Total Water Storage

a proposal from TOPC

GCOS Steering Committee 28

Item 6.1.b

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Total Water Storage

Only TWS change provides the full picture of hydrological changes on the continents

Continental water balance

$$P = ET + Q + \Delta TWS$$

P: Precipitation
ET: Evapotranspiration
Q: Runoff
ΔTWS: Storage change

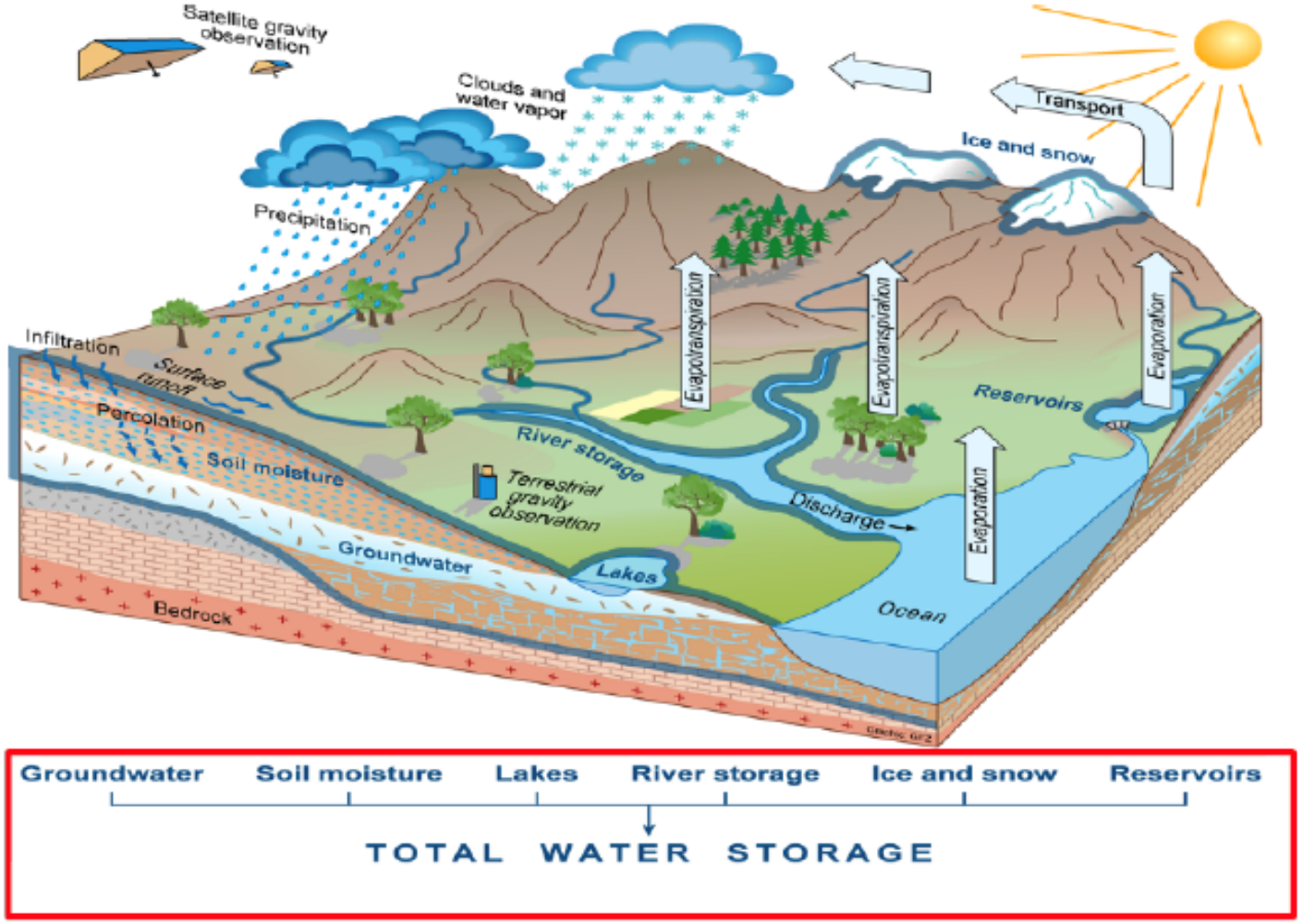

Figure 1: Total terrestrial water storage and its change as part of the continental water cycle

Uses Include

- Quantifying the net effect of changes in the climate, human water use and other hydrological effects on the continental water budget
- Closing the terrestrial water balance
- Identifying hot spots of changes in the water cycle assessing the severity of droughts, contributing to flood prediction by measuring the wetness status of river basins, monitoring the ice mass loss of glaciers and ice caps, quantifying the contribution of TWS to sea level rise
- Improving the predictive skill of Earth system models through validation and calibration

