





# International Ocean Colour Science Meeting 2023

Advancing Global  
Ocean Colour  
Observations

## Overall Goal of IOCS Meetings

- To build, represent, and reinforce the voice of the global ocean colour communities
- To promote international linkages among different ocean and Earth science communities
- To provide a forum for discussion on key research and technology topics and *come up with recommendations/advice for IOCCG, user communities, and feedback to space agencies*
- To facilitate broad ocean colour community engagement in IOCCG activities

## IOCS Meetings

- Nov 2023, St. Petersburg, FL, USA  
268 attendees from 26 countries
- April 2019, Busan, South Korea  
235 attendees from 29 countries
- May 2017, Lisbon, Portugal  
344 attendees from 41 countries
- June 2015, San Francisco, CA, USA  
262 attendees from 29 countries
- May 2013, Darmstadt, Germany  
244 attendees from 36 countries



## IOCCG activities since last IOCS (April 2019)

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- **IOCCG Reports published:**

Report #20 (2021) *Observation of Harmful Algal Blooms with Ocean Colour Radiometry*. Edited by Bernard, S., Kudela, R., Robertson Lain, L. and Pitcher, G.C., pp. 165

✓ Report #19 (2020) *Synergy between Ocean Colour and Biogeochemical/Ecosystem Models*. Edited by Stephanie Dutkiewicz, pp. 184

✓ Report #18 (2019) *Uncertainties in Ocean Colour Remote Sensing*. Edited by Frédéric Mélin, pp. 164

- ✓ **IOCCG Protocols published:**

Aquatic Primary Productivity Field Protocols for Satellite Validation and Model Synthesis (September 2022)

Particulate Organic Matter Sampling and Measurement Protocols: Consensus Towards Future Ocean Color Missions (August 2021)

Protocols for Satellite Ocean Color Data Validation: In situ Optical Radiometry (December 2019)

Inherent Optical Property Measurements and Protocols: Best Practices for the Collection and Processing of Ship-Based Underway Flow-Through Optical Data (November 2019)



## IOCCG activities since last IOCS (April 2019)

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- **New Working groups established:**
  - Conducting Benthic Reflectance Measurements (June 2020)
  - Ocean Primary Production from Space (March 2023)
  - ✓ Classification of optical water types in aquatic radiometry (March 2023)
- **New Task Forces established:**
  - ✓ Ocean Colour Systems Vicarious Calibration (OC-SVC) Task Force (May 2021)
  - Task Force on Remote Sensing of Marine Litter and Debris (July 2021)
  - Ocean Carbon Task Force (March 2023)
  - ✓ Hyperspectral Remote Sensing of the Ocean (March 2023)
- **Trevor Platt Memorial Scholarship**, established 2023
- **5th IOCCG Summer Lecture Series**, July 2022
- **New Chair**, transition from Cara Wilson to Shubha Sathyendranath, June 2022
- **New Coordinator**, transition from Venetia Stuart to Raisha Lovindeer, January 2023



# IOCS Breakout Group Recommendations

Advancing Global  
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**4** IOCS Meetings



**34** Breakout Groups

**75** Session Chairs

AC	Geo	Data Sharing	Operational	Cal/Val Protocols	Training	SVC
Climate	PFT/PCS	File formats	Calibration	PFT/PCS	Uncertainties	Water Quality
High Latitudes	High Resolution	Hyperspectral	BGC-Argo	Trichodesmium	SVC	Inland Waters
Southern Ocean	Lidar	Multi-Water	Protocols	Carbon	Tools & Resources	Phyto from Hyperspectral
High Temporal & Spatial Res	VC & calibration	R2O	New Technology	Calibration	AC	

**20** Breakout Groups Themes

PFT/PCS (4)	Hyperspectral (2)	Uncertainties
High Temporal/Spatial Resolution (4)	R2O (2)	Water Quality
Sensor Calibration (3)	File Formats & Tools (2)	Multi-water Algorithms
Vicarious Calibration (3)	Emerging New Technology (2)	Carbon from Space
Atmospheric Correction (2)	Ecosystems & Climate Change (2)	Training & Outreach
Protocols (2)	High Latitudes (2)	Multi-agency data sharing
Optically Complex Waters (2)	BGC-Argo	



# IOCS Breakout Group Recommendations

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**20** Breakout Groups Themes

