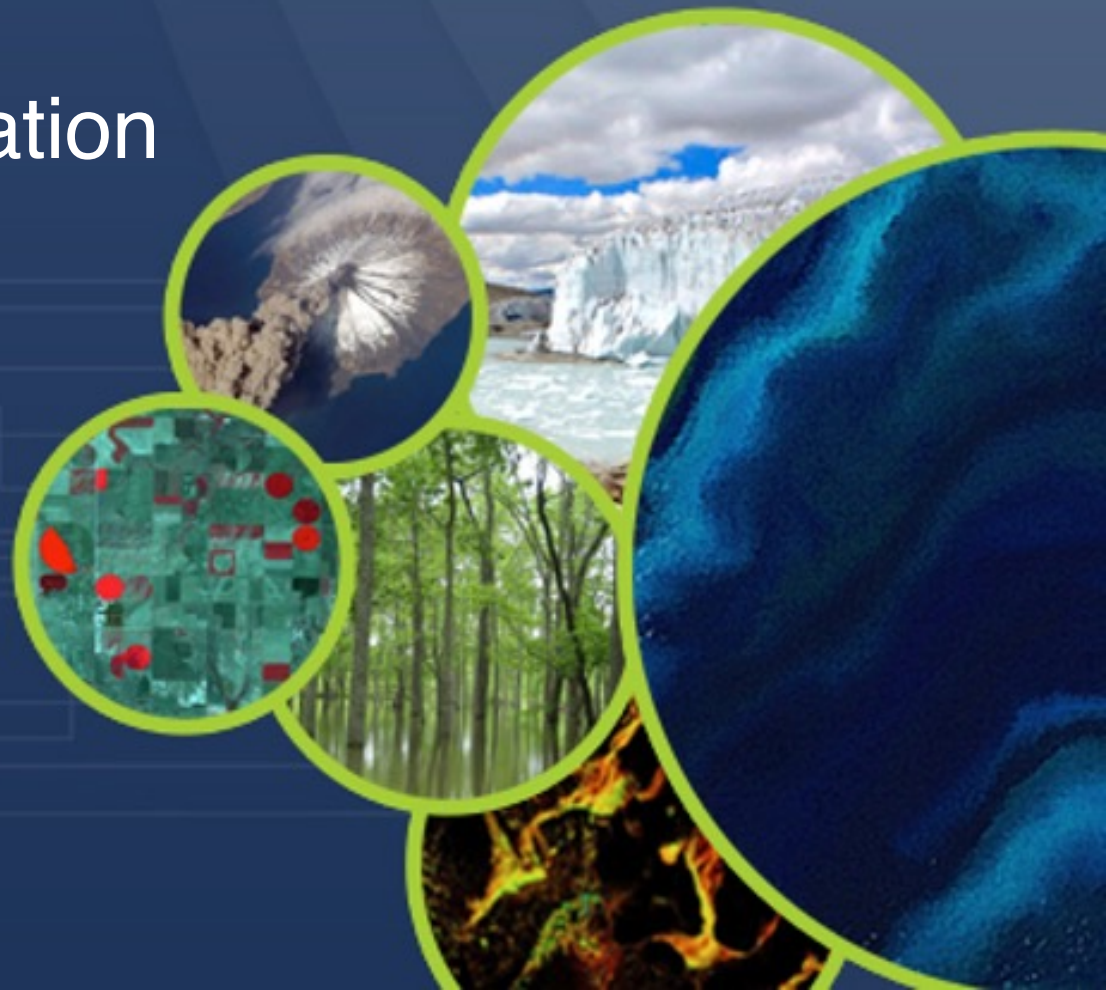
Committee on Earth Observation Satellites

Working Group Calibration & Validation



TMSG & DEMIX progress

Peter Strobl, EC-JRC, WGCV

CEOS WGCV #50, Virtual Meeting

24 March 2022

TMSG status

- Proceedings of the Terrain Mapping SubGroup (TMSG)
  - Re-activated early 2020
  - as of Feb 28th 2022:
    - 62 subscriptions (+4)
    - 14 countries
    - ~50% with CEOS background
    - ~30% Geomorphometry.org
    - ~35 expressed interest in the intercomparison exercise DEMIX (incl. industry!)
  - plenary envisaged for Q3 2021 postponed (waiting for DEMIX results) on the agenda now for Q2 2022

