HALO: Using CM SAF's MAGICSOL method to retrieve global and direct surface radiation from historical geosynchronous observations

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Historical solar
Analysis from
Long-term geosynchronous
Orbit

Proof of concept for a global solar ECV data set

Global solar data sets: Requirements

Essential climate variables:

- Relevant base variable
- Long-term record
- High quality measurements

Global solar data sets: Available data

Comparable data sets:

- Helio-Clim
- ERA-Interim
- GEWEX SRB
- ISCCP FD
- FLASHFlux
- CLARA

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Data needed with:

- Robust data requirements
- Long time series available
- High resolution
- Differentiation in diffuse/beam radiation
- Free to use/distribute
- Global spatial extent

Global solar data sets: MAGICSOL

Advantages:

- Robust and well tested
- Low data requirements
- Self-calibration – high data availability
- Computation of direct and diffuse radiation
- Relatively low computational costs
- Best validation among comparable data sets
- Open source – verifiable, modifiable, freely usable

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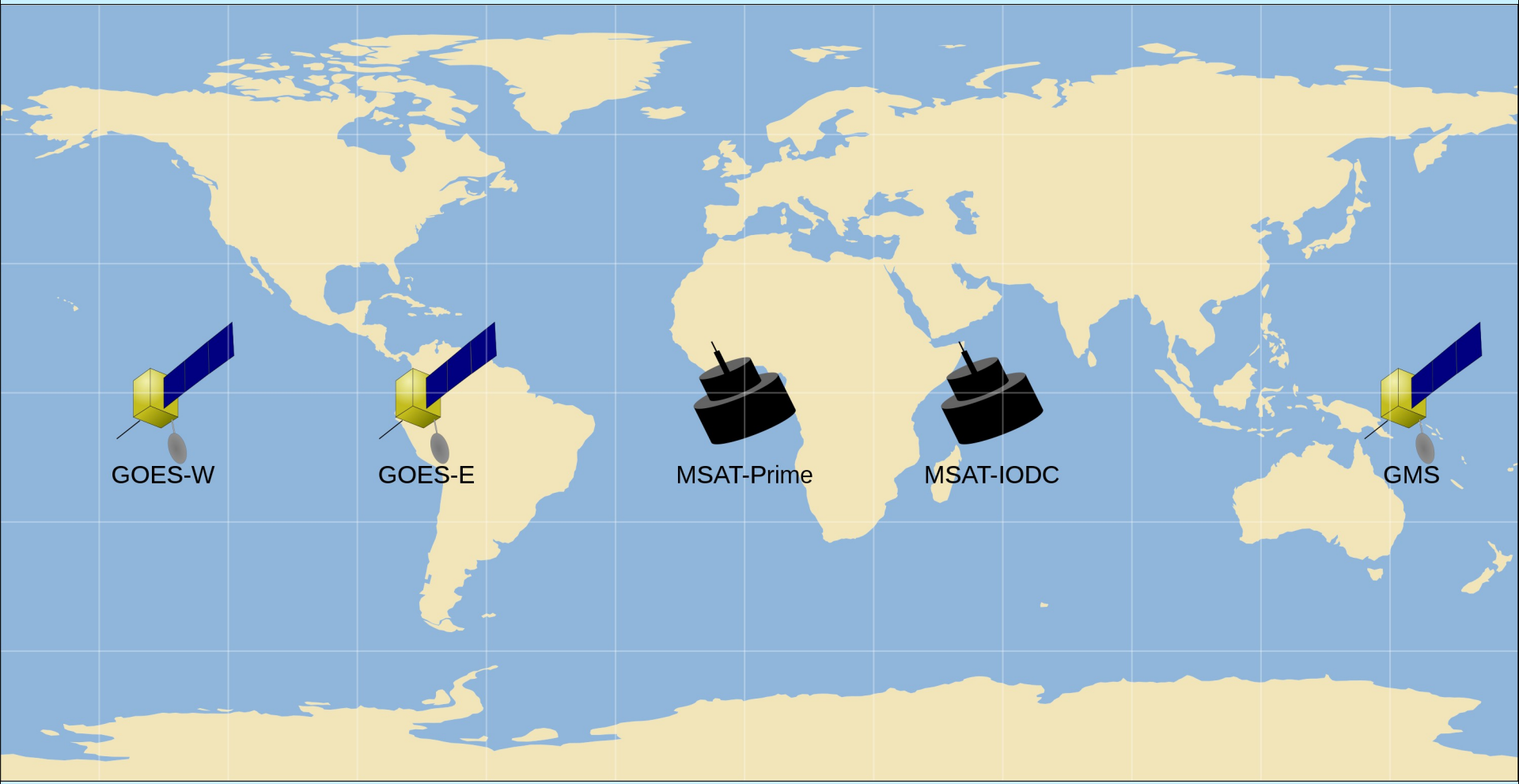
HALO:
Spatial coverage

