

COST-G combination of Swarm gravity fields of different analysis centers

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Swarm Data Quality Workshop

Prague, Czech Republic

16 – 20 September, 2019

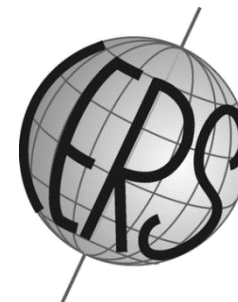
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International Association of Geodesy

Int. Gravity
Field Service



Int. Earth
Rotation
Service



Int. Gravimetric
Bureau



Int. Geoid Service



Permanent
Service for
Mean Sea Level



IGS INTERNATIONAL
GNSS SERVICE

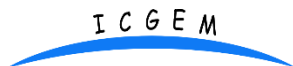


Int. Geodynamics and
Earth Tide Service



Int. Laser
Ranging
Service

Int. Center for Global
Earth Models



Int. DEM Service



Combination Service for Time-variable Gravity Fields

Product Center of the IGFS




Int. VLBI
Service



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COST-G: Products



Combination Service for Time-variable Gravity Fields

Home Introduction Consortium Service **Products** Documents Contact The COST-G Plotter

Products

COST-G provides a number of products via different platforms and channels:

GRACE

Level 2 – Products are sets of spherical harmonic coefficients which stem from the combination on solution or normal equation level. The coefficients need to be processed by a spherical harmonic synthesis in order to derive gridded data. They are available at the International Center for Global Gravity Earth Models (ICGEM): http://icgem.gfz-potsdam.de/series/03_COST-G/GRACE

Level 2b – Products will be available soon.

Level 3 – Products will be available soon.

GRACE Follow-On

Level 2 – Products will be available soon.

Level 2b – Products will be available soon.

Level 3 – Products will be available soon.

Swarm

Level 2 – products are a combination of different kinematic orbit products and various gravity field recovery approaches. Data is available at the International Center for Global Gravity Earth Model (ICGEM): http://icgem.gfz-potsdam.de/series/03_COST-G/Swarm

