

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

R.W. Mueller  
German Weather Service

D. Lee  
University of Marburg





**H**istorical solar  
**A**nalysis from  
**L**ong-term geosynchronous  
**O**rbital

Proof of concept for a global solar ECV data set

## Essential climate variables:

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

## 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

## 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

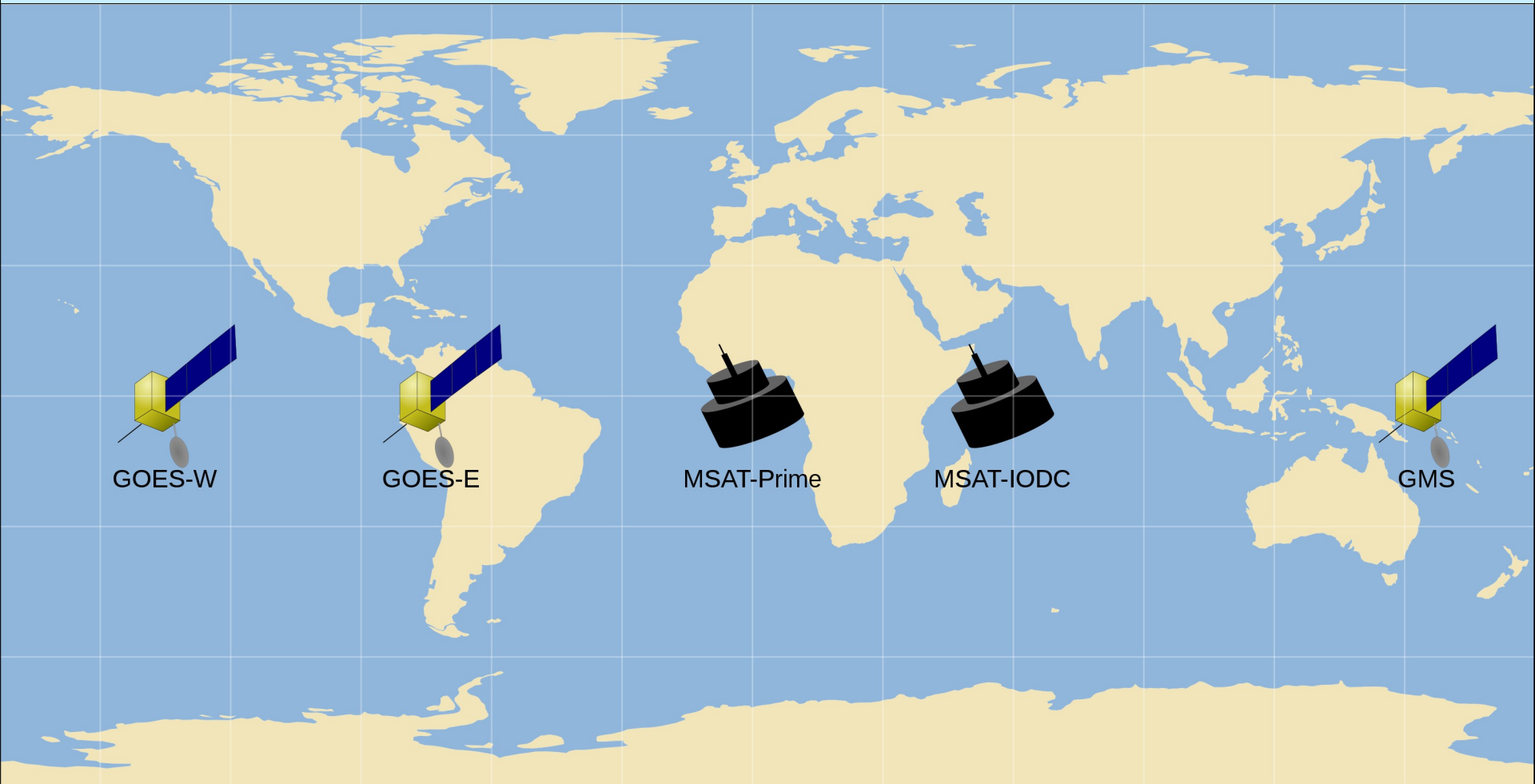


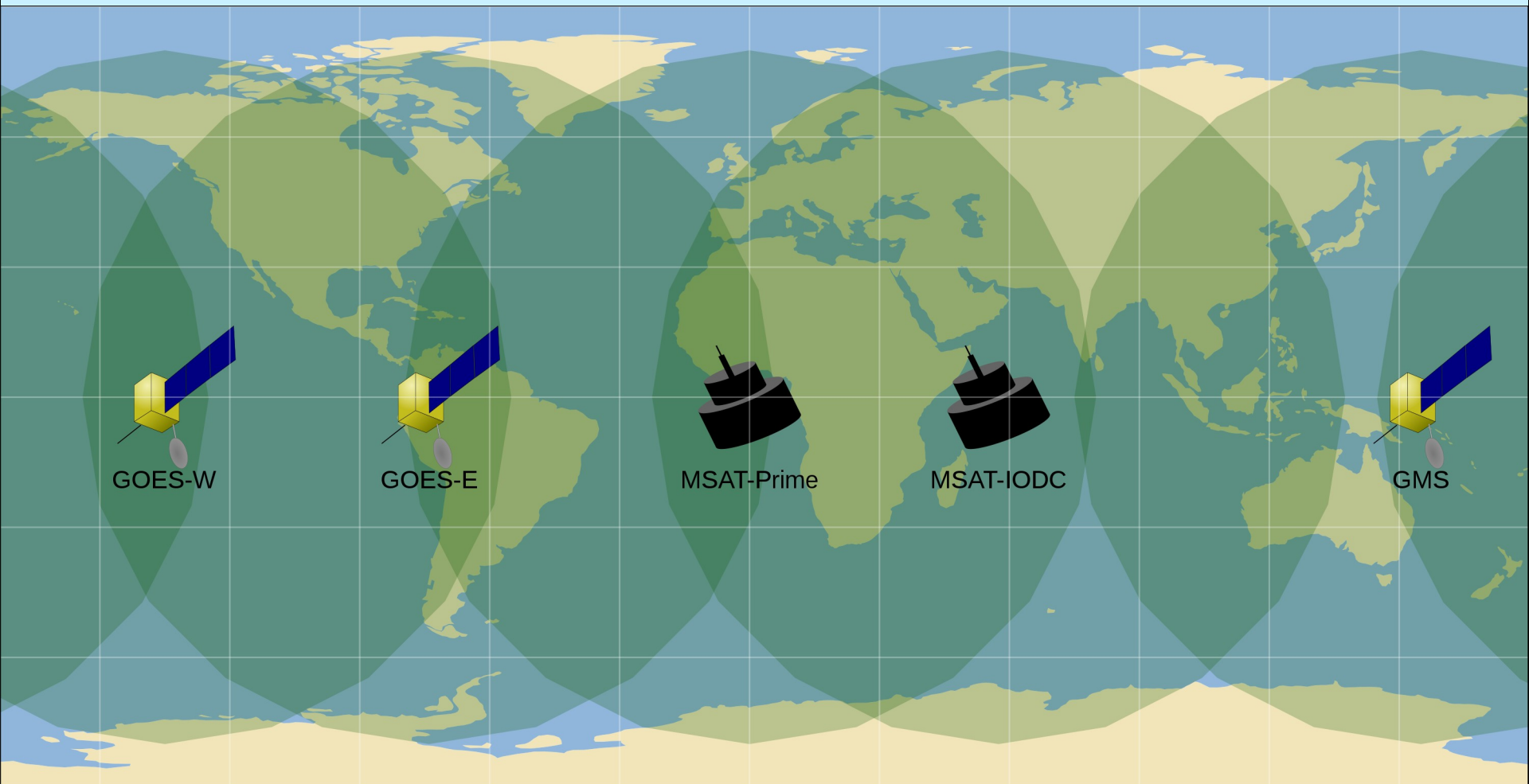
**H**istorical solar  
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**O**rbit