Source: Météo-France 2009, composite by author

HALO:
Spatial coverage



Source: NOAA 2012, EUMETSAT 2012, map by author

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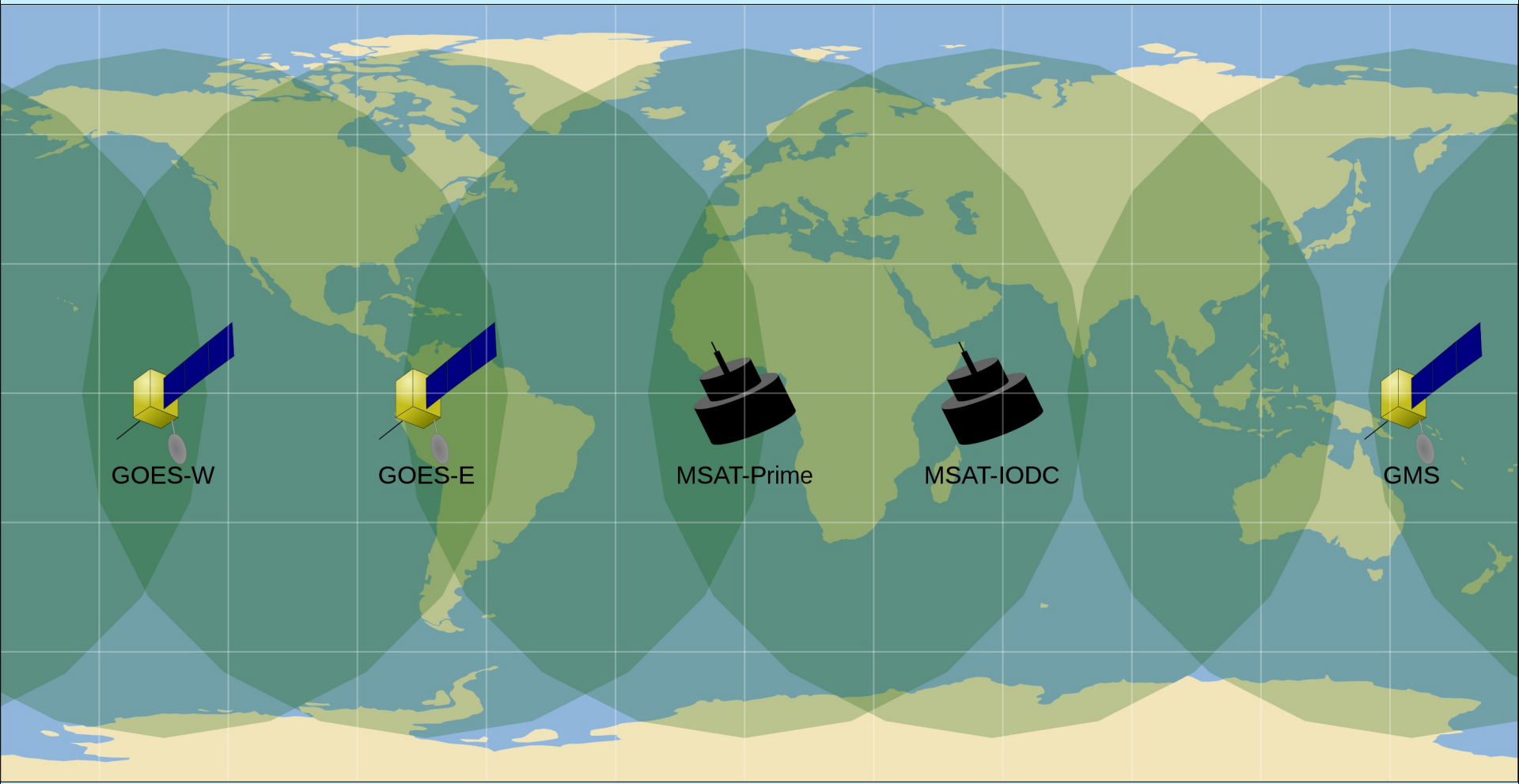
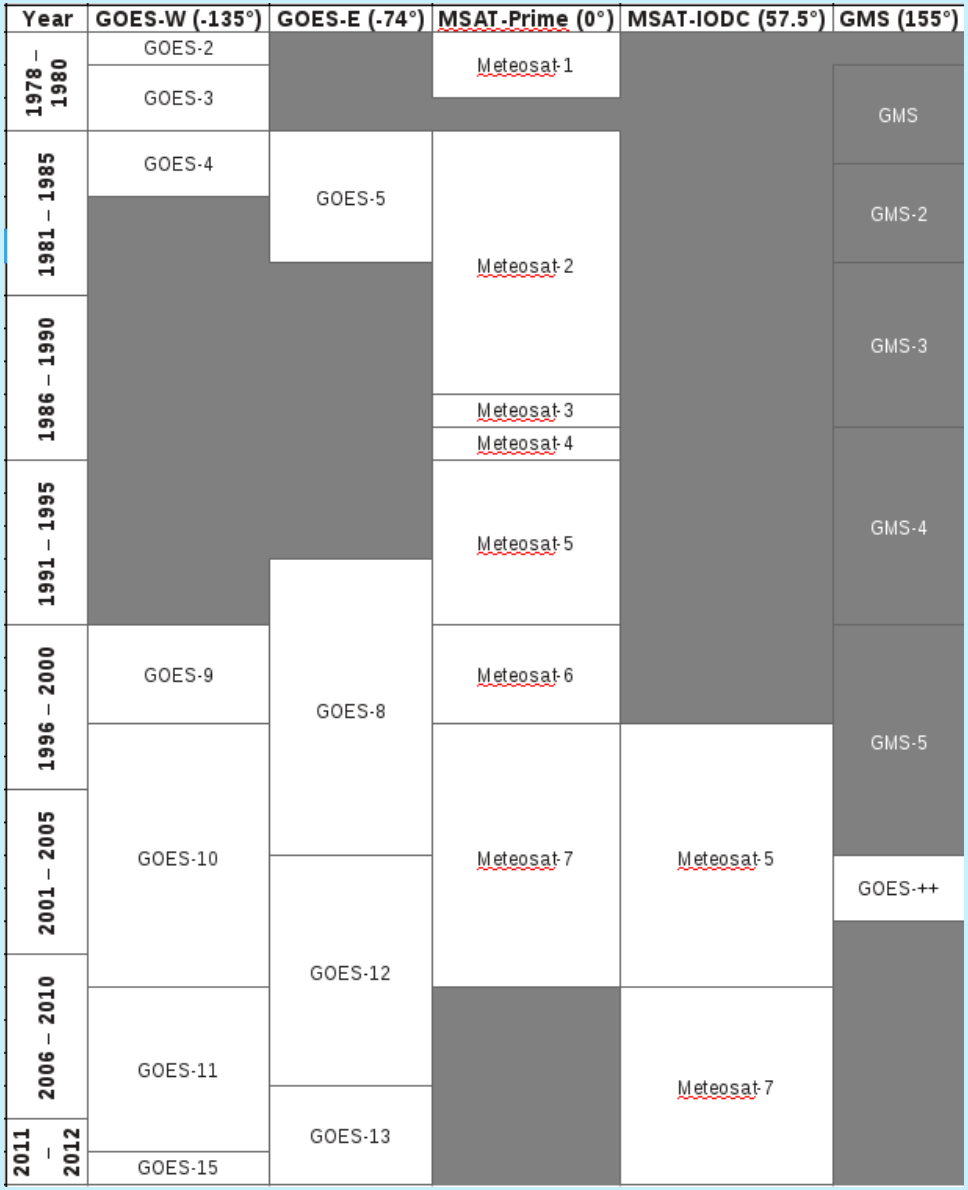
Spatial coverage