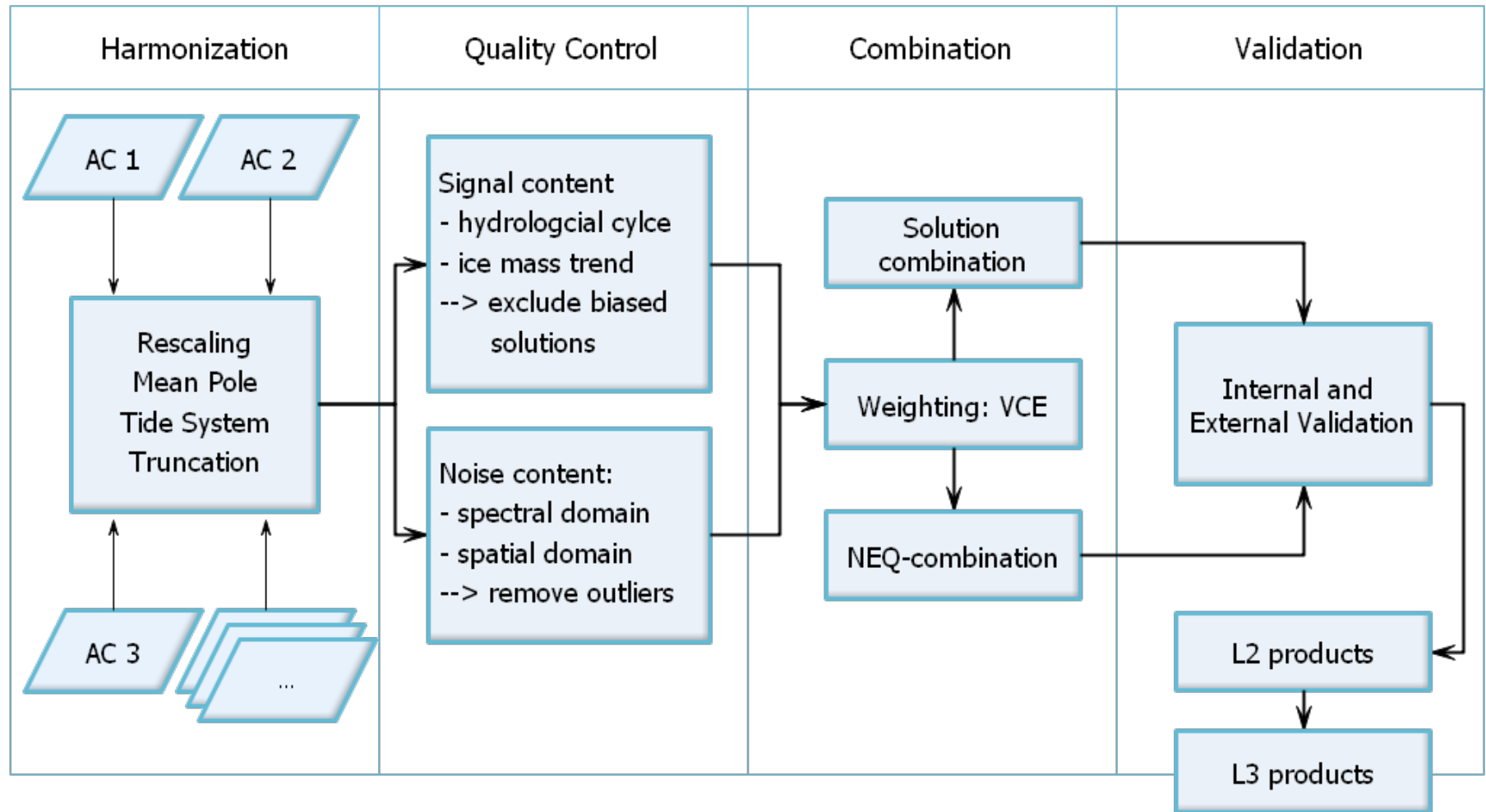


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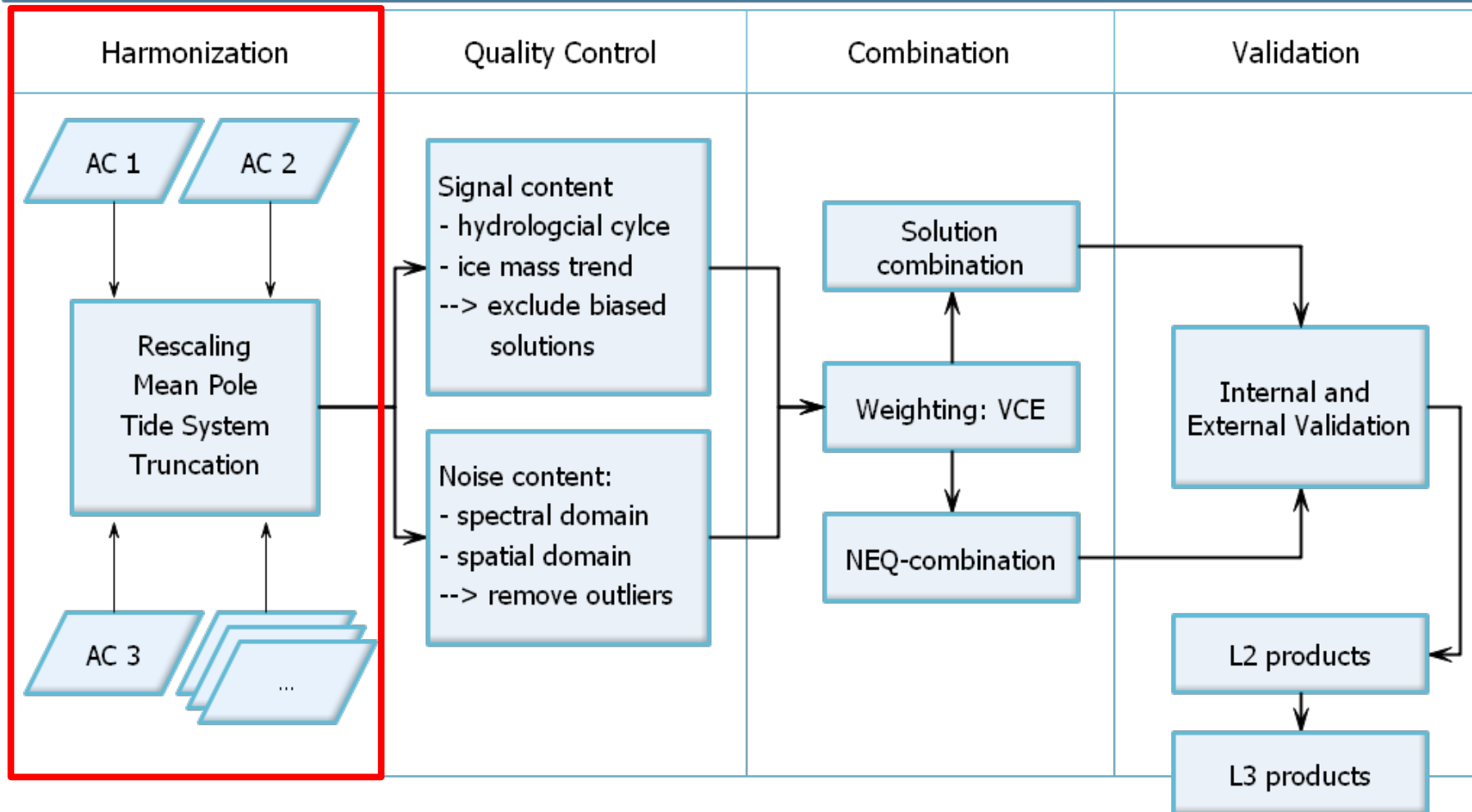
COST-G: Workflow

