



MERMAID

MERIS Matchup In-situ Database

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In-situ matchups in MERMAID

MERMAID currently had 5 matchup datasets, consisting of fixed and cruise locations, and more data is soon to be uploaded.



AERONET AAOT (JRC): Adriatic Sea

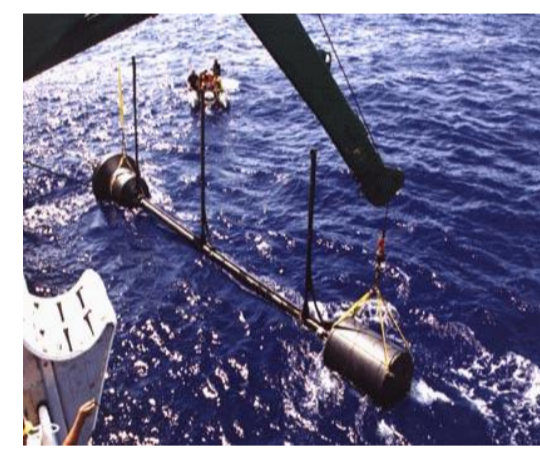
PI: G. Zibordi
Matchups: 161*

Other AERONET-OC soon to be included.



BOUSSOLE (LOV) Med. Sea

PI: D. Antoine
Matchups: 440*



MOBY (NOAA) Lanai, Hawaii

PI: M. Ondrusek
Matchups: 472*



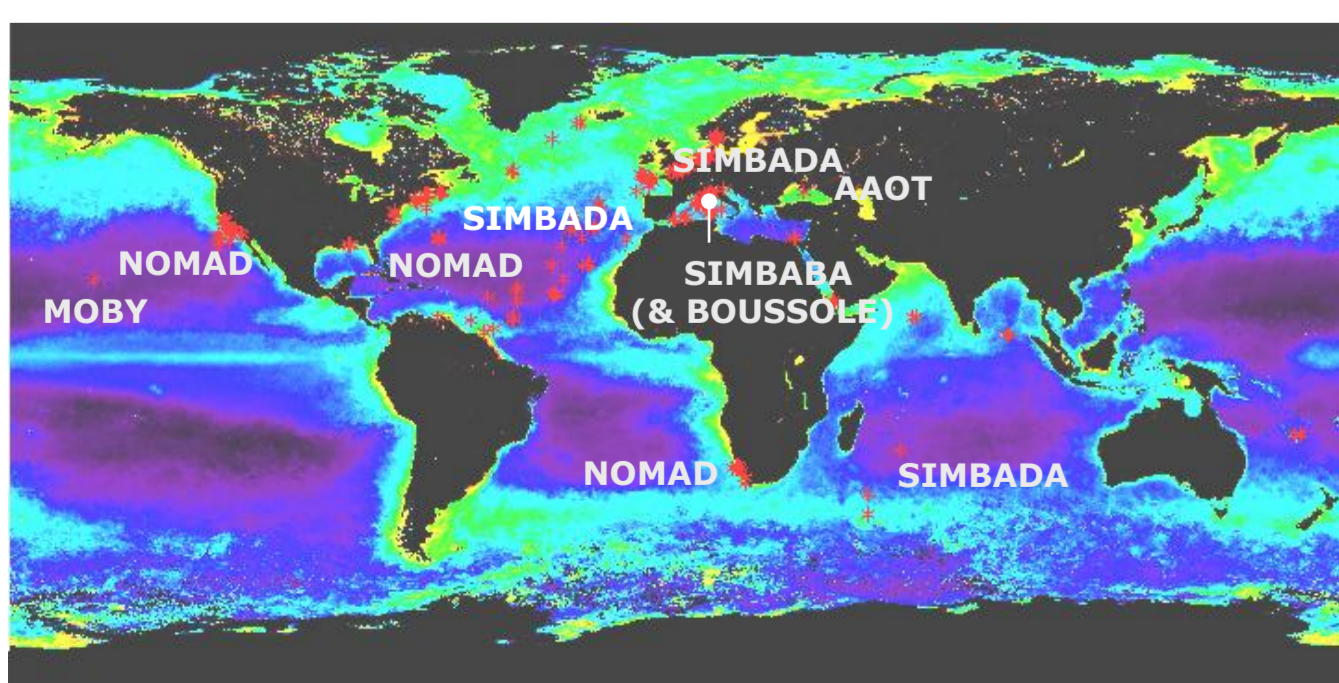
SIMBADA (LOA) Various locations

PI: P.-Y. Deschamps
Matchups: 327*



NOMAD (NASA) Various locations

PI: J. Werdell
Matchups: 140*



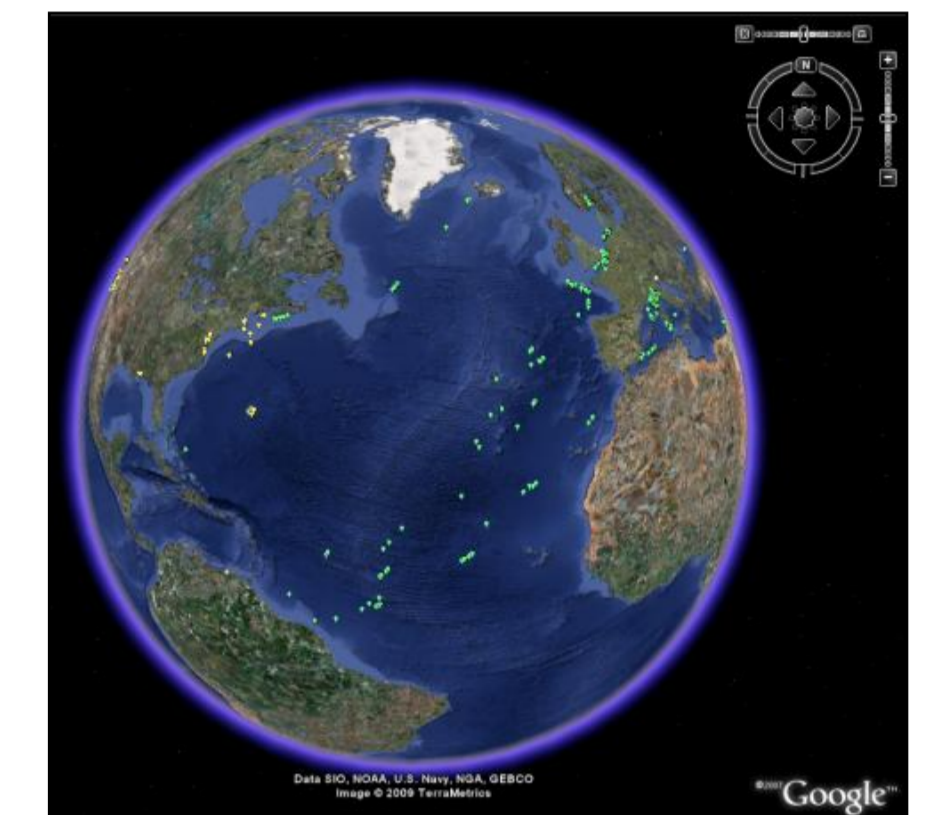
* All flags counted
Full acknowledgment to all PIs

Introduction: Purpose of the database

Within the frame of the European Space Agency (ESA) MERIS Validation Team (MVT) and MERIS Data Quality Working Group (DQWG) activities, a central database centralising for in-situ optical measurements has been set up. The project, has been running since 2006, and was initially began as a component of the MQWG framework for Atmospheric Correction studies, with some in-situ data sourced from a number of sites including from AAOT, BOUSSOLE and MOBY. Due to a need for increasing levels of more data handling, data distribution, site specific protocols and automated tools, MERMAID was born in 2008. The long-term objectives of this database are to:

1. Enable the assessment of the MERIS Level 2 (L2) products delivered by the ENVISAT ground segment,
2. Support the monitoring of these MERIS products over the lifetime of the mission by providing a complete temporal coverage of the mission and
3. Support vicarious adjustment of the instrument, atmospheric correction and specific algorithm evolution and upstream processing such as Level 1 calibration.

The database contains in-situ fully normalised water reflectances, $\rho_w(\lambda_{MERIS})$, with concurrent and comparable extractions of the MERIS L2 products (including flags and auxiliary data). These data are currently available to the members of the MERIS QWG under the strict data access policy of their original provider, and to contributing PIs.



MERMAID Google Earth interactive application

In-situ and MERIS Data Processing

At present, MERMAID presently does not specify a format for data submission. As long as the metadata and radiometric measurements are submitted, it's a relatively simply process to convert to $\rho_w(\lambda)$, from which $\rho_{wn}(\lambda)$ is derived.