Source: NOAA 2012, EUMETSAT 2012, map by author

HALO:
Temporal coverage



Source: NOAA 2012, EUMETSAT 2012, JMA 2012, diagram by author

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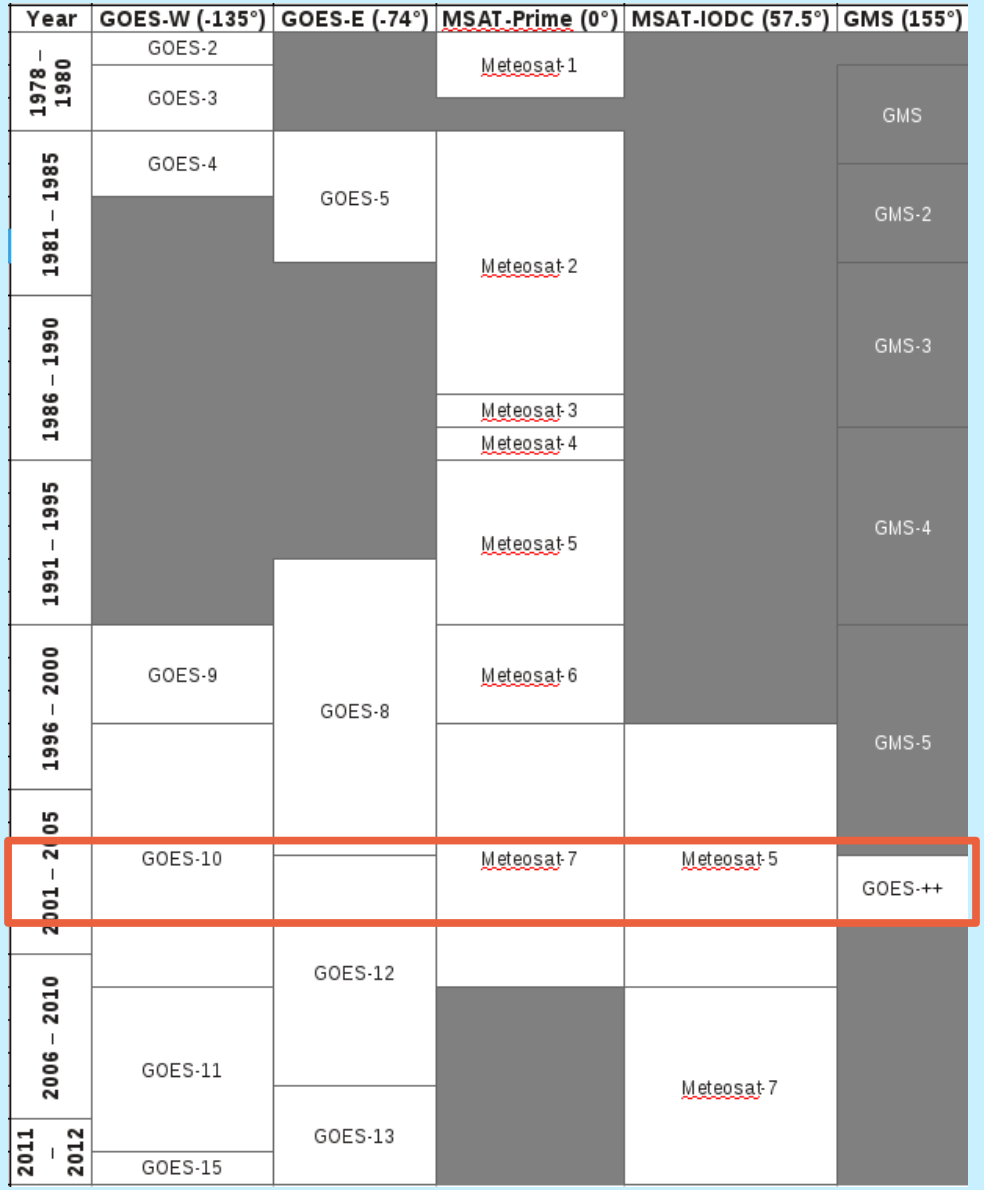
Temporal coverage



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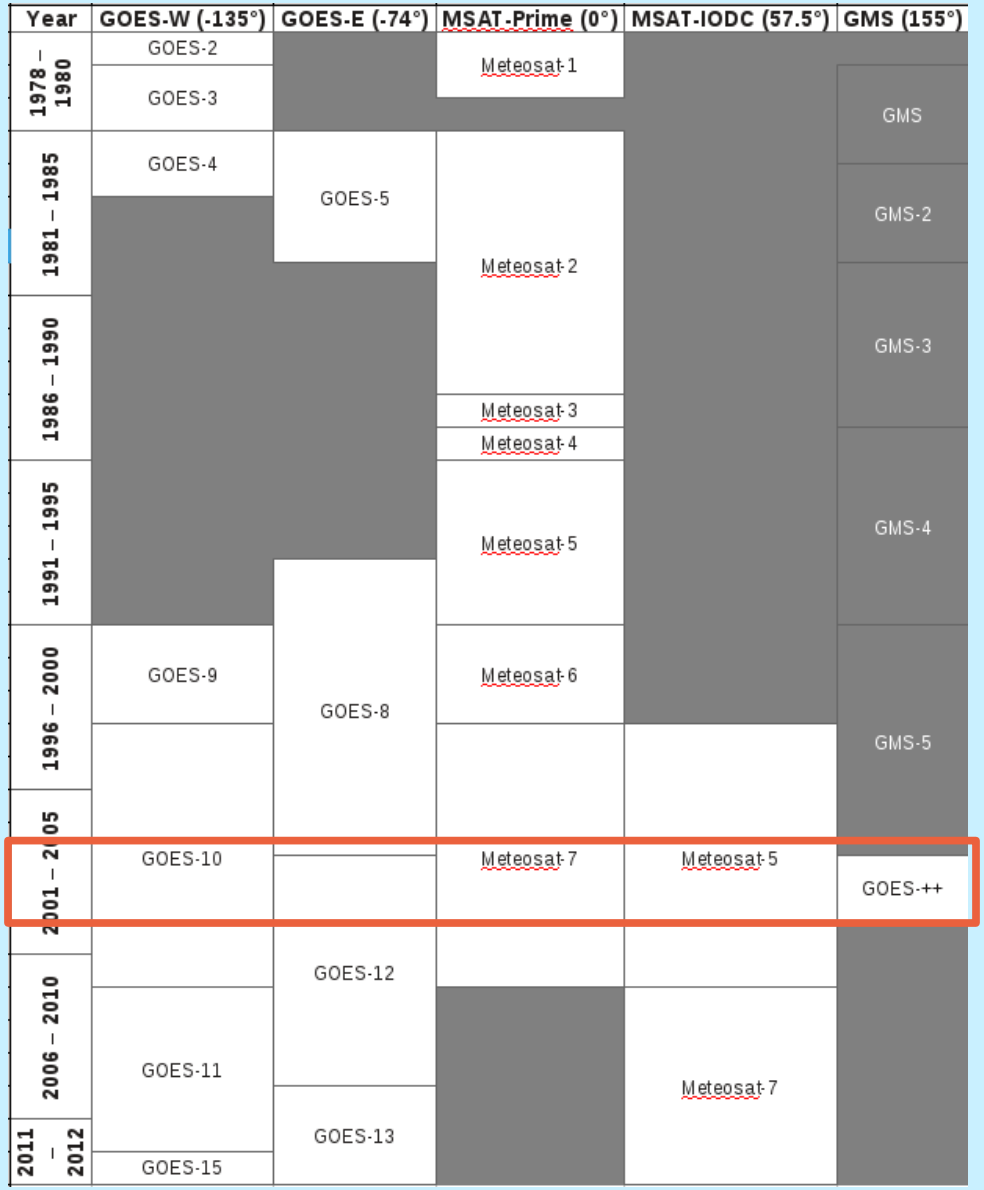
Temporal coverage