Combination Process



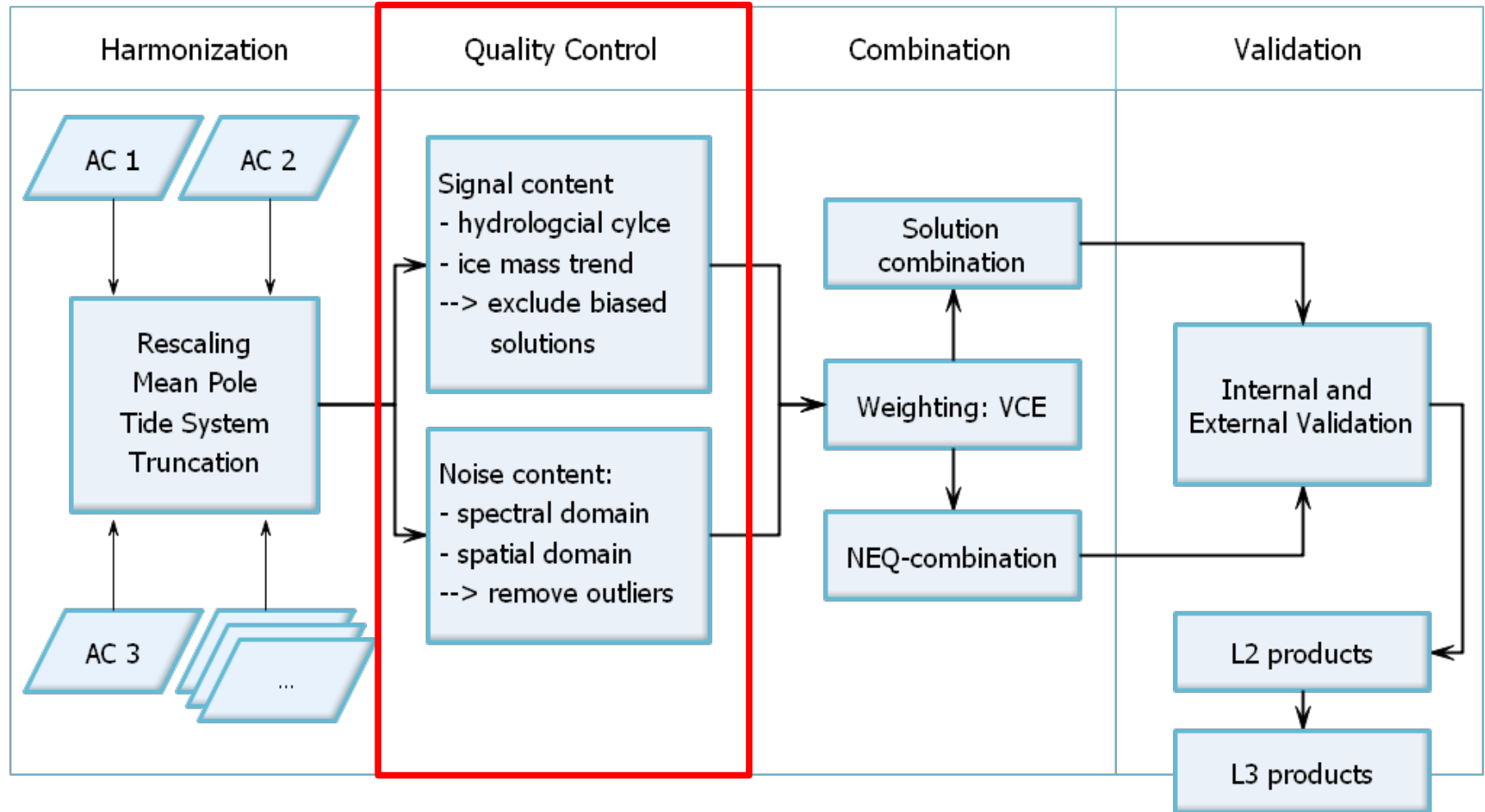
COST-G: Harmonization

Combination Process



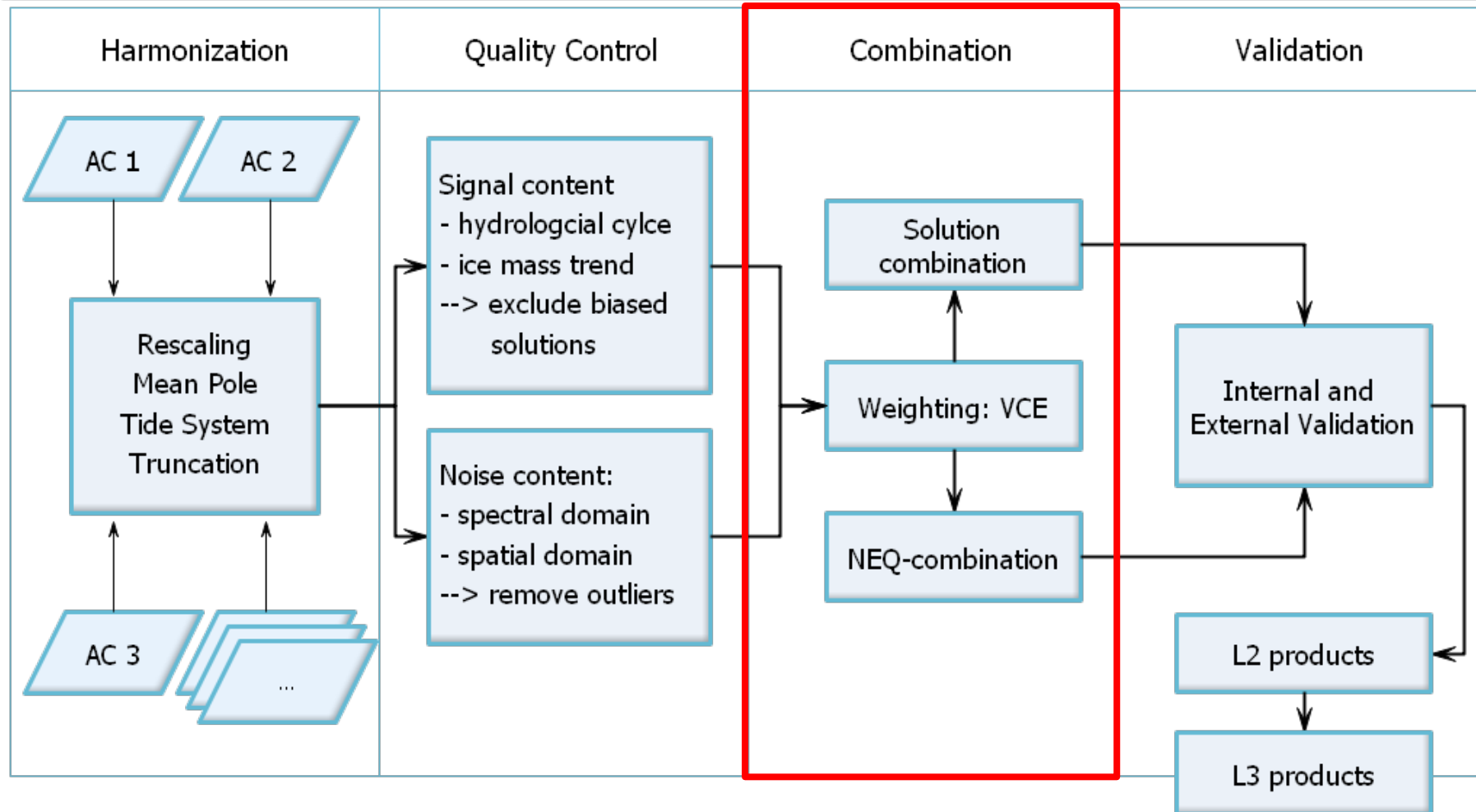
COST-G: Quality Control

Combination Process

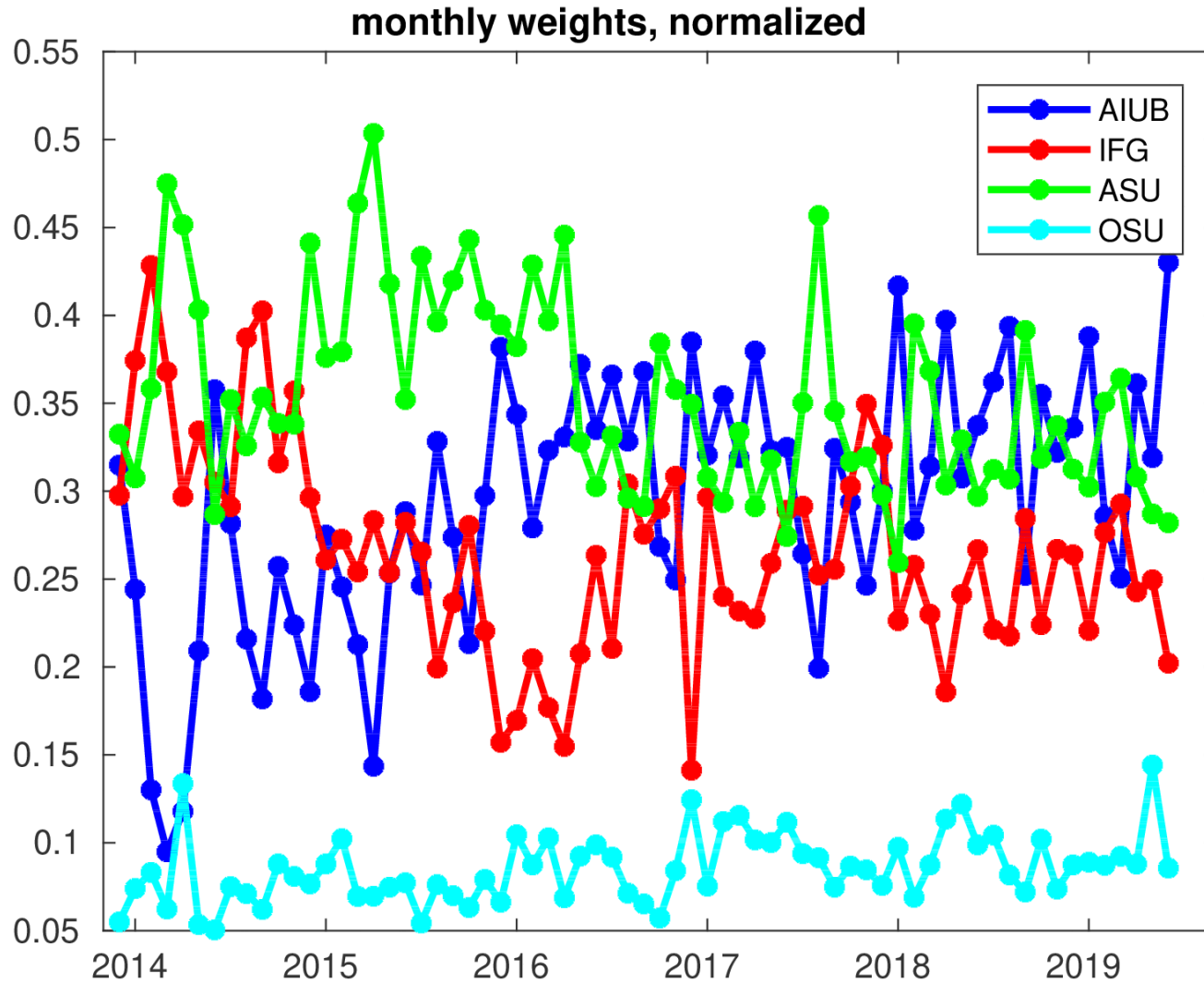


COST-G: Combination

Combination Process

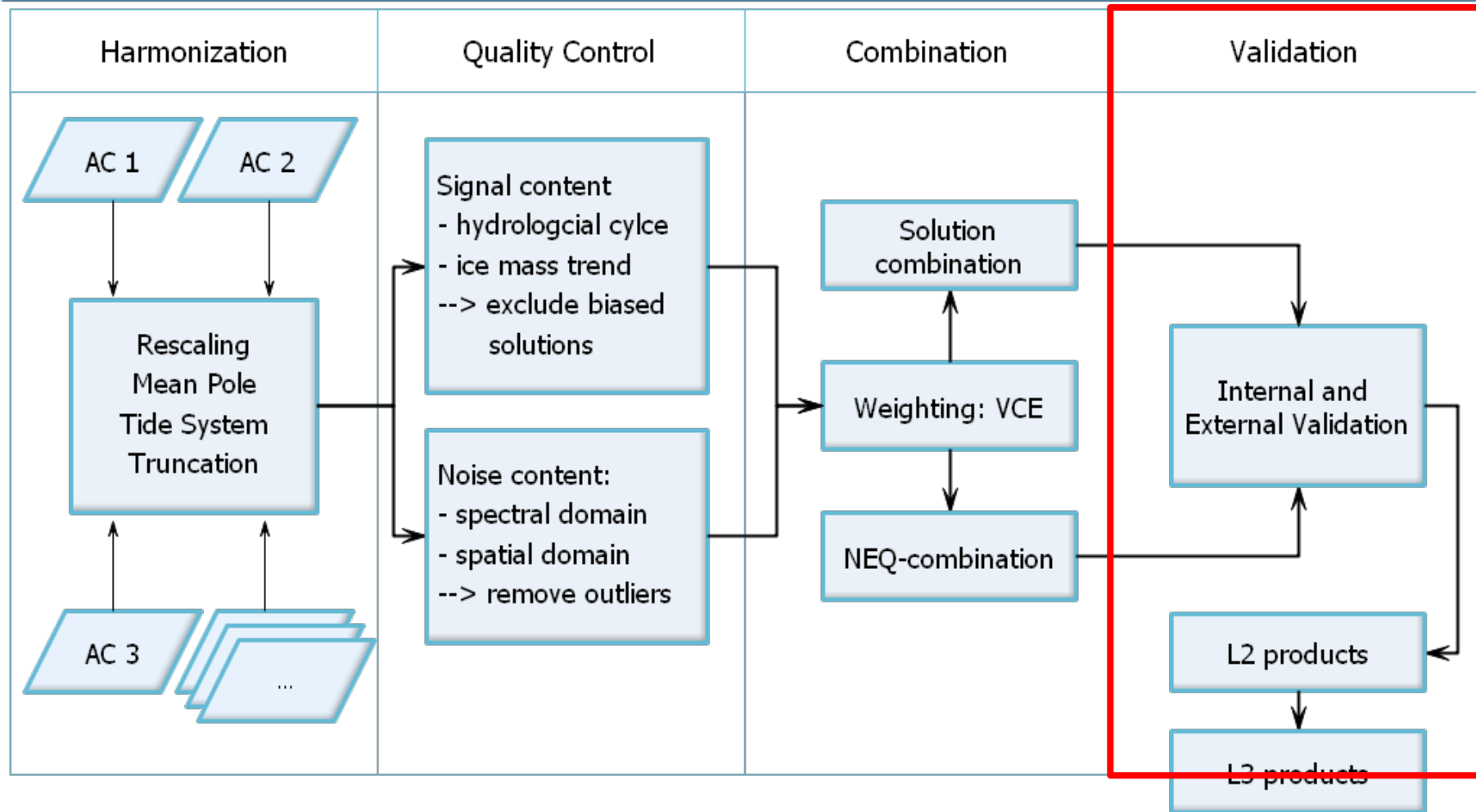


Variance Component Estimation

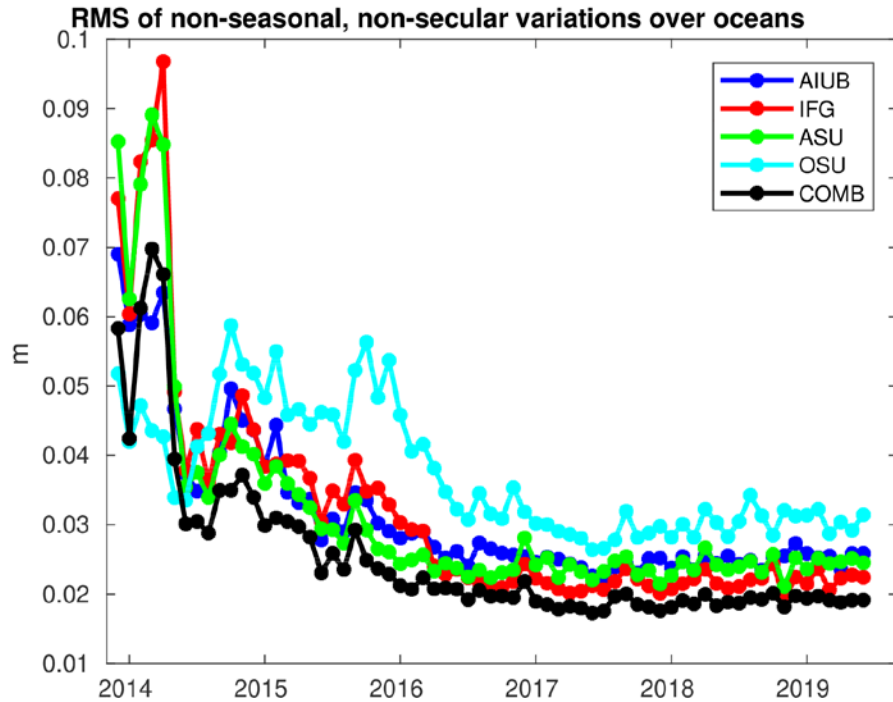