**75** Session Chairs

PFT/PCS (4)	Hyperspectral (2)	Uncertainties
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Atmospheric Correction (2)	Ecosystems & Climate Change (2)	Training & Outreach
Protocols (2)	High Latitudes (2)	Multi-agency data sharing
Optically Complex Waters (2)	BGC-Argo	

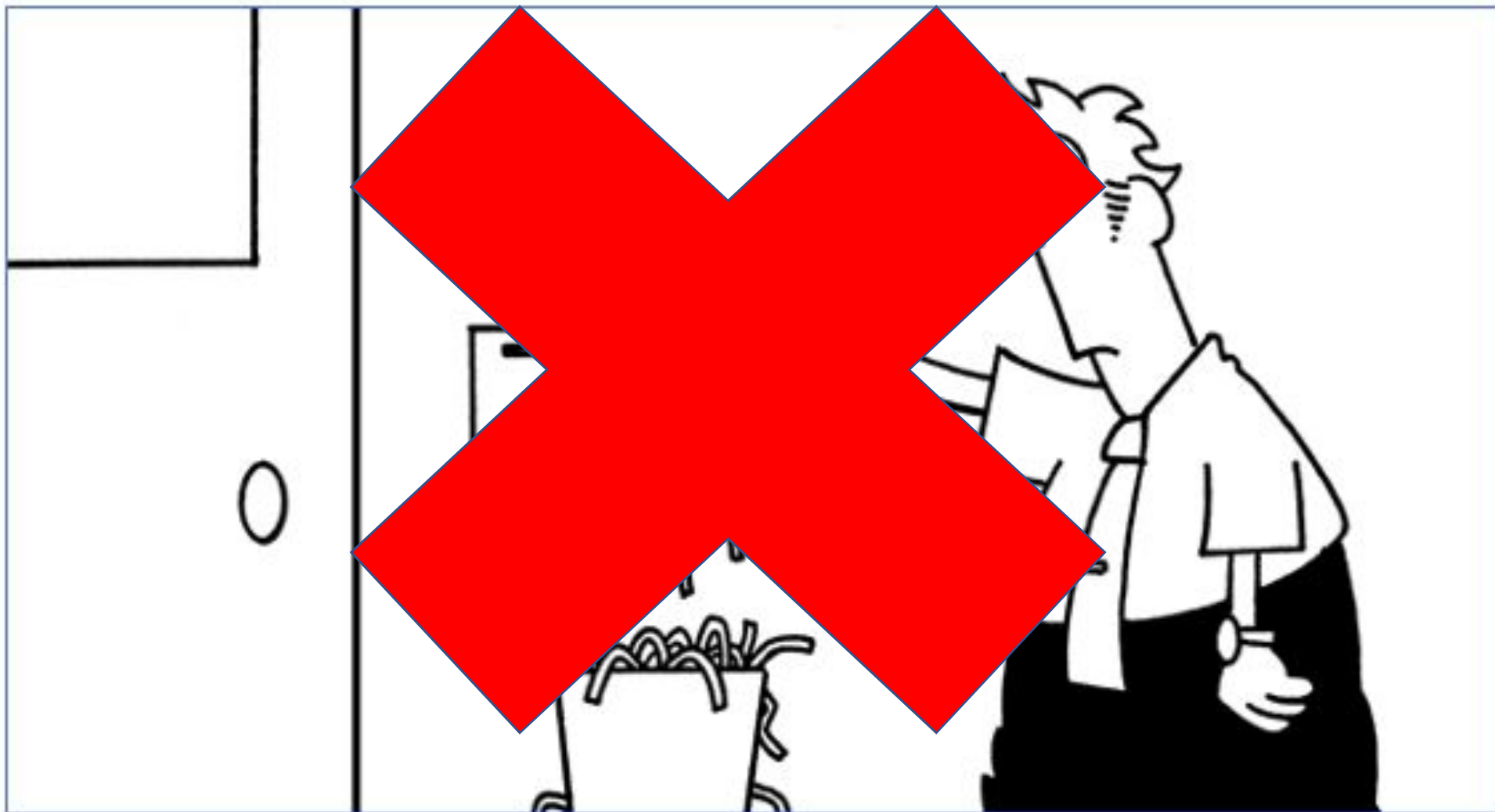
Generated **159** separate recommendations!