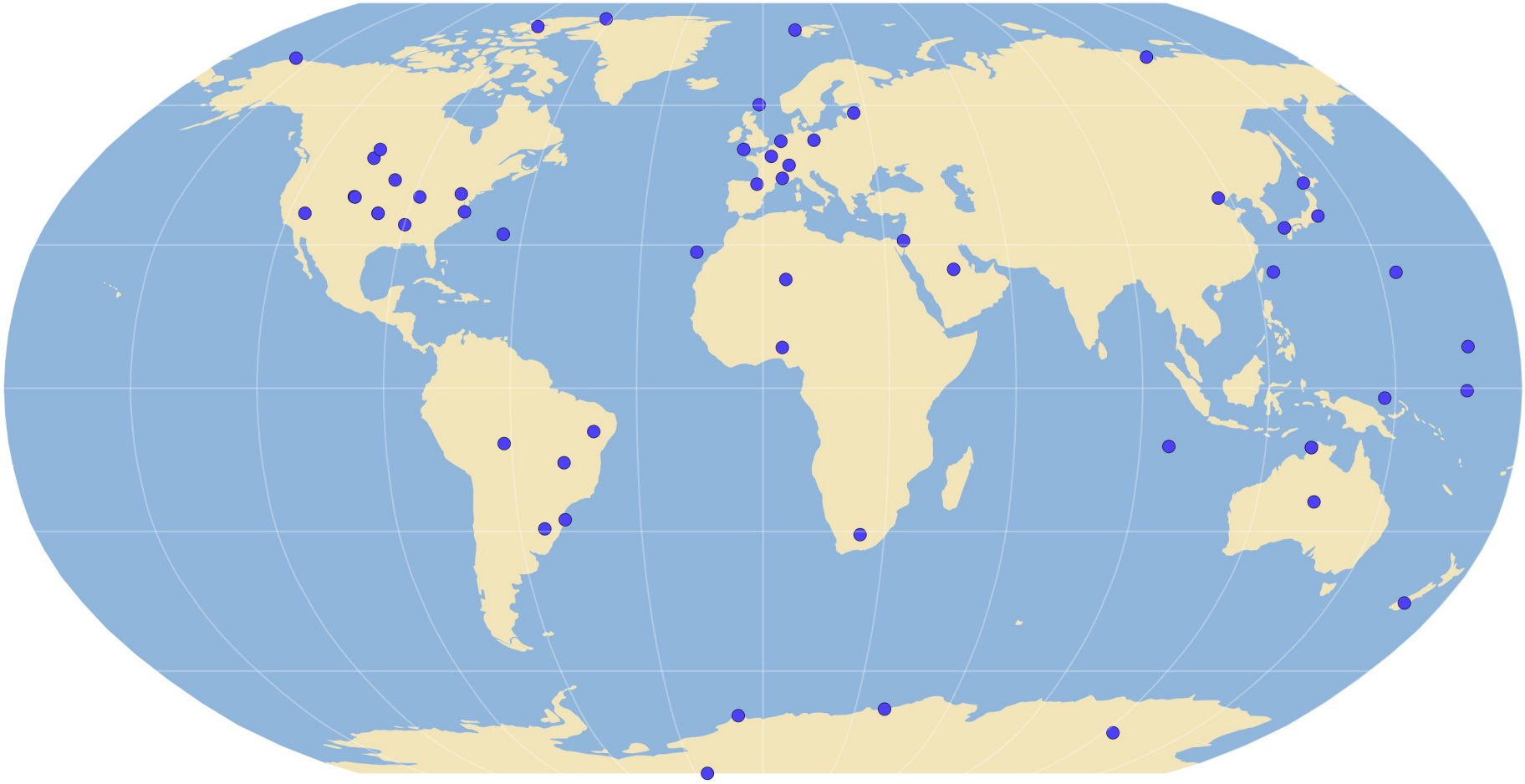
1 month = ~ 3 TB

Chosen test month:

June 2003

Source: NOAA 2012, EUMETSAT 2012, JMA 2012, diagram by author

HALO:
Validation stations



Source: BSRN 2012, map by author

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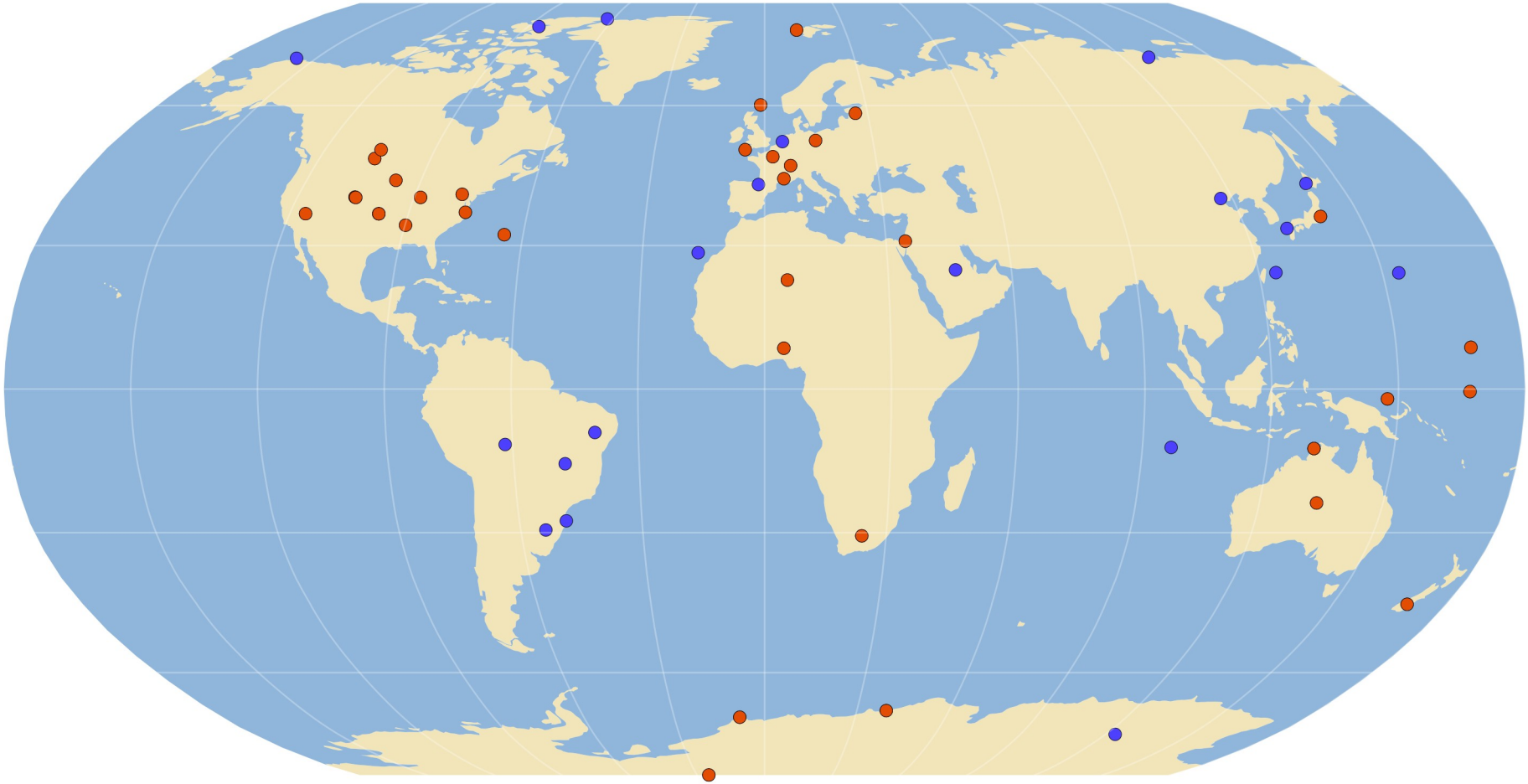
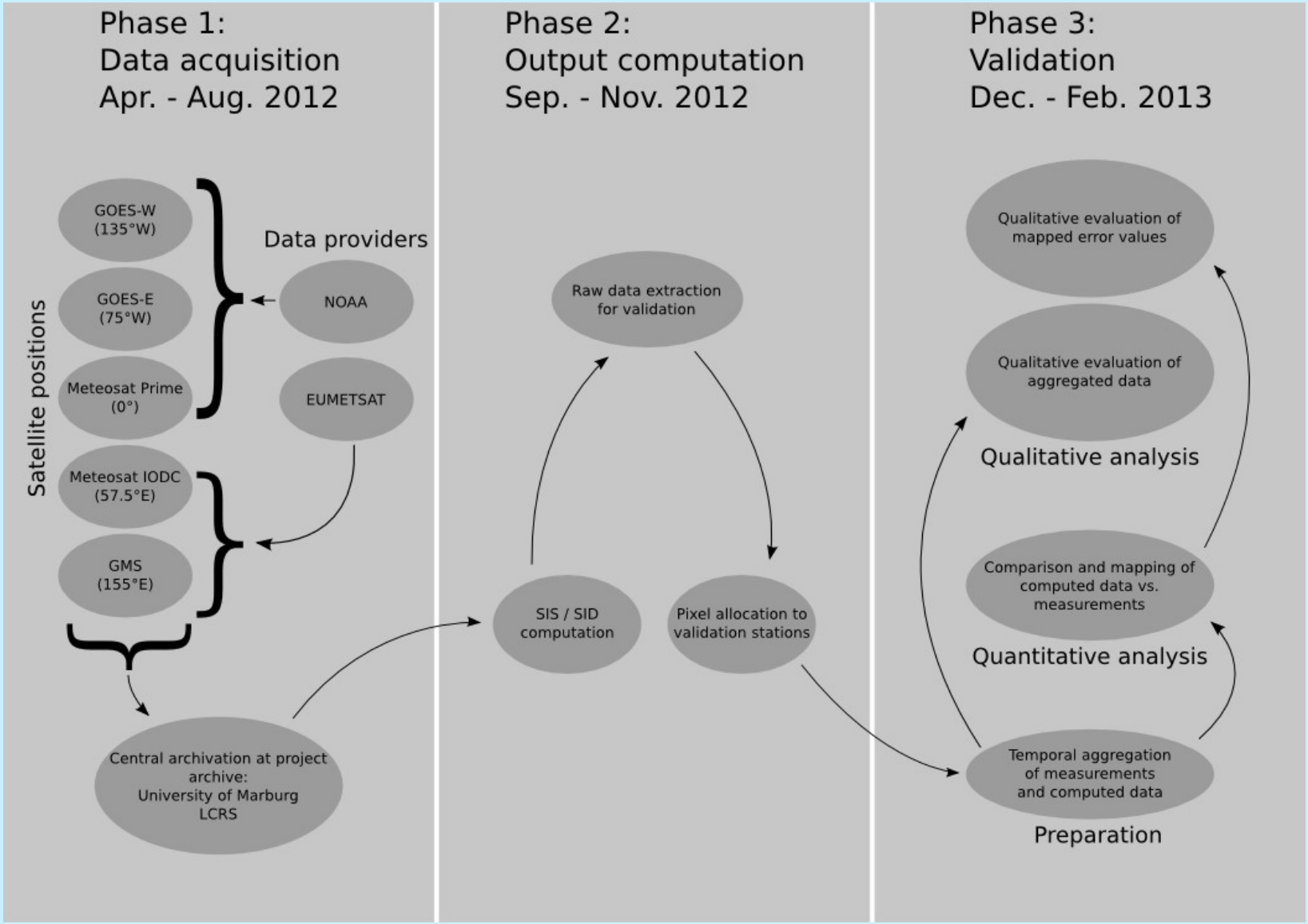
Validation stations