COST-G: Validation

Combination Process

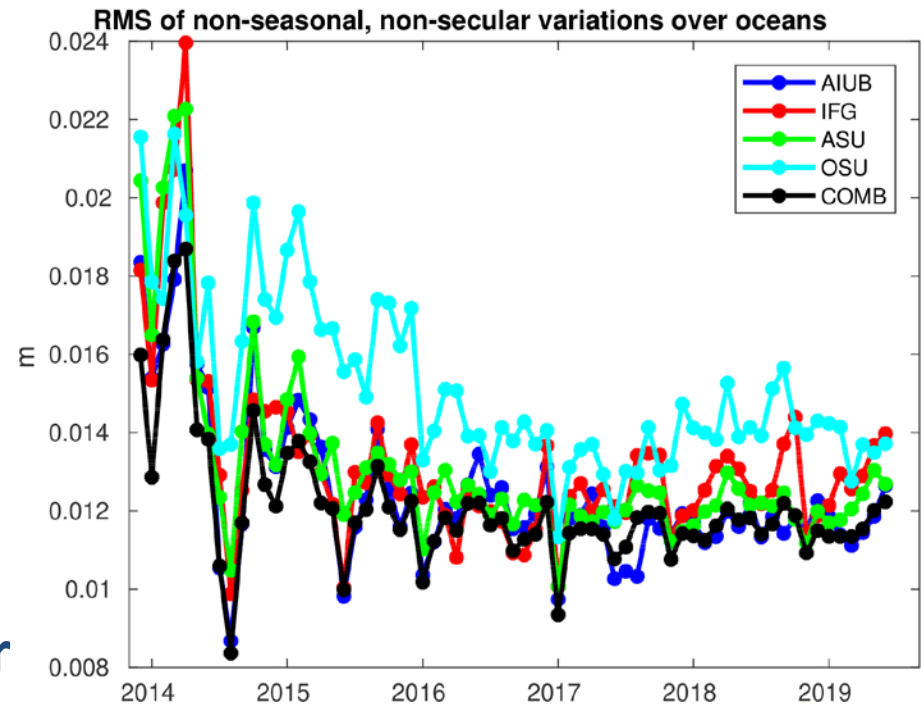


Noise Levels of Swarm Gravity Fields

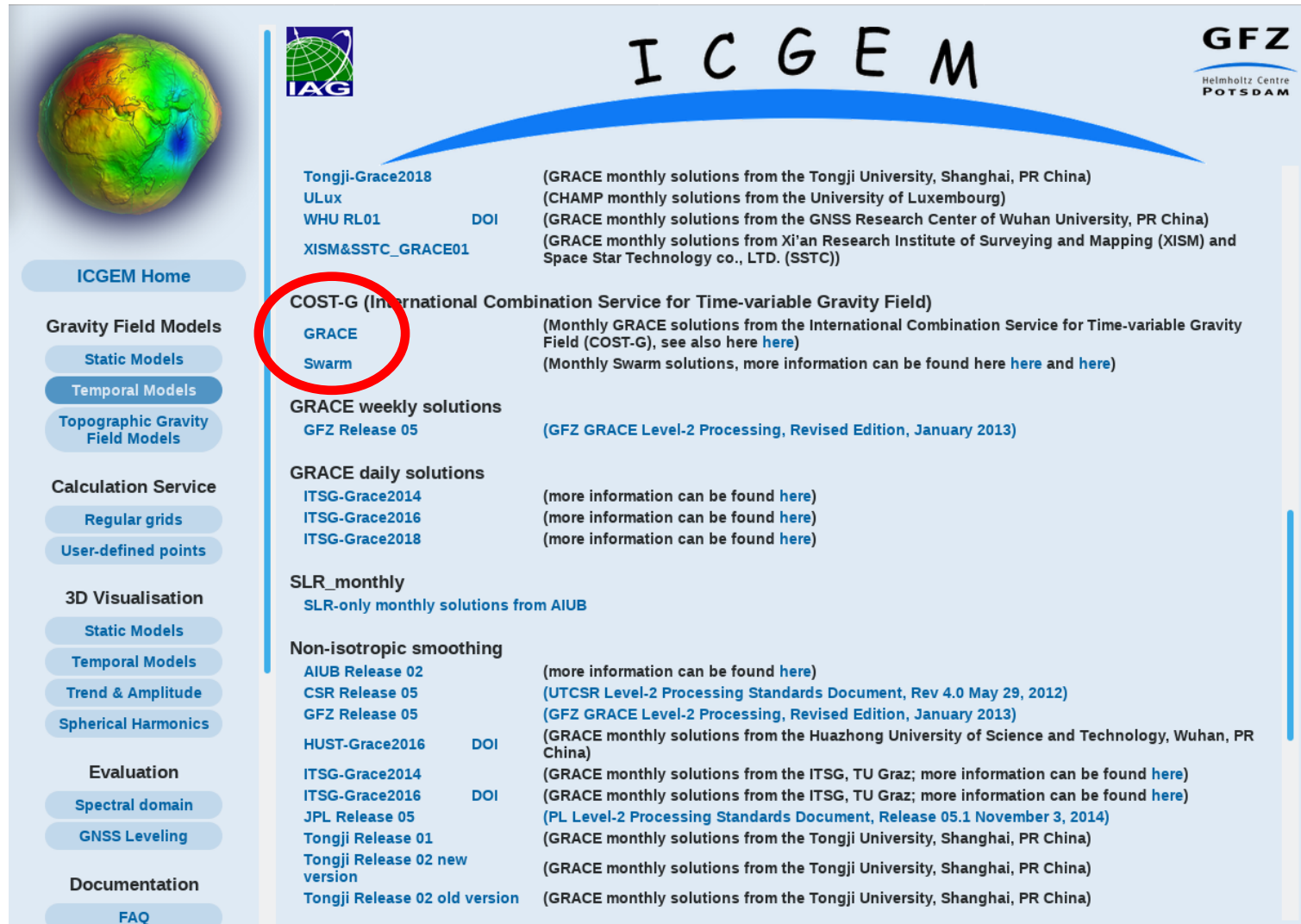


Smoothed by 400 km Gauss filter

Unfiltered



Product Dissemination



The screenshot displays the ICGEM (International Combination Service for Time-variable Gravity Field) website. The header features the IAGG logo, the ICGEM acronym, and the GFZ Helmholtz Centre Potsdam logo. A sidebar on the left contains navigation links for Gravity Field Models (Static, Temporal, Topographic), Calculation Service (Regular grids, User-defined points), 3D Visualisation (Static, Temporal, Trend & Amplitude, Spherical Harmonics), Evaluation (Spectral domain, GNSS Leveling), and Documentation (FAQ). The main content area lists various data products and services, with 'COST-G' highlighted by a red circle. The products listed include Tongji-Grace2018, ULux, WHU RL01, XISM&SSTC_GRACE01, GRACE, Swarm, GRACE weekly solutions (GFZ Release 05), GRACE daily solutions (ITSG-Grace2014, ITSG-Grace2016, ITSG-Grace2018), SLR_monthly, Non-isotropic smoothing (AIUB Release 02, CSR Release 05, GFZ Release 05, HUST-Grace2016), and Tongji Release 01, 02 new version, and 02 old version.

