Inland and coastal water remote sensing: current status and future directions in the correction of adjacency effects

Chairs: Barbara Bulgarelli, Alexandre Castagna

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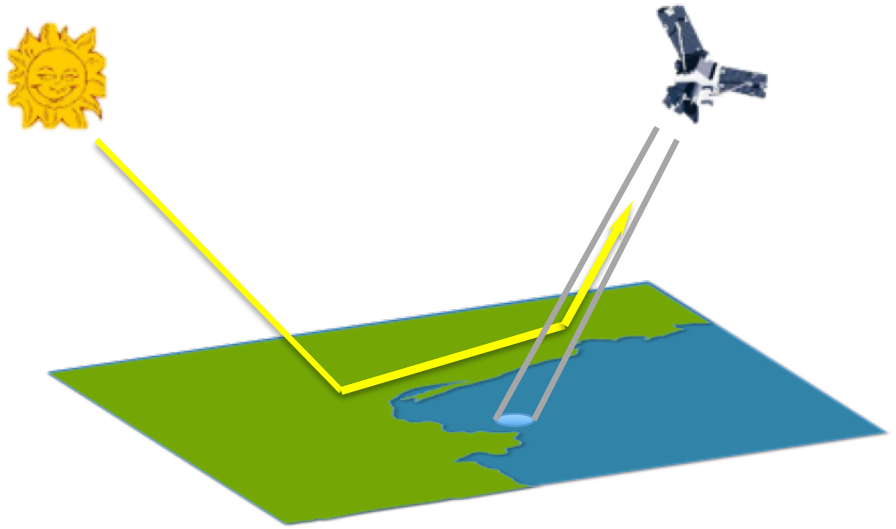
Adjacency Effects

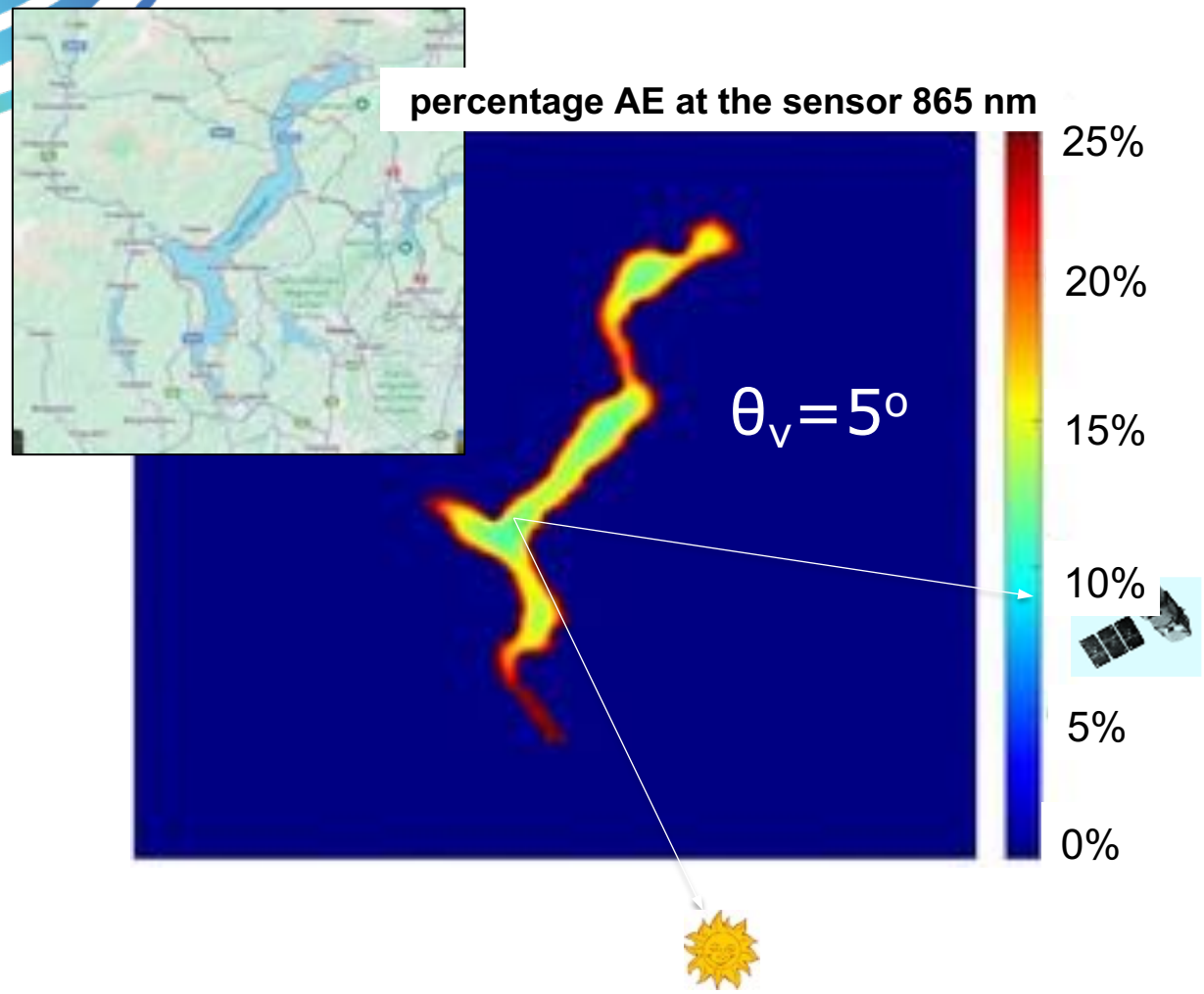
Adjacency effects arise when a scattering atmosphere is superimposed to a non-uniform surface:

light scattered from bright adjacent pixels contaminates the signal received by the satellite sensor from the darker target pixel, resulting in an inaccurate measurement.



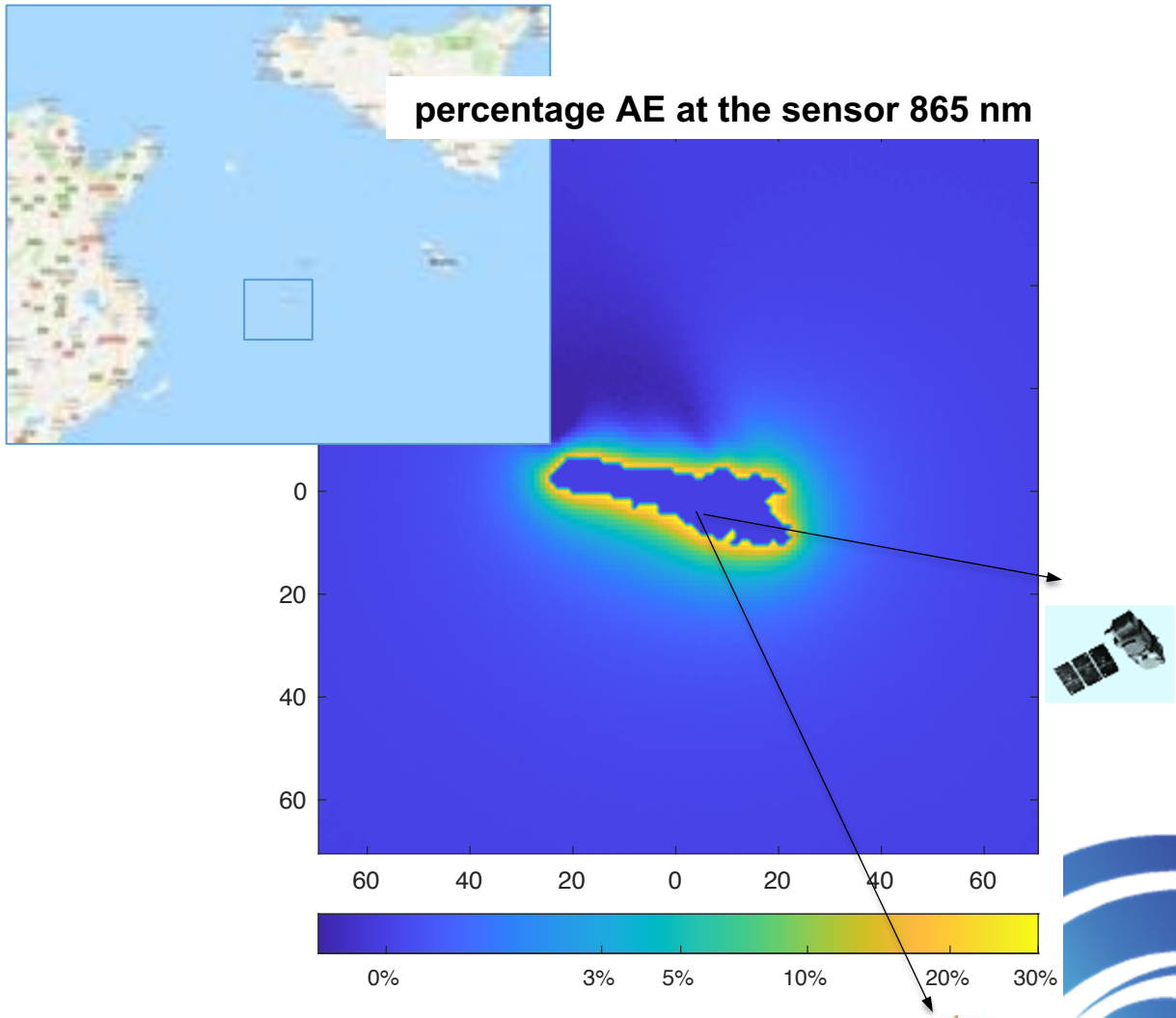
Adjacency effects

Lake Maggiore



(Bulgarelli et al., 2014)