Source: BSRN 2012, map by author

HALO: Workflow



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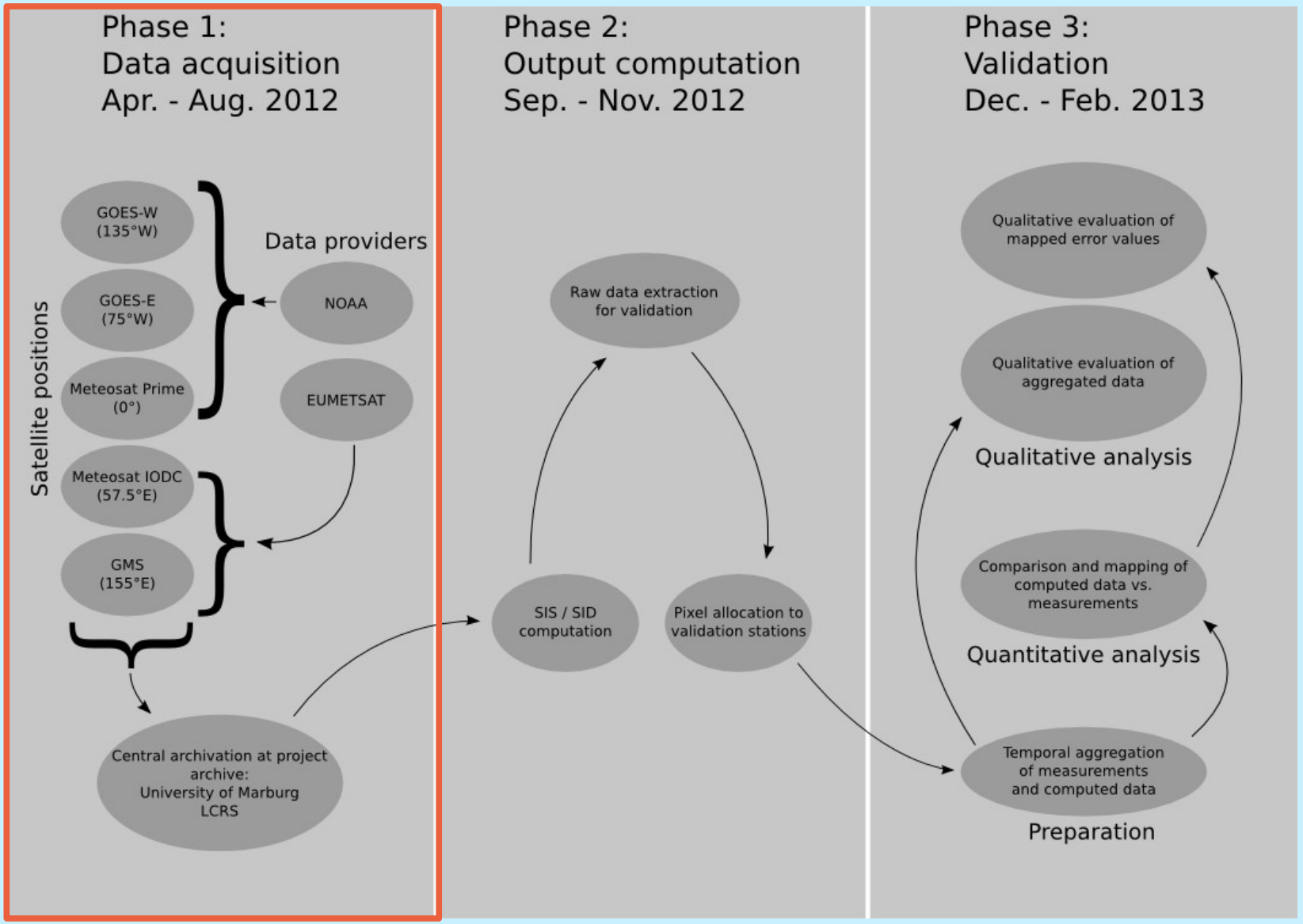

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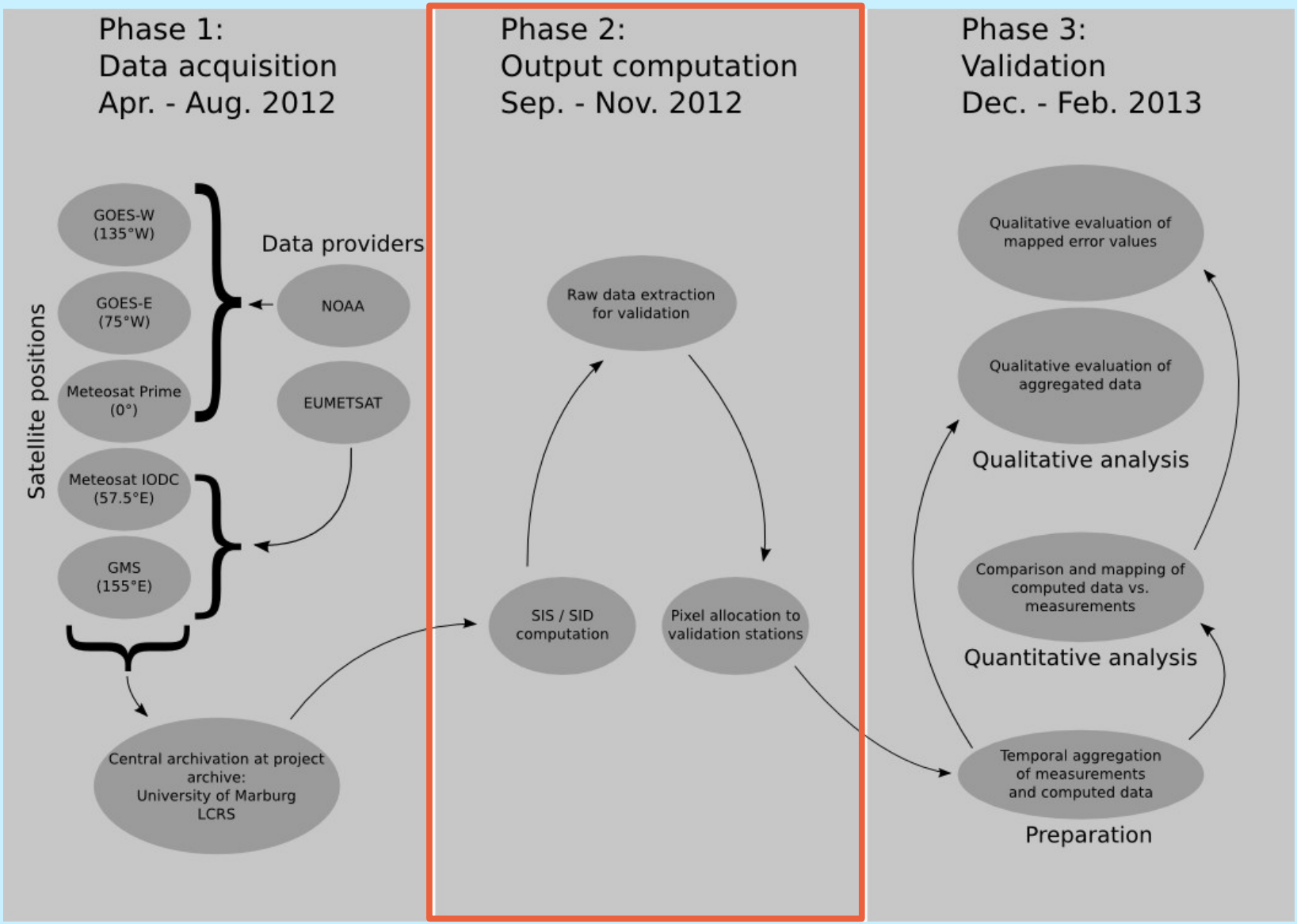

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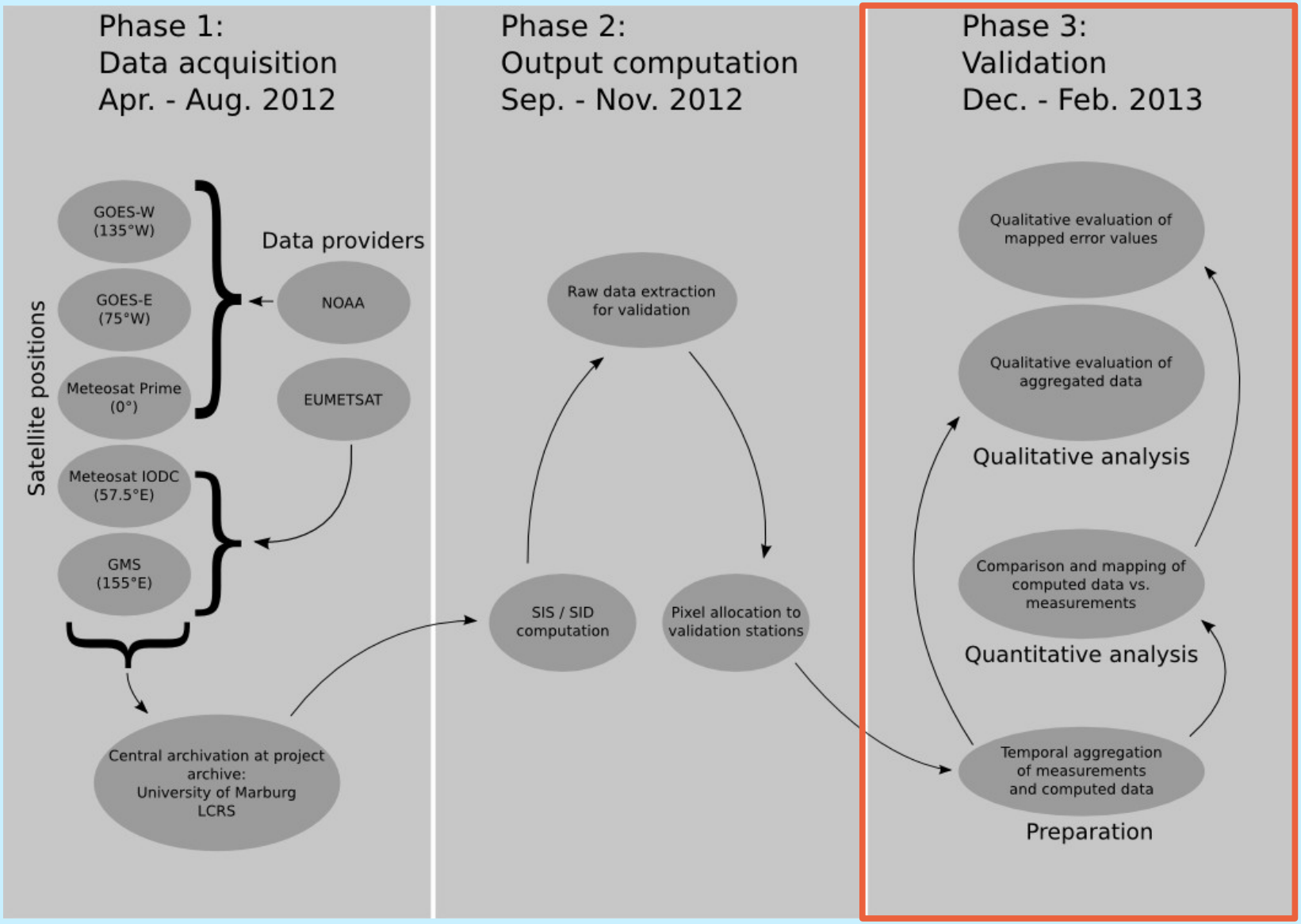
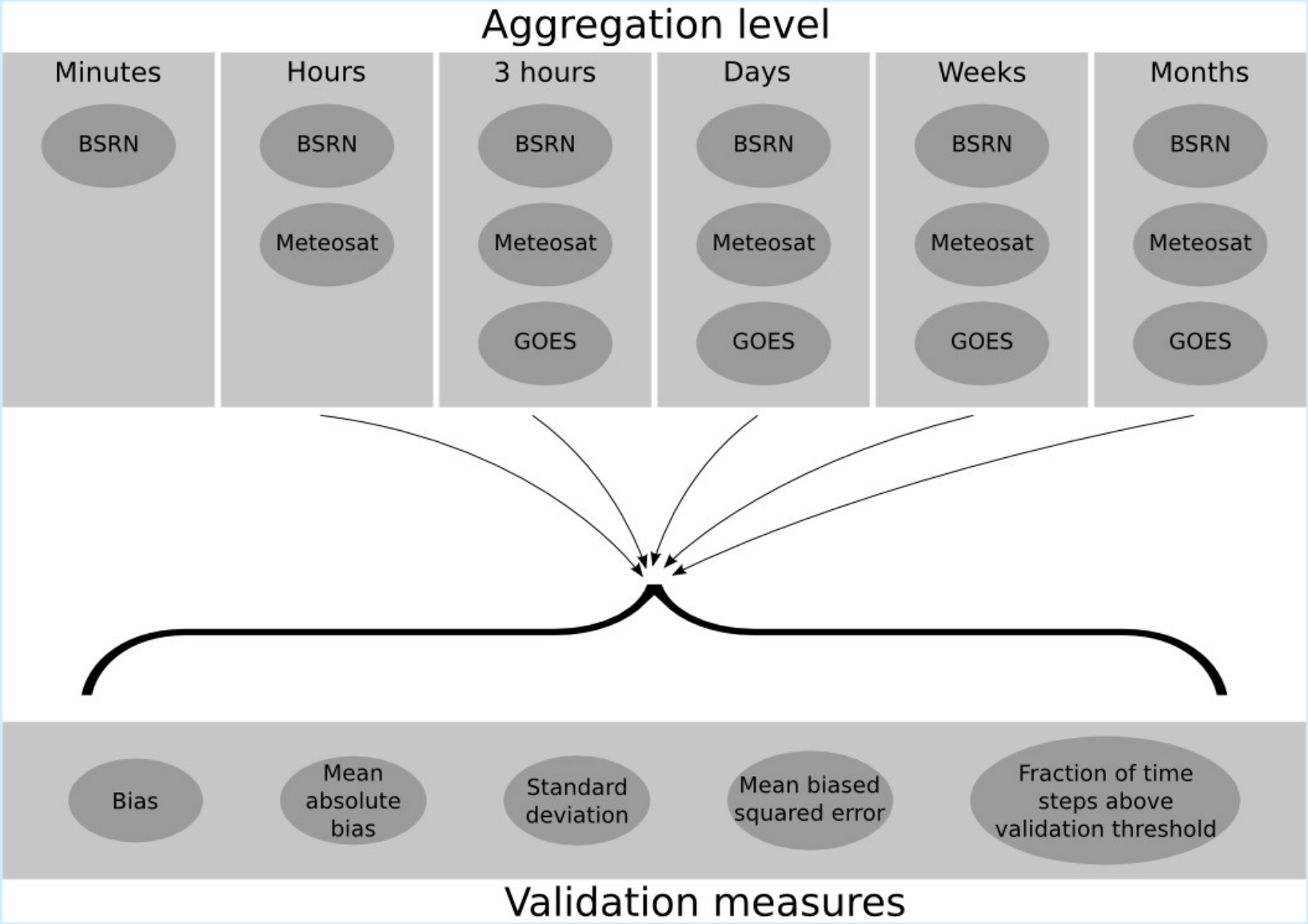


HALO:
Validation scheme



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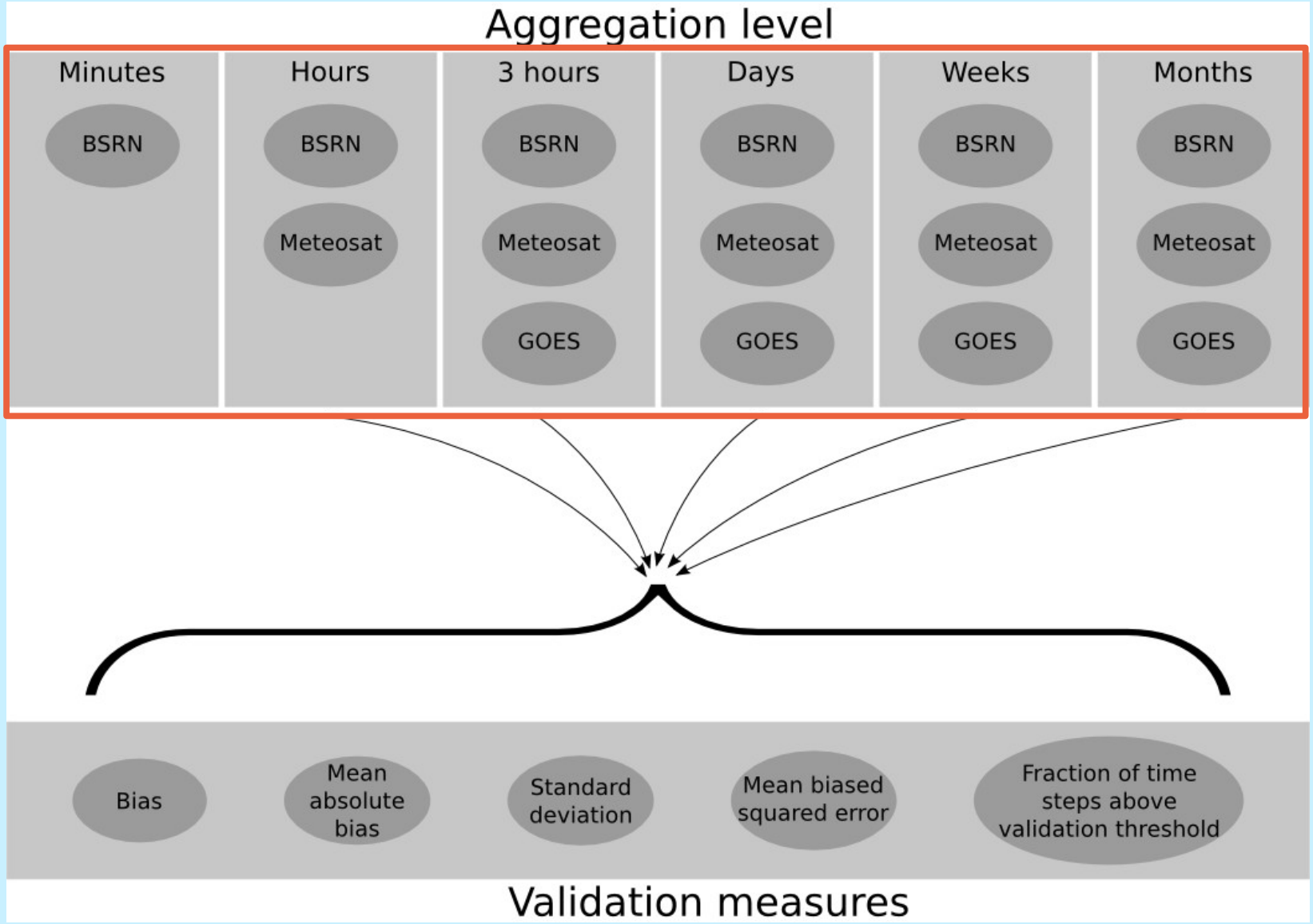

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