In-situ (ARGANS Ltd)

- Collation of in-situ optical data, and first point of contact for the PI.
- Data quality and protocol checking.
- Data formatting to MERMAID template
- Full normalisation of in-situ $\rho_w(\lambda)$ (Morel formula).

What data do we acquire?

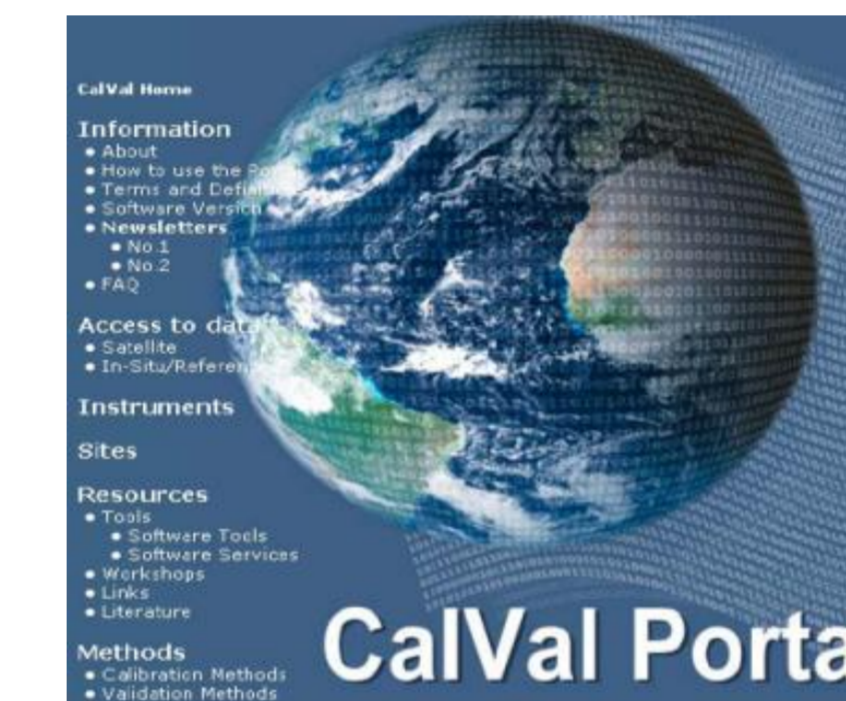
- Meta data (lat, lon, time, date)
- Un-normalised, non-glint affected, $\rho_w(\lambda)$, or water leaving radiances, $L_w(\lambda)$
- In-situ chlorophyll and geometry for the normalisation. .

Matchups and MERIS extraction (ACRI-ST)

- MERIS Level 0 (L0) MERIS data are received by ACRI-ST through DDS (Data Dissemination System) and locally archived.
- From the geographic and temporal information, ACRI-ST processes the relevant L0 products with the MERIS Ground Segment data processing prototype, (MEGS 7.4) up to L2.
- From these MERIS data are extracted (5x5 RR pixels around site) a range of products, coincident with the in-situ information and a number of criteria. (e.g time differences <3 hours, flagging)
- MERIS ρ_w are fully normalised once extracted, using MERIS extracted products (e.g. chl-a).

MERMAID Website: <http://hermes.acri.fr/mermaid>

The MERMAID website is hosted at ACRI-ST, but also accessed via the Cal Val Portal (<http://calvalportal.ceos.org>), an open access site, providing support for cal/val activities. The MERMAID website outlines the purpose of the website, and specifies a strict data policy, and is open access apart from the data access page. The web interface is however very versatile in allowing the user to specify its own extraction criteria.



Data Policy

Any PI can become part of the MVT by contributing data. Once quality checked and protocols received, the PI is provided access to the data. In contrast to NASA SeaBASS, MERMAID access is password protected restricted to contributing PIs and the DQWG. Users wishing to publish a paper using MERMAID data must seek the permission of the site's PI and offer coauthorship.