Subscription page: https://ec.europa.eu/eusurvey/runner/WGCV-TMSG_membership

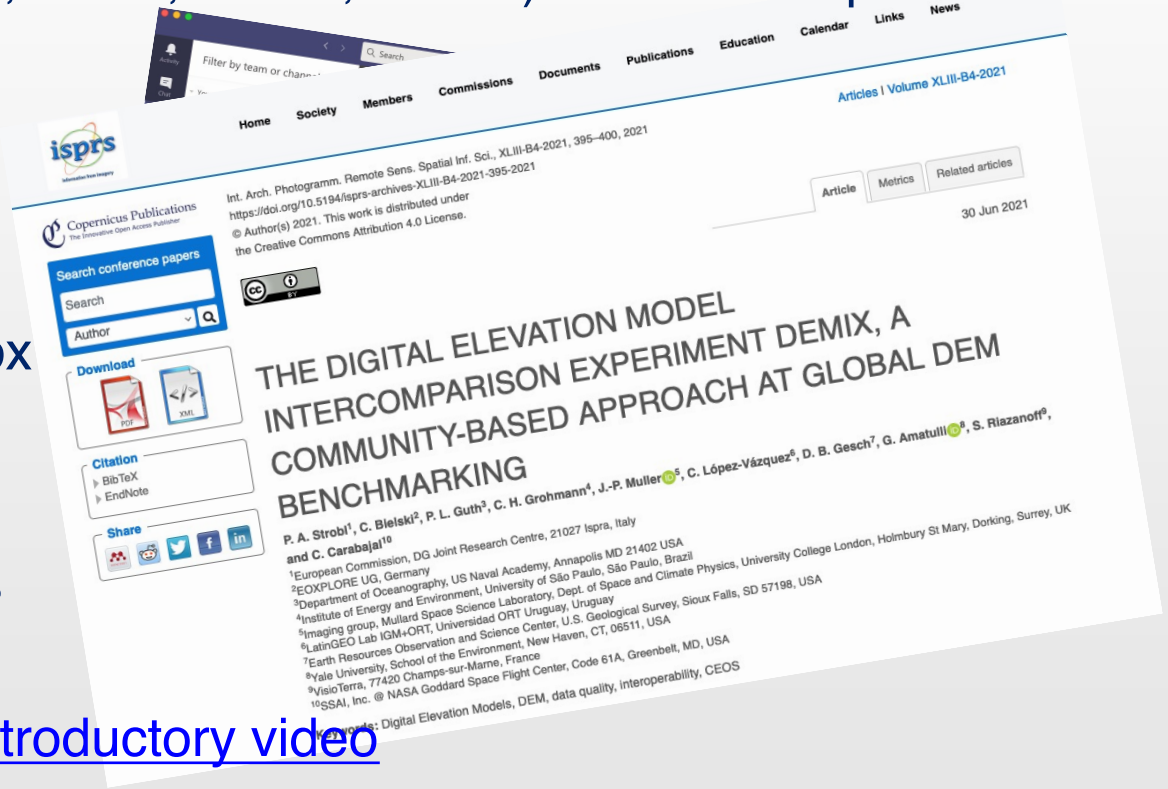
Digital Elevation Inter-Comparison (DEMIX)

Status:

- DEMIX call for participation issued 5 May 2020
- Kick-off meeting held with 26 participants on 26&30 June 2020
- ~25 participants active (CAS, DLR, EC, ESA, ISRO, JAXA, NASA, USGS) + domain experts & industry

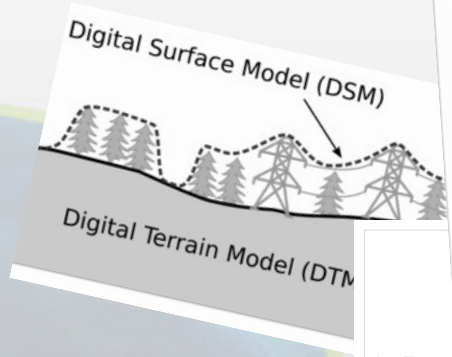
Progress:

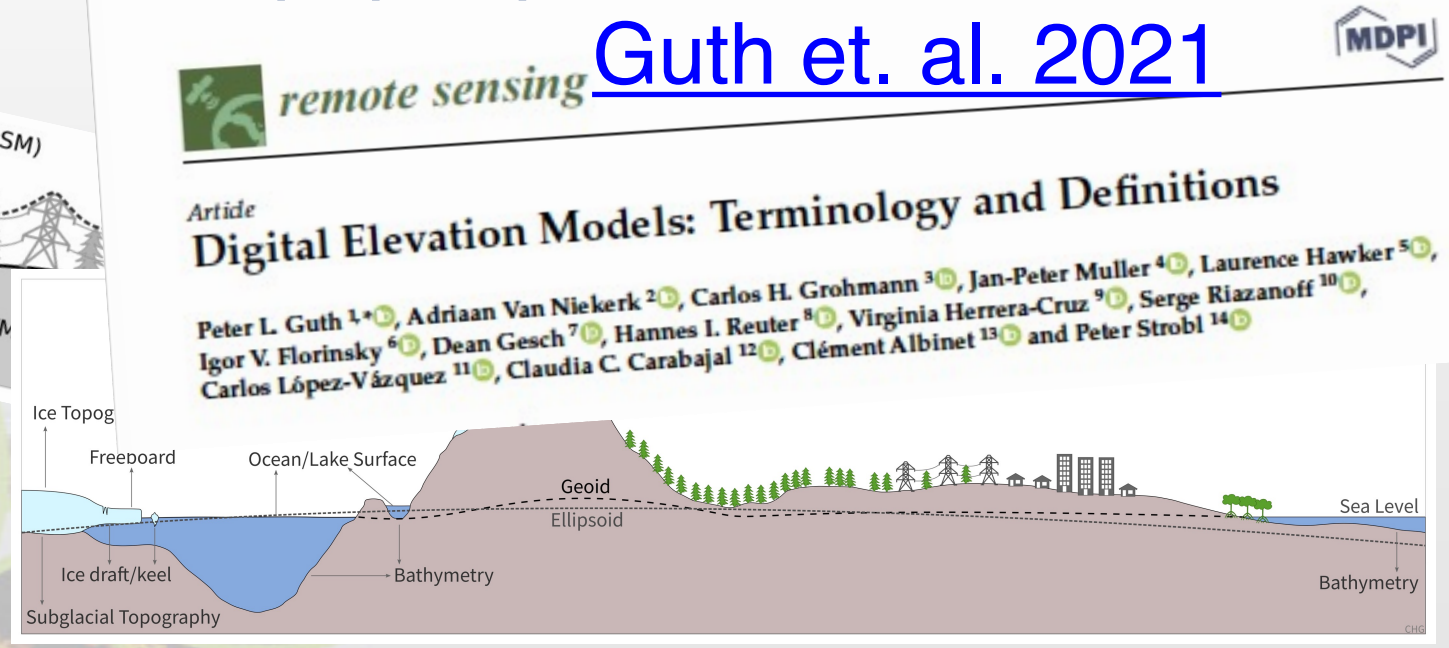
- Sub-groups currently active:
  1) terminology and analytical basis
  2) algorithms and software – open source tool box
  3) platforms and processing
- TEAMS channel (thanks USGS!)
  - ❖ biweekly meetings of subgroups 2&3 on Teams
  - ❖ document sharing and via Teams cloud
  - ❖ ISPRS2021 conference paper and 10 minute introductory video



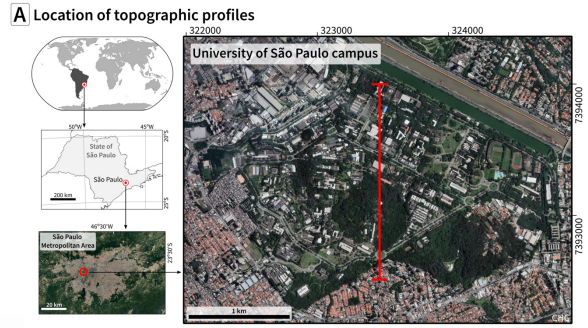
Progress:

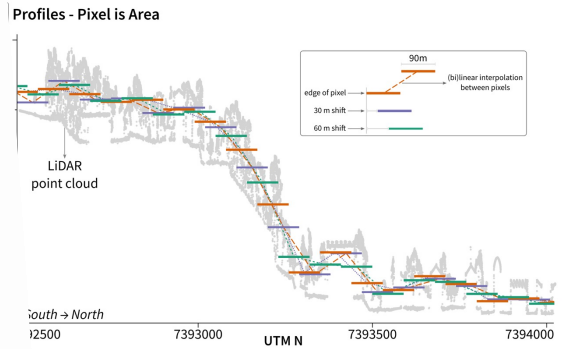
- Revised terminology and comprehensive definitions (glossary) finished
- Peer reviewed paper published:

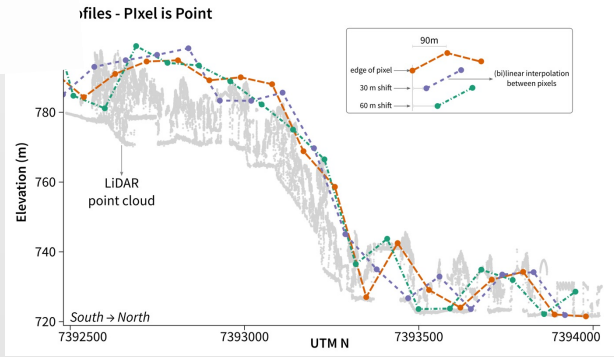




Guth et. al. 2021



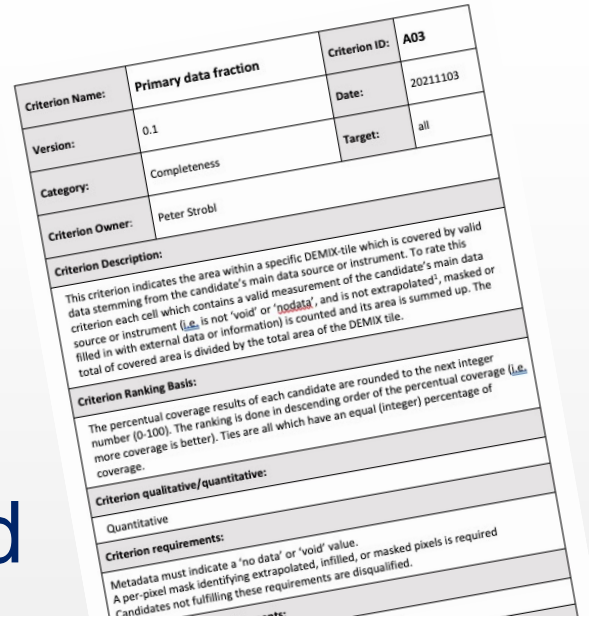




Subgroup 2

Progress:

- Extensive test of algorithms and tools
- Criteria categories and catalogue set-up
- Criteria Consensus Documents agreed
- Reference data preparation protocols developed
- Implementation of ‘wine contest’ concept using Jupyter notebooks
- Peer reviewed paper on methods and results in preparation



Criterion Name:	Primary data fraction	Criterion ID:	A03
Version:	0.1	Date:	20211103
Category:	Completeness	Target:	all
Criterion Owner:	Peter Strobl		

Criterion Description:

This criterion indicates the area within a specific DEMIX-tile which is covered by valid data stemming from the candidate's main data source or instrument. To rate this criterion each cell which contains a valid measurement of the candidate's main data source or instrument (i.e. is not 'void' or 'nodata', and is not extrapolated[1], masked or filled in with external data or information) is counted and its area is summed up. The total of covered area is divided by the total area of the DEMIX tile.

Criterion Ranking Basis:

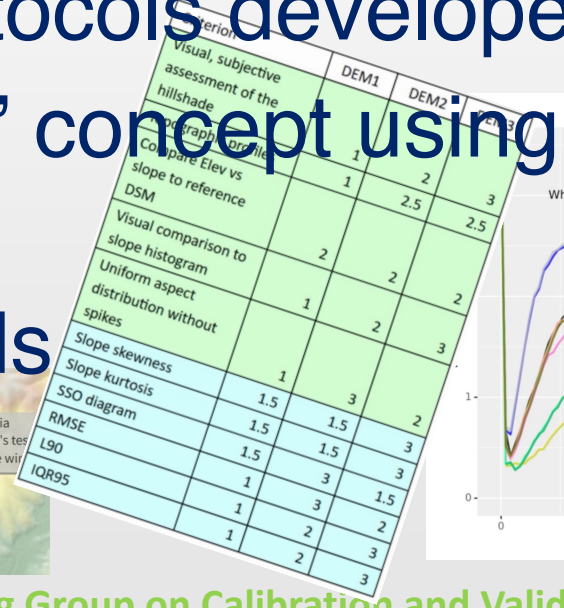
The percentual coverage results of each candidate are rounded to the next integer number (0-100). The ranking is done in descending order of the percentual coverage (i.e. more coverage is better). Ties are all which have an equal (integer) percentage of coverage.