*Source: Météo-France 2009, composite by author*







Year	GOES-W (-135°)	GOES-E (-74°)	MSAT-Prime (0°)	MSAT-IODC (57.5°)	GMS (155°)
1978 – 1980	GOES-2		<u>Meteosat-1</u>		GMS
	GOES-3				
1981 – 1985	GOES-4	GOES-5	<u>Meteosat-2</u>		GMS-2
1986 – 1990			<u>Meteosat-3</u>		GMS-3
			<u>Meteosat-4</u>		
1991 – 1995			<u>Meteosat-5</u>		GMS-4
1996 – 2000	GOES-9	GOES-8	<u>Meteosat-6</u>		GMS-5
2001 – 2005	GOES-10		<u>Meteosat-7</u>	<u>Meteosat-5</u>	GOES-++
2006 – 2010	GOES-11	GOES-12			
2011 – 2012	GOES-15	GOES-13		<u>Meteosat-7</u>	

# HALO: Temporal coverage

Year	GOES-W (-135°)	GOES-E (-74°)	MSAT-Prime (0°)	MSAT-IODC (57.5°)	GMS (155°)
1978 – 1980	GOES-2		<u>Meteosat-1</u>		GMS
	GOES-3				
1981 – 1985	GOES-4	GOES-5	<u>Meteosat-2</u>		GMS-2
1986 – 1990			<u>Meteosat-3</u>		GMS-3
			<u>Meteosat-4</u>		
			<u>Meteosat-5</u>		
1991 – 1995					GMS-4
1996 – 2000	GOES-9	GOES-8	<u>Meteosat-6</u>		GMS-5
2001 – 2005	GOES-10		<u>Meteosat-7</u>	<u>Meteosat-5</u>	GOES-++
2006 – 2010		GOES-12			
	GOES-11			<u>Meteosat-7</u>	
2011 – 2012		GOES-13			
	GOES-15				

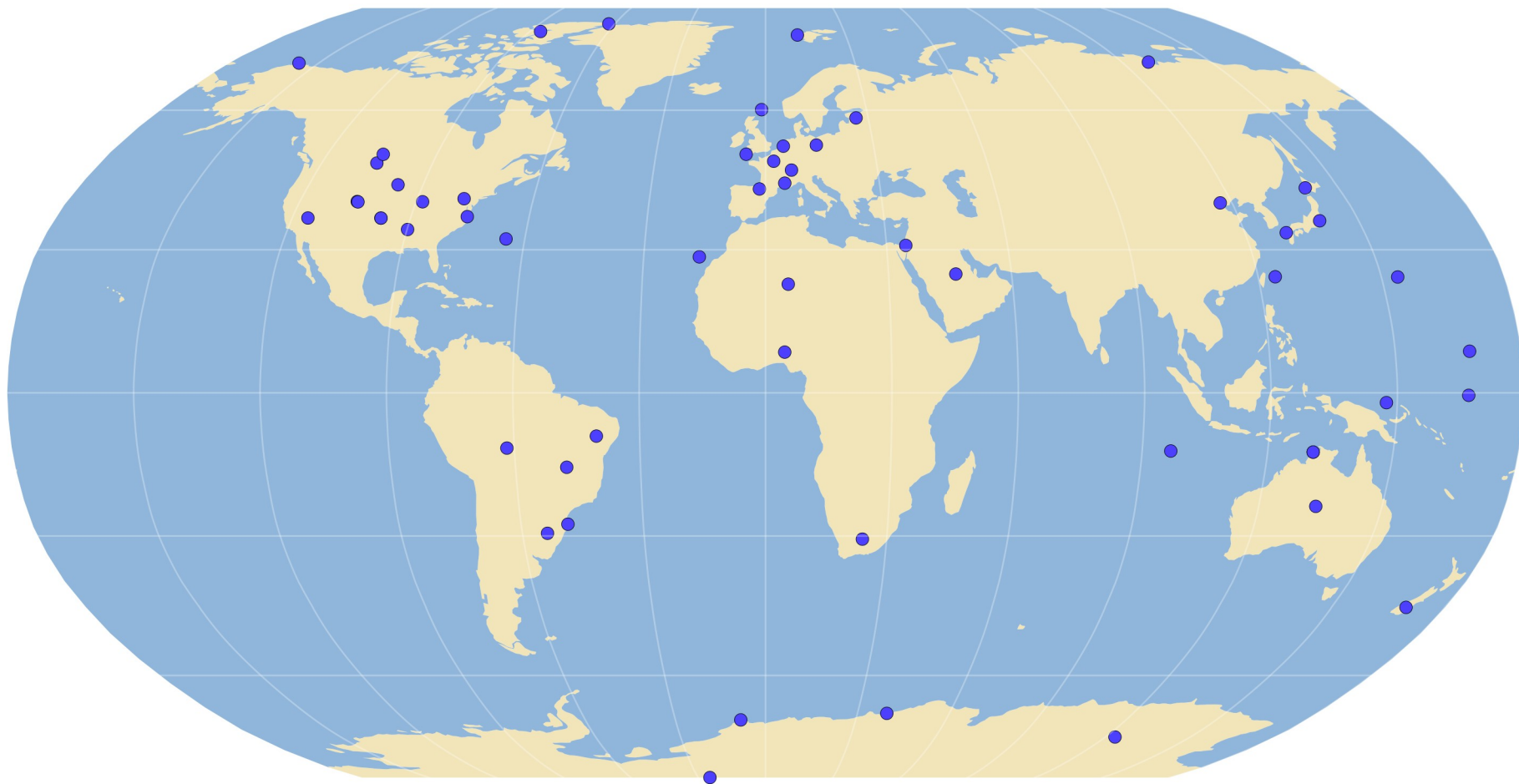
Source: NOAA 2012, EUMETSAT 2012, JMA 2012, diagram by author