MERMAID content:

- Matchup extractions : March 2002 to present.
- Fully normalised in-situ and MERIS ρ_{wn} , from 412 nm to 709 nm (MERIS bands 1 – 9).
- Associated quality control and protocol flagging.
- MERIS concurrent data over 5 sites at present (RR macro-pixel extraction)
- Intermediary data (reflectances: TOA, path, aerosol; aerosol models)
- Atmospheric data: $\tau(560)$, $\tau(865)$, α
- Level 2 flags
- Site and PI name (to maintain traceability)

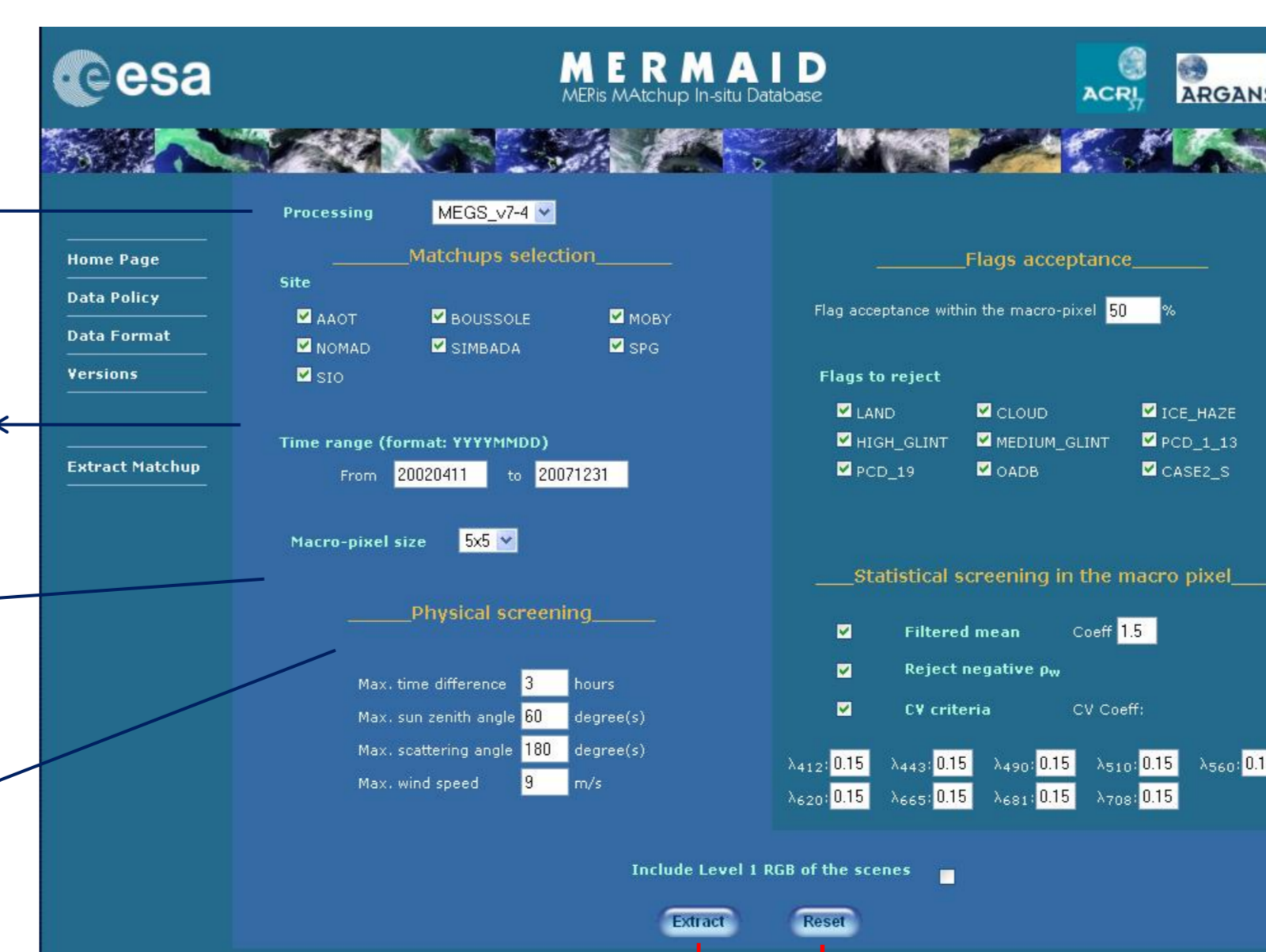
Matchup Data Extraction Page

MERIS Processor and in-situ sites.

Matchup date range: 2002-present

Macro pixel size: 1, 3x3, 5x5

Physical screening e.g. Time-difference (in-situ to sensor), sun zenith angle, wind speed, scattering angle.



