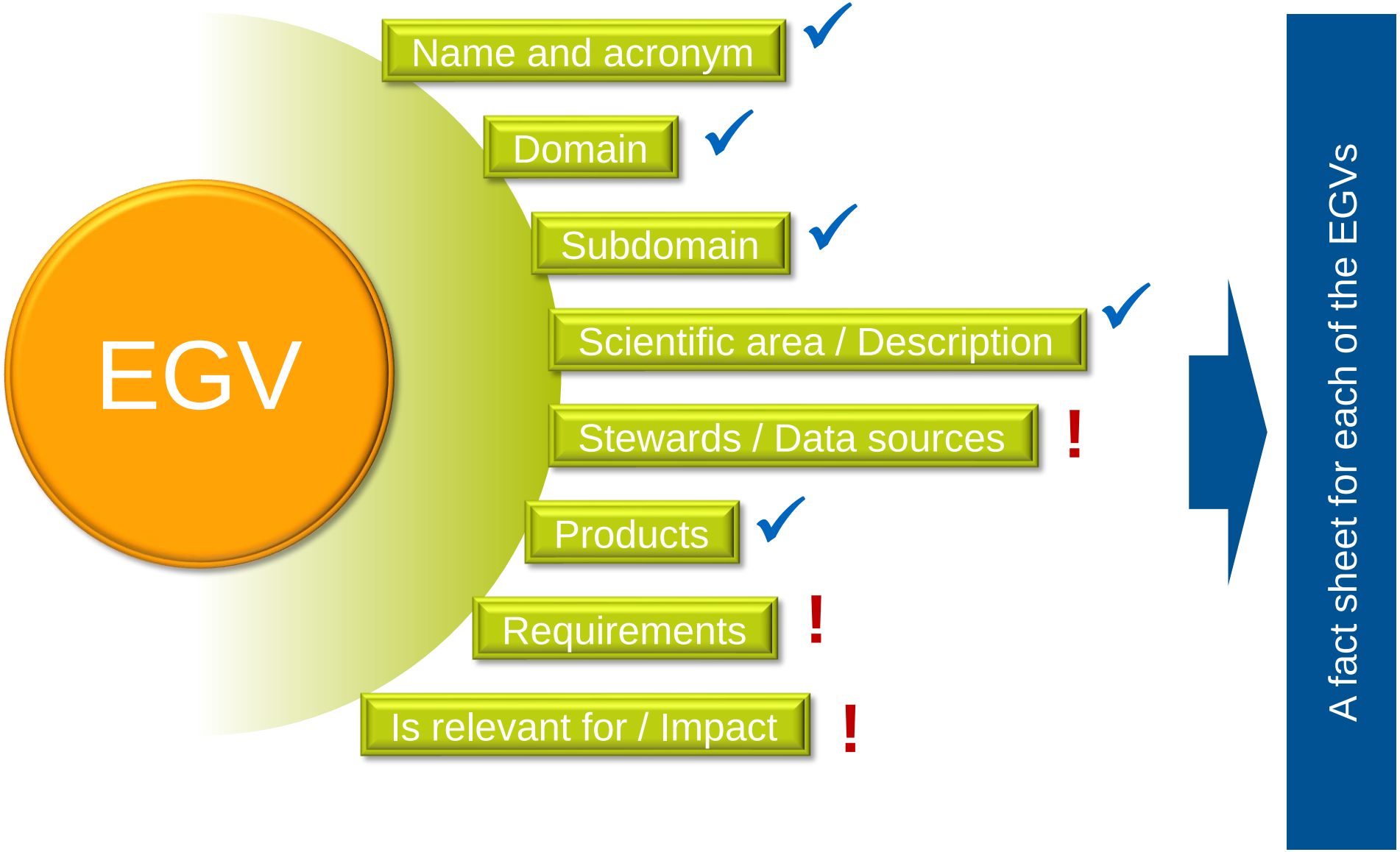
EGVs
Level 3: 14
Level 2: 4
Level 1: ongoing
Level 0: ongoing

Domain
Global: 6
Land: 5
Ocean: 4
Land/Ocean: 3

Subdomain
Geometric: 7
Physical: 6
Geometric/Physical: 5

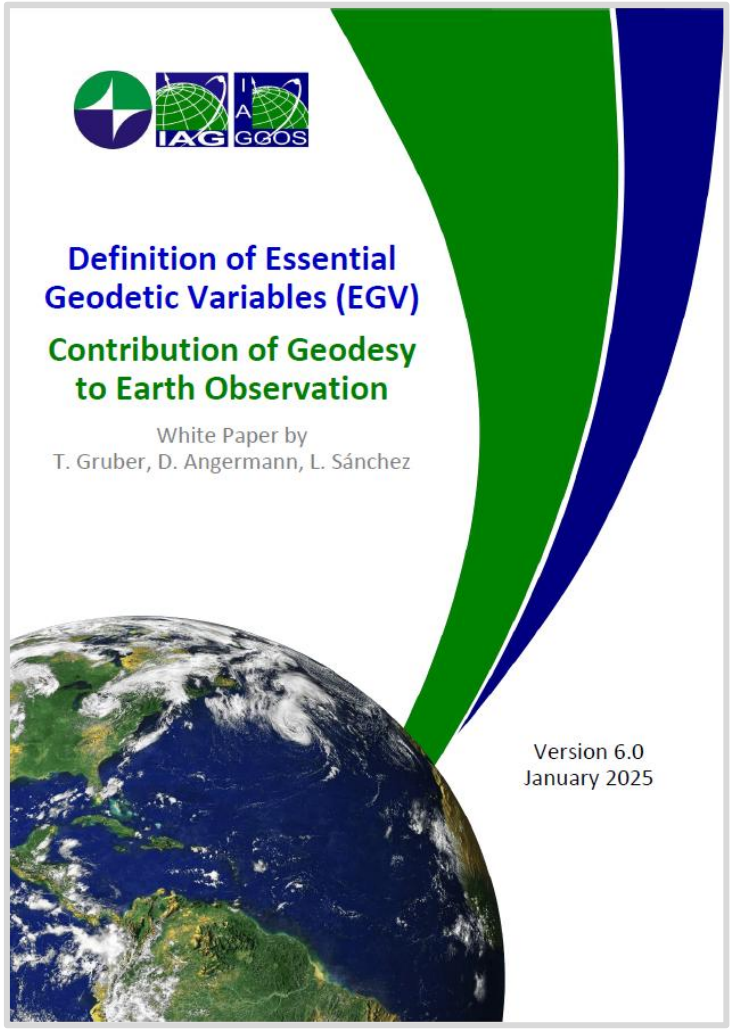
EGVs and GCOS/GOOS
8 EGVs linked to ECVs
3 EGVs linked to EOVs

Characterisation of Essential Geodetic Variables



Status and the way forward

- EGVs are a central component of
  - → the GGOS Strategic Plan
  - → the UN-GGCE 1st Joint Development Plan for Global Geodesy
- EGV concept already reviewed by
  - → GGOS Science Panel
  - → GGOS Governing Board
  - → IAG Executive Committee (revision underway)
  - → UN-GGCE (revision underway)
- EGVs Level 0 and Level 1 in progress
- Next step
  - → Requirements
- Then a broader public review
  - → Consensus



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