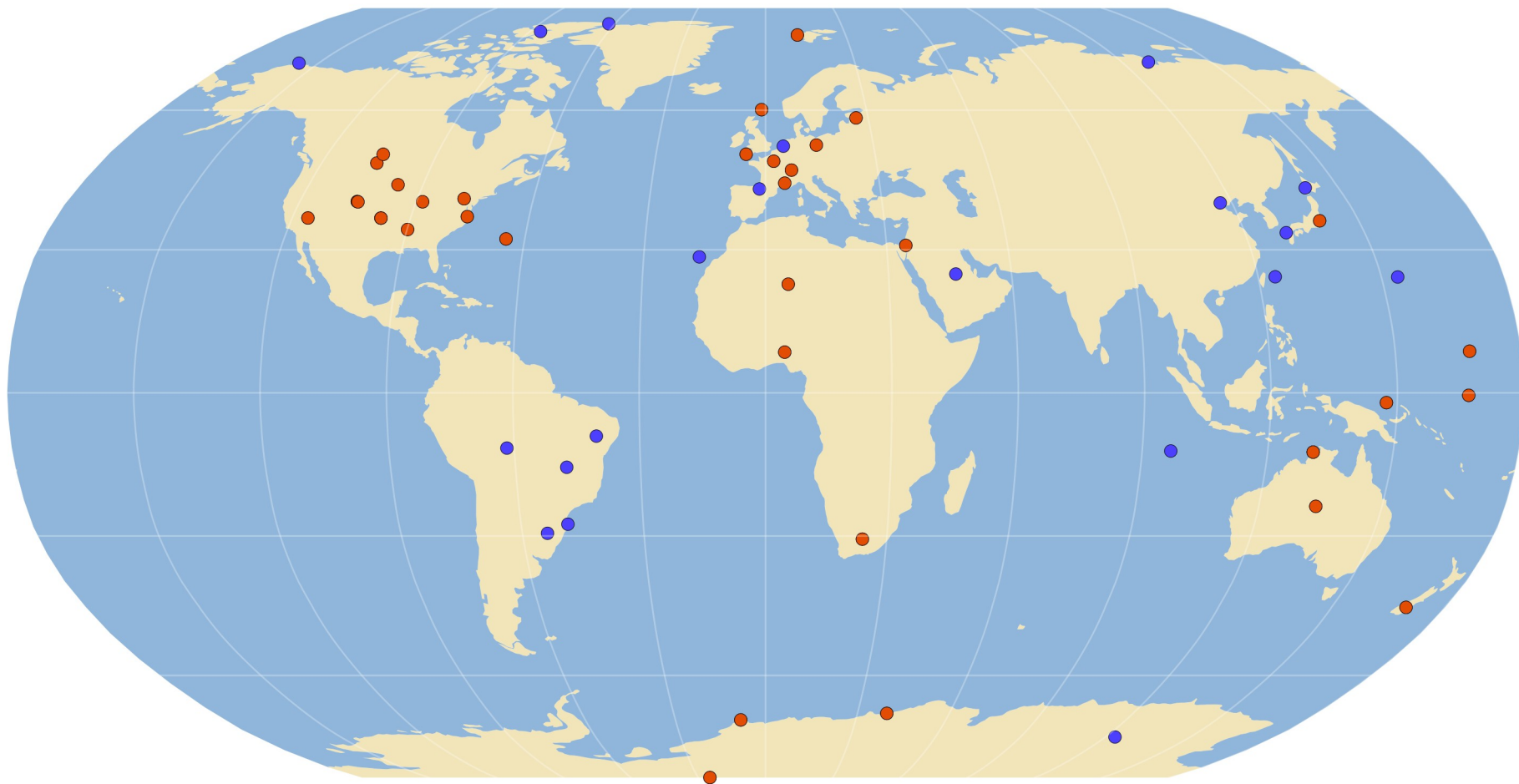
Year	GOES-W (-135°)	GOES-E (-74°)	MSAT-Prime (0°)	MSAT-IODC (57.5°)	GMS (155°)
1978 – 1980	GOES-2		<u>Meteosat-1</u>		
	GOES-3				
1981 – 1985	GOES-4	GOES-5	<u>Meteosat-2</u>		GMS
					GMS-2
1986 – 1990			<u>Meteosat-3</u> <u>Meteosat-4</u>		GMS-3
1991 – 1995			<u>Meteosat-5</u>		GMS-4
1996 – 2000	GOES-9	GOES-8	<u>Meteosat-6</u>		GMS-5
2001 – 2005	GOES-10		<u>Meteosat-7</u>	<u>Meteosat-5</u>	GOES-++
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	GOES-11				
2011 – 2012		GOES-13		<u>Meteosat-7</u>	
	GOES-15				