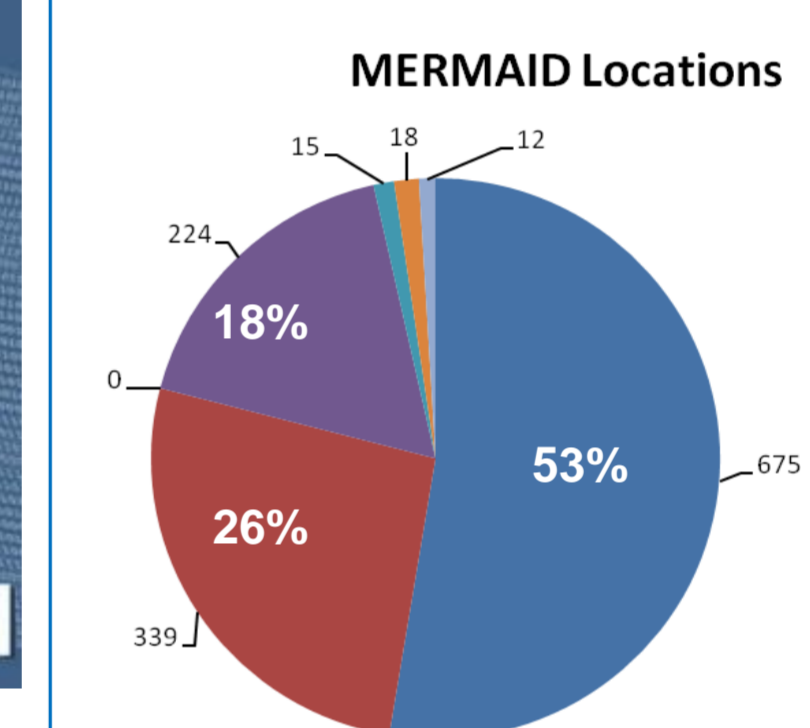
Flag screening and user defined acceptance. Flags include: Case 2, glint, cloud, land.

Statistical screening: filtered mean, CV criteria (Bailey & Werdell: RSE, 2006)

Extraction format: Data in CSV format and (if selected) RGB thumbnail

Site	Time	Lat	Lon	Wind	Temp	Humid	Cloud	Depth	Chl-a	Chl-b	Chl-c	Chl-d	Chl-e	Chl-f	Chl-g	Chl-h	Chl-i	Chl-j	Chl-k	Chl-l	Chl-m	Chl-n	Chl-o	Chl-p	Chl-q	Chl-r	Chl-s	Chl-t	Chl-u	Chl-v	Chl-w	Chl-x	Chl-y	Chl-z
AAOT	20020301	45.76	12.10	1.5	15.0	75	0	10	0.1	0.05	0.02	0.01	0.005	0.002	0.001	0.0005	0.0002	0.0001	0.00005	0.00002	0.00001	0.000005	0.000002	0.000001	0.0000005	0.0000002	0.0000001	0.00000005	0.00000002	0.00000001	0.000000005	0.000000002	0.000000001	

Data locations and example uses

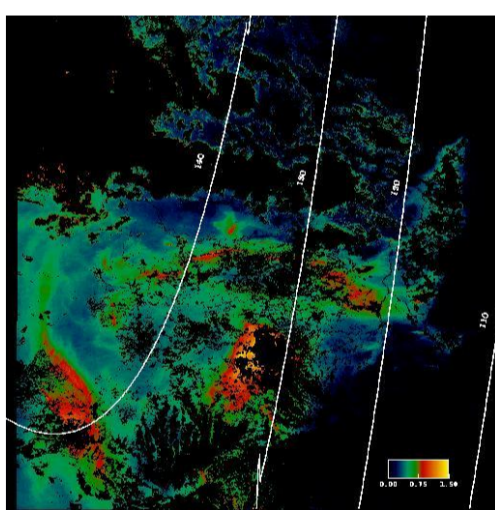


Total: 1283 (186 Case 2)