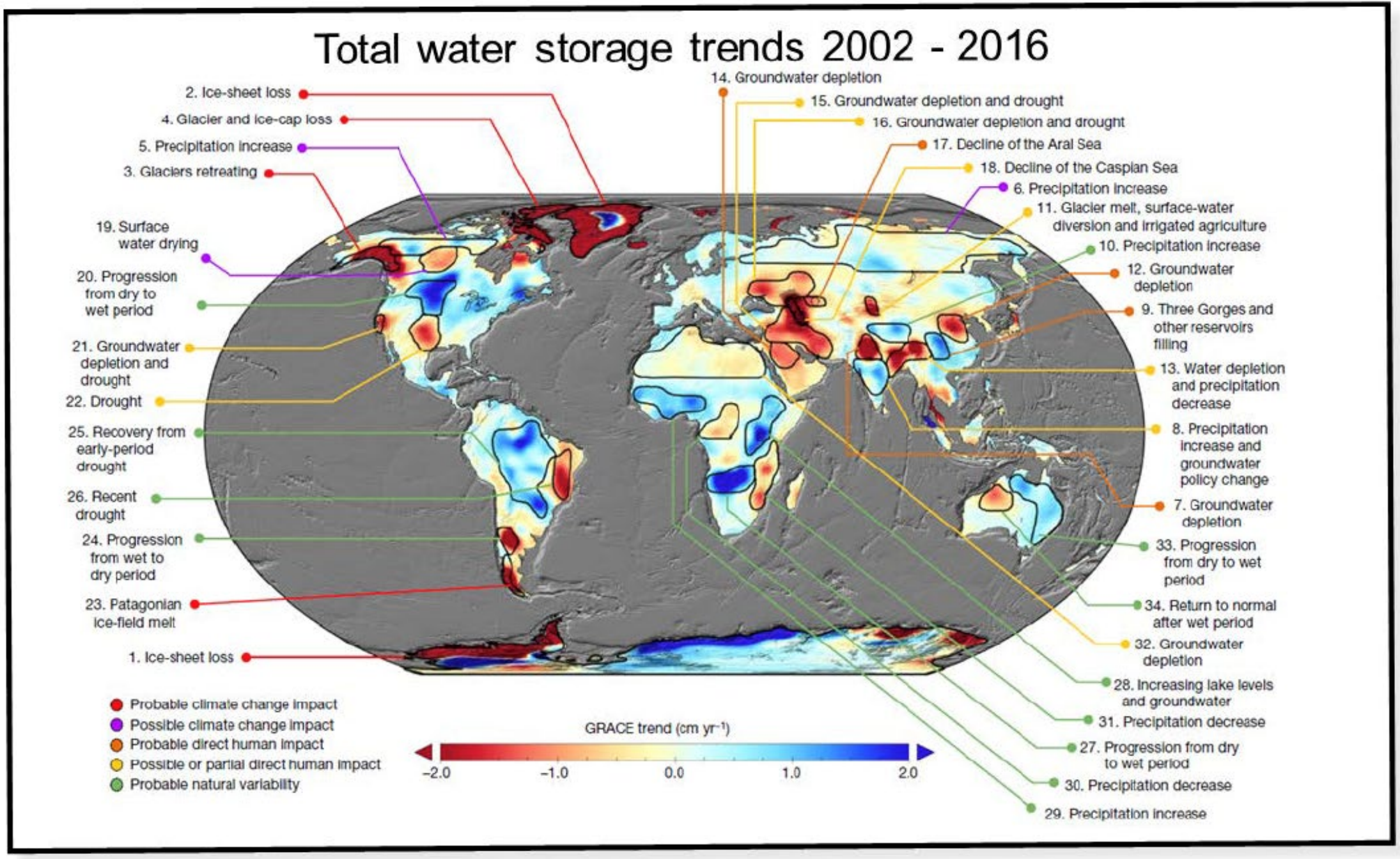

Figure 2: TWS trends from GRACE time-variable gravity data (Rodell et al., 2018)

Proposed ECV

Table 1 ECV product requirements for proposed new ECV - Thresholds*

ECV	Product	Temporal resolution	Latency	Spatial resolution	Required measurement uncertainty	Stability (per decade)
Terrestrial Water Storage (TWS)	TWS anomaly	monthly	monthly	300 km	10-20 mm, Trend 10 mm/a	No drift

*GCOS ECV guidelines: The threshold defines the minimum requirement, i.e., the value that has to be met to ensure that data are useful

Table 3 ECV product requirements for proposed new ECV – Goals+

ECV	Product	Temporal resolution	Latency	Spatial resolution	Required measurement uncertainty	Stability (per decade)
Terrestrial Water Storage (TWS)	TWS anomaly	daily	2-3 days	50 km	10-20 mm, Trend 10 mm/a	No drift

+GCOS ECV guidelines: The goals define the ideal requirements above which further improvements are not necessary. This is likely to evolve as applications and technologies progress

Draft Decision

- The Steering Committee decides that Total Water Storage (TWS) should be an ECV and asks TOPC to include it, and its requirements, in the next revision of the GCOS Implementation Plan.

thank you

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