***What's happened to them all?***



# IOCS Breakout Group Recommendations

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# IOCS Breakout Group Recommendations

Advancing Global  
Ocean Colour

Count	Year	BO ID	BO Theme	BO Name	Chairs	Recommendation ID	Recommendation	Type
1	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.1	Cloud screening should be linked to atmospheric correction	Technical
2	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.2	Absorption by hydrosols in the NIR needs to be determined for ver	Technical
3	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.3	Planned sensors should complement spectral measurements from	Technical
4	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.4	Efforts should be made by space agencies to make the new techn	Technical
5	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.5	Parallel processing lines with standard and improved schemes may	Technical
6	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.6	Synergy between instruments/missions should be considered, in p	Technical
7	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.7	New techniques suggest sensors should not saturate over Sun glin	Technical
8	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.8	Aerosol altitude is an essential variable to compute atmospheric e	Technical
9	2013	2013.02	AC	Advances in AC	<a href="mailto:rfrouin@ucsd.edu">rfrouin@ucsd.edu</a> , <a href="mailto:sean.w.bailey@nasa.gov">sean.w.bailey@nasa.gov</a>	2013.02.9	Aerosol model determination (size distribution, index of refraction	Technical
10	2013	2013.03	Oral/Spatial	Geostationary	<a href="mailto:antonio.mannino-1@nasa.gov">antonio.mannino-1@nasa.gov</a> , <a href="mailto:jhryu@kiost.a">jhryu@kiost.a</a>	2013.03.1	Broader distribution and application of GOCI data is recommende	User
11	2013	2013.03	Oral/Spatial	Geostationary	<a href="mailto:antonio.mannino-1@nasa.gov">antonio.mannino-1@nasa.gov</a> , <a href="mailto:jhryu@kiost.a">jhryu@kiost.a</a>	2013.03.2	Organize geostationary ocean colour radiometry sessions at future	User
12	2013	2013.03	Oral/Spatial	Geostationary	<a href="mailto:antonio.mannino-1@nasa.gov">antonio.mannino-1@nasa.gov</a> , <a href="mailto:jhryu@kiost.a">jhryu@kiost.a</a>	2013.03.3	Generate geostationary articles in various publications (IOCCG new	User
13	2013	2013.04	Data	Multi-Agency Dat	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.04.1	When using data from MERMAID (MERIS Matchup In-situ Databas	Data
14	2013	2013.04	Data	Multi-Agency Dat	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.04.1	Collaboratively identify and resolve bottlenecks to free and open e	Data
15	2013	2013.04	Data	Multi-Agency Dat	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.04.2	Space agencies should continue the pursuit and support of interna	Data
16	2013	2013.04	Data	Multi-Agency Dat	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.04.3	Researchers should archiving satellite data sets used in publicat	Data
17	2013	2013.04	Data	Multi-Agency Dat	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.04.4	The user community should get together to discuss standardisatio	Data
18	2013	2013.04	Data	Multi-Agency Dat	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.04.5	Space agencies/data providers should commit to providing global l	Data
19	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.1	The quality of operational ocean colour data is of critical importan	Data
20	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.2	Assure data continuity and sustainability of product delivery. Distri	Data
21	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.3	Produce and distribute Level-3 data.	Data
22	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.4	Ensure that operational capabilities are achieved soon after launch	Data
23	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.5	Provide open source modular software that matches the operatio	Data
24	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.6	Provide all data online for downloading (instead of a limited rolling	Data
25	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.7	Expand the core product suite; keep algorithms state-of-the-art.	Data
26	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.8	Consolidate ocean colour requirements for services, ecosystem an	User
27	2013	2013.05	R2O	Operational	<a href="mailto:Ewa.Kwiatkowska@eumetsat.int">Ewa.Kwiatkowska@eumetsat.int</a> , <a href="mailto:sbernard@">sbernard@</a>	2013.05.9	Create a framework within which the wider international commun	User
28	2013	2013.06	Protocols	In Situ Measurem	<a href="mailto:gfgargion@optonline.net">gfgargion@optonline.net</a> , <a href="mailto:Jean-Paul.Huot@esa">Jean-Paul.Huot@esa</a>	2013.06.1	<i>In situ</i> measurement protocols should not be revised by a single in	Technical
29	2013	2013.06	Protocols	In Situ Measurem	<a href="mailto:gfgargion@optonline.net">gfgargion@optonline.net</a> , <a href="mailto:Jean-Paul.Huot@esa">Jean-Paul.Huot@esa</a>	2013.06.2	Some support for protocol development should be secured from v	Technical
30	2013	2013.06	Protocols	In Situ Measurem	<a href="mailto:gfgargion@optonline.net">gfgargion@optonline.net</a> , <a href="mailto:Jean-