Criterion qualitative/quantitative:

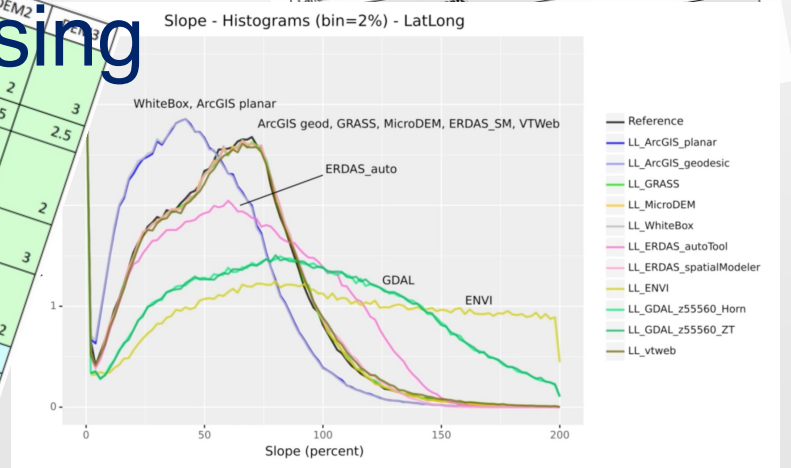
Quantitative

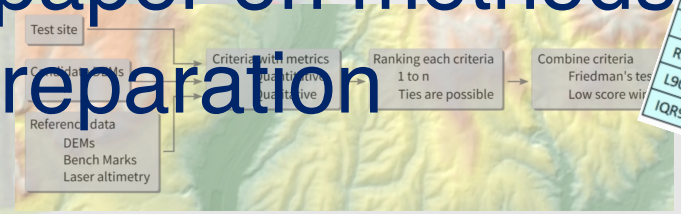
Criterion requirements:

Metadata must indicate a 'no data' or 'void' value.
A per-pixel mask identifying extrapolated, infilled, or masked pixels is required
Candidates not fulfilling these requirements are disqualified.



Criterion	DEM1	DEM2	DEM3
Visual, subjective assessment of the hillshade	1	2	3
Compare Elev vs slope to reference DSM	1	2.5	2.5
Visual comparison to slope histogram	2	2	2
Uniform aspect distribution without spikes	1	2	3
Slope skewness	1	3	2
Slope kurtosis	1.5	1.5	3
SSO diagram	1.5	1.5	3
RMSE	1.5	3	3
L90	1	3	1.5
IQR95	1	2	2
	1	3	3
	2	3	3