1 month = ~ 3 TB

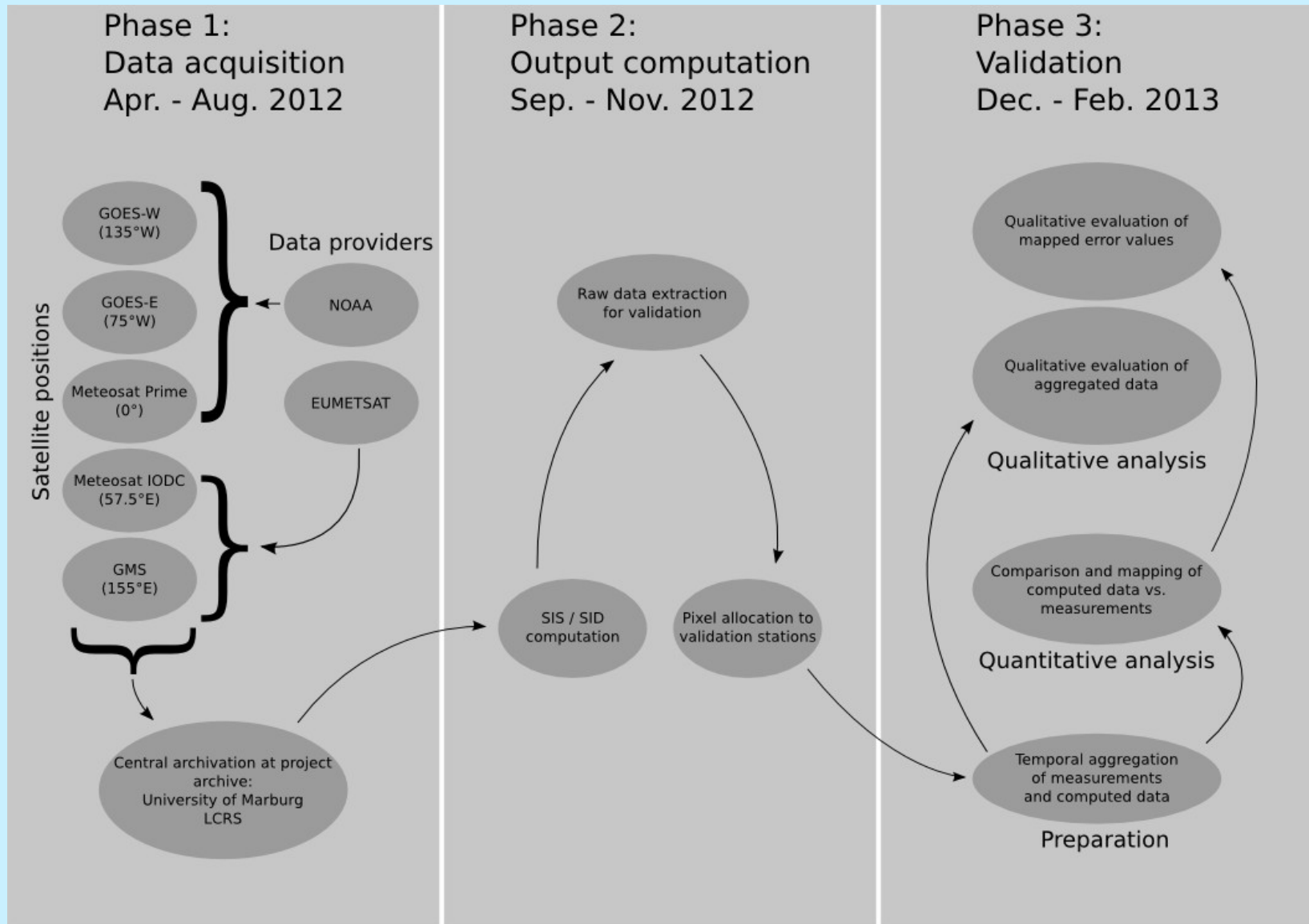
Chosen test month:

June 2003



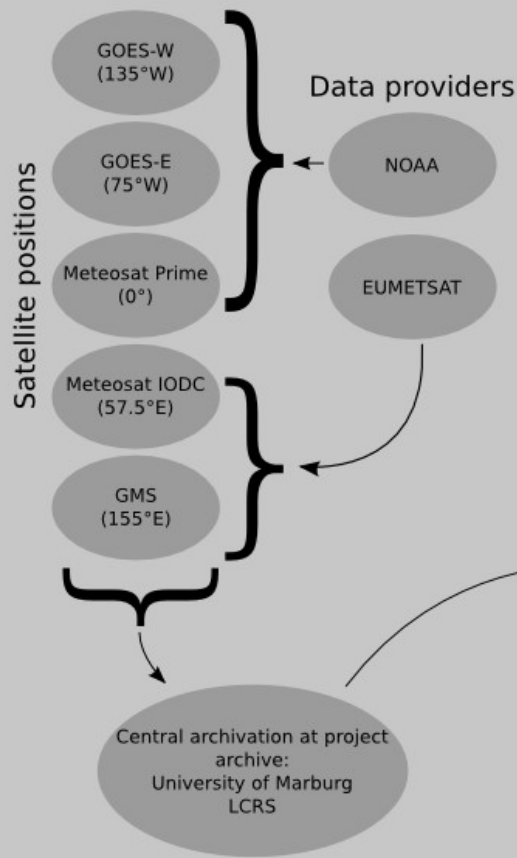




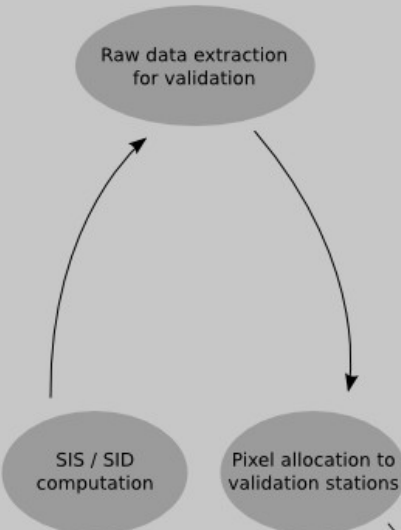




## Phase 1: Data acquisition Apr. - Aug. 2012



## Phase 2: Output computation Sep. - Nov. 2012



## Phase 3: Validation Dec. - Feb. 2013