ICGEM

GFZ
Helmholtz Centre
POTSDAM

Tongji-Grace2018 (GRACE monthly solutions from the Tongji University, Shanghai, PR China)
ULux (CHAMP monthly solutions from the University of Luxembourg)
WHU RL01 DOI (GRACE monthly solutions from the GNSS Research Center of Wuhan University, PR China)
XISM&SSTC_GRACE01 (GRACE monthly solutions from Xi'an Research Institute of Surveying and Mapping (XISM) and Space Star Technology co., LTD. (SSTC))

COST-G (International Combination Service for Time-variable Gravity Field)
GRACE (Monthly GRACE solutions from the International Combination Service for Time-variable Gravity Field (COST-G), see also here [here](#))
Swarm (Monthly Swarm solutions, more information can be found here [here](#) and [here](#))

GRACE weekly solutions
GFZ Release 05 (GFZ GRACE Level-2 Processing, Revised Edition, January 2013)

GRACE daily solutions
ITSG-Grace2014 (more information can be found [here](#))
ITSG-Grace2016 (more information can be found [here](#))
ITSG-Grace2018 (more information can be found [here](#))

SLR_monthly
SLR-only monthly solutions from AIUB

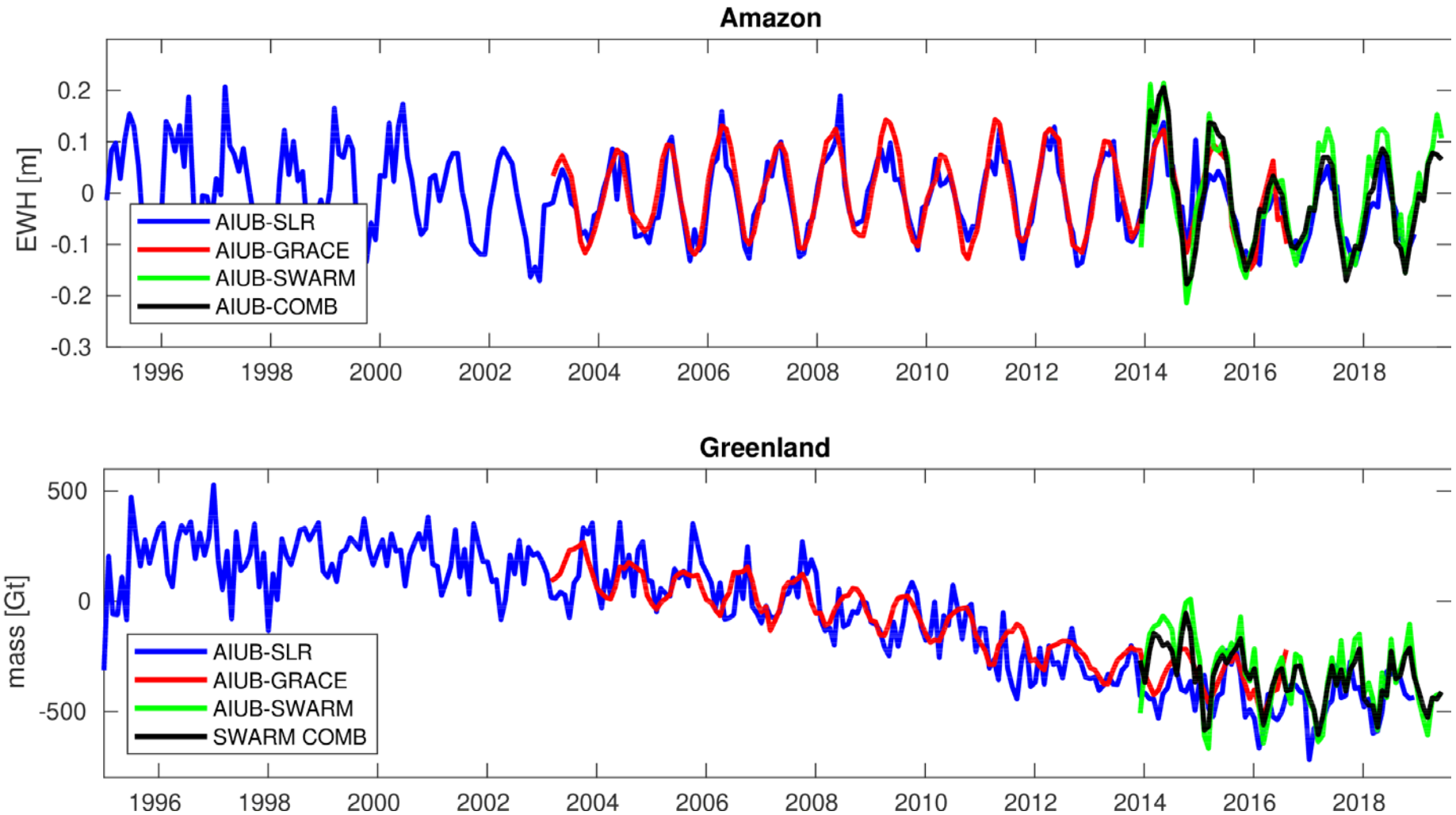
Non-isotropic smoothing
AIUB Release 02 (more information can be found [here](#))
CSR Release 05 (UTCSR Level-2 Processing Standards Document, Rev 4.0 May 29, 2012)
GFZ Release 05 (GFZ GRACE Level-2 Processing, Revised Edition, January 2013)
HUST-Grace2016 DOI (GRACE monthly solutions from the Huazhong University of Science and Technology, Wuhan, PR China)
ITSG-Grace2014 (GRACE monthly solutions from the ITSG, TU Graz; more information can be found [here](#))
ITSG-Grace2016 DOI (GRACE monthly solutions from the ITSG, TU Graz; more information can be found [here](#))
JPL Release 05 (PL Level-2 Processing Standards Document, Release 05.1 November 3, 2014)
Tongji Release 01 (GRACE monthly solutions from the Tongji University, Shanghai, PR China)
Tongji Release 02 new version (GRACE monthly solutions from the Tongji University, Shanghai, PR China)
Tongji Release 02 old version (GRACE monthly solutions from the Tongji University, Shanghai, PR China)



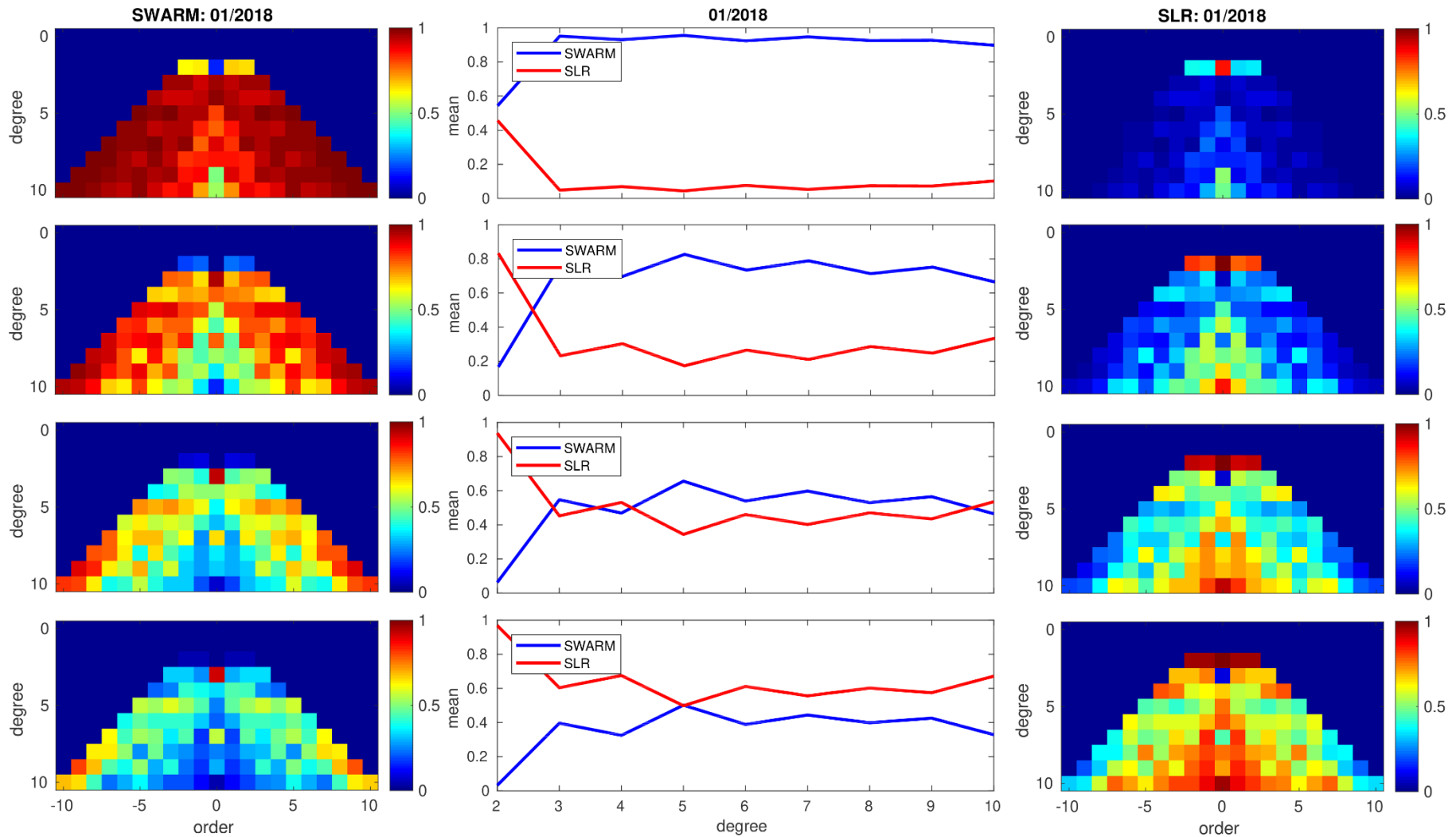
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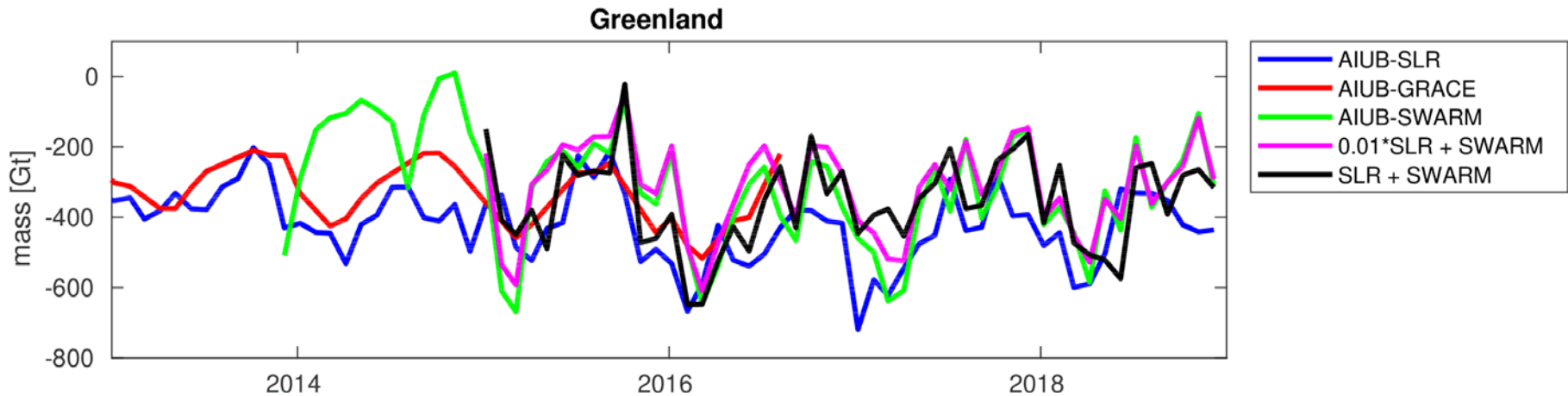
Application of Swarm Gravity Fields



Swarm / SLR Combination



Swarm / SLR Combination



Conclusions:

- Swarm monthly gravity fields are determined by several analysis centers (AIUB, ASU, IfG, OSU)
- Swarm gravity fields are combined by COST-G, the new product center of the IGFS (IAG)
- L2 products (spherical harmonic representation) are available at ICGEM
- Swarm gravity fields are useful, e.g., to bridge the gap between GRACE and GRACE-FO