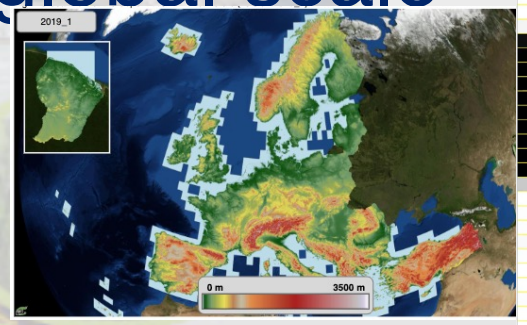


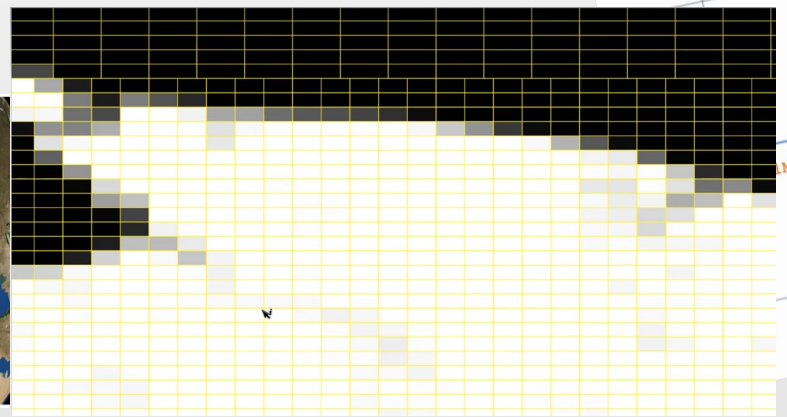


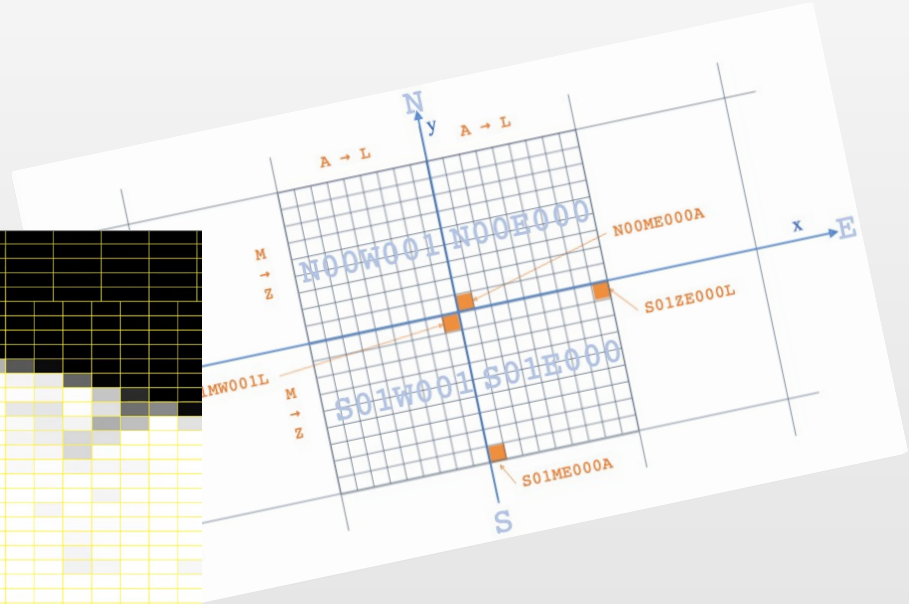
Subgroup 3

Progress:

- Major support by ESA (through VtWeb) Much appreciated!
- Contacts to CEOS Earth Analytics Interoperability Lab (EAIL)
- Ensuring easy and consistent access to test data
- Global master grid agreed
- Preparations for roll out of tests to continental/global scale



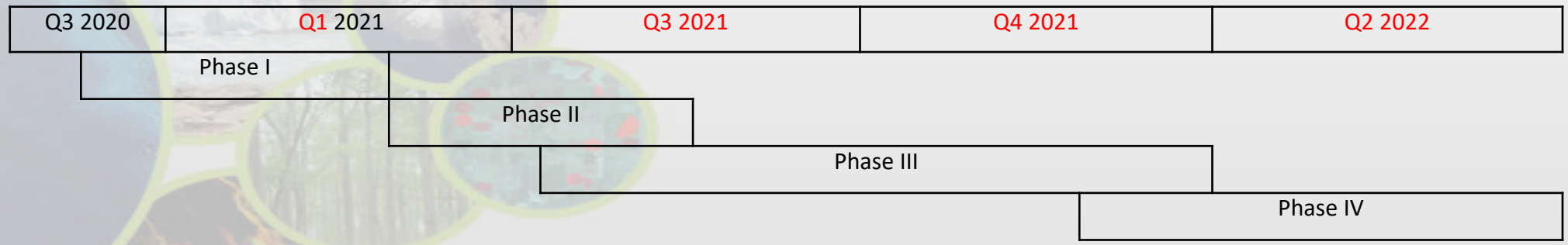




Digital Elevation Inter-Comparison (DEMIX)

- DEMIX to be performed in 4 phases
  I. General agreement among main contributors (data owners) on approach & scope; Call for expression of interest to further partners (commercial tbd); circulation of JRC Workshop report (in preparation) & selection of base (Δx, Δy, Δz) & extended (slope, aspect, morphology) testing methods and algorithms; Identification of suitable test areas (at least 1 per continent);
  II. Cross-comparison of all participating data sets on test areas and, if feasible, identification of a reference dataset (at DGED L1). If available and where applicable cross-comparison to suitable orthorectified (reference?) imagery (Sentinel-2?); Workshop to exchange experiences from the test areas and agree on details of an eventual global roll-out;
  III. Feasibility testing & potential global roll out of at least base tests & determination of suitable aggregation scale for reporting;
  IV. Calculation of agreed comparison metrics for all candidates and publication of results.

- Timeline



Thank you for your attention!

Any questions?

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Big thanks to all active volunteers!
In particular the **sub-group leaders**:
Peter Guth, Carlos Grohman,
Conrad Bielski, Serge Riazanoff