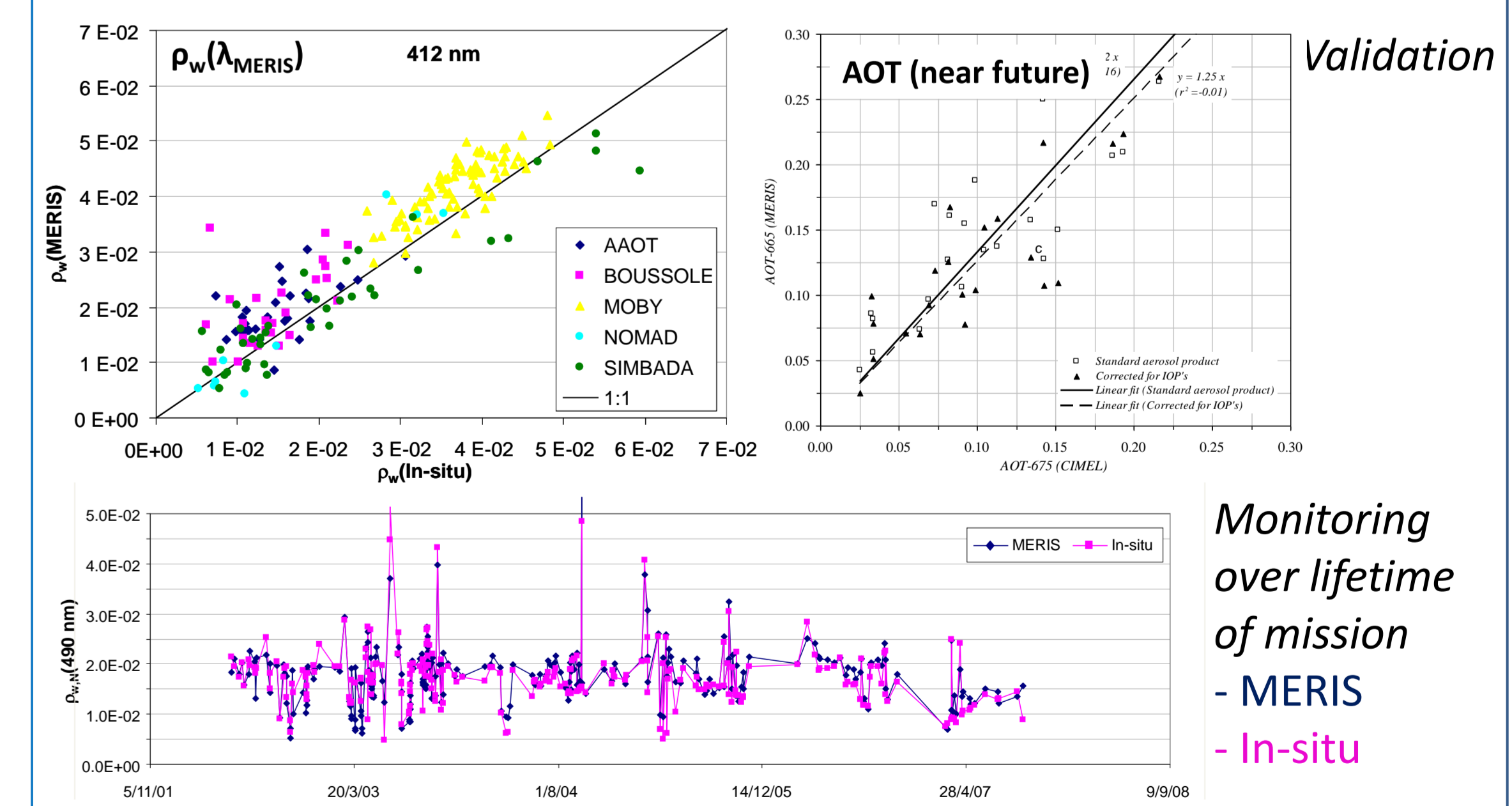
- N Atlantic
- Mediterranean
- S Atlantic
- N Pacific
- Indian Ocean
- S Pacific
- Black Sea

New data to come (Including Case 2): Further data are being acquired from a broad range of PIs and locations, including Case 2:

- AERONET-OC (Gustav Dahlen Tower, Helsinki Lighthouse, Palgrunden),
- Bristol Channel, Irish Sea (D. McKee)
- Algarve (J. Icelly)



AOT(560) from a MERIS scene over Amazonia (July 15th, 2003). Isolines for scattering angles are superimposed.



Validation

Ongoing development:

- MERMAID is one of the tools for validating the next MERIS reprocessing (end September 2009; third reprocessing).
- Inclusion of Case 2 matchups (Case 2 normalised)
- Inclusion of atmospheric matchups, from AERONET-OC CIMEL measurements (AOT and Angstrom exp.).
- Extension of MERMAID bands and matchups to $\rho_w(NIR)$
- Heritage extension to Sentinel-3 (OLCI)

Monitoring over lifetime of mission - MERIS - In-situ