Lampedusa Island



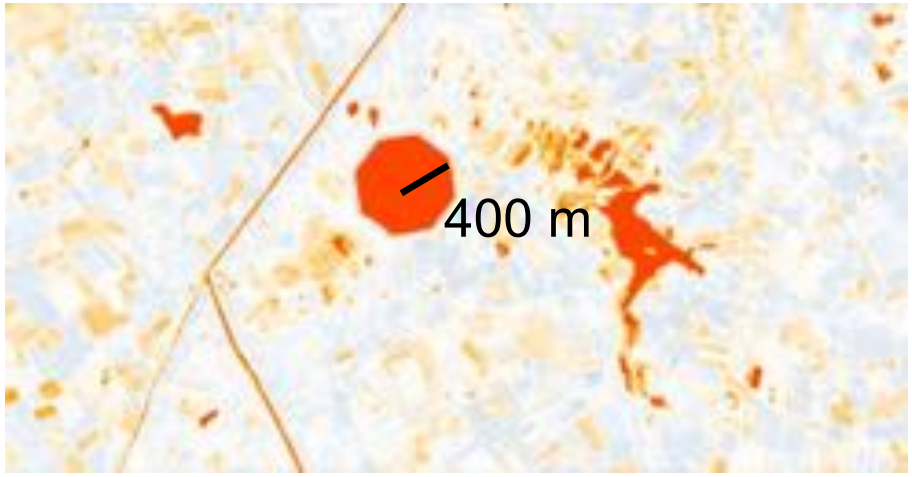
Bulgarelli and Zibordi, AO 2020 (NAUSICAA MC code)

Adjacency effects

Example: Blankaart reservoir

B4 (665 nm)

B8A (864 nm)



MSI/Sentinel-2B, 2021-03-31

~ 99% lakes < 1km^2
~ 99% rivers < 1km wide

Relative difference

< -100%

> 100%

RadCor

natural sciences .be

belspo

Review of Existing IOCS Recommendations

2017.04.3: Apply spectral unmixing approaches to correct for AE from adjacent land/ice (Community/OPEN)

some non AE-specific recommendations for atmospheric corrections, optically complex waters, uncertainties

Review of Other Recommendations

From CEOS-ARD for Aquatic Reflectance:

Per pixel metadata:

2.14. adjacency effects: depending on the AC method, amount of per-pixel adjacency effects contamination.

Goal (desired) requirement

Products and Algorithms:

3.11. Adjacency effects correction. Goal (desired) requirement

Goals of the Breakout Workshop

- Establishing a consensus in the parameters utilized to **quantify AE in satellite data** from inland and coastal waters

- Overview available tools for the quantification of AE, and to identify **key AE dependencies**, **feasible approximations**, as well as **aspects that still need to be addressed**.

- **inventorying current potential algorithms for the operational correction of AE** in satellite radiometric data from coastal and inland waters

- **identify gaps and research needs**, as well as areas of collaborations (with specific focus on AE **algorithm inter-comparison** and **validation with in-situ data**)

Agenda

Time	Description	Presenter
14:30	Session Starts and Introduction	**Barbara Bulgarelli** (JRC-EC)
14:42	Impact of adjacency effect on high resolution products in operational services.	**Carsten Brockman** (Brockman Consult, D)
14:54	Assessing the impact of adjacency effects on atmospheric correction using Monte-Carlo simulations with the SMART-G radiative transfer code	**François Steinmetz** (HYGEOS, F)
15:06	Quantification of adjacency effects in inland and coastal waters by the sensor-agnostic MIP-Adjacency correction processor	**Thomas Heege** (EOMAP, D)
15:18	GAAC: a Genetic Algorithm for Adjacency Correction for Inland Waters	**Simon Belanger** (University of Quebec, CA)
15:30	**Coffee Break**	
16:00	Sensor-generic AE correction in aquatic remote sensing using T-Mart	**Yulun Wu** (University of Ottawa, CA, online)
16:12	Atmospheric correction in the presence of adjacency with ACOLITE/RAdCor	**Alexandre Castagna** (Ghent University, BE)
16:24	**Open discussion**	
17:30	Session Ends	

New IOCS Recommendations to support future operational correction of adjacency effects (AE)

- ➔ The community should further develop algorithms for the correction of AE, refining the capability to account for atmospheric optical properties and off-nadir view, including the capability to account for water surface reflectance anisotropy, evaluating algorithm uncertainties
- ➔ The space agencies should support the further development of AE correction algorithms
- ➔ The community should collect reference in-situ measurements for the validation of AE correction algorithms (i.e., near-to-the-shore in coastal waters and large inland water basins and over small or narrow water bodies)
- ➔ The space agencies and IOCCG should promote intercomparison exercises of AE correction algorithms with reference in-situ data and potentially with synthetic data
- ➔ The community should develop flags identifying satellite data pixels potentially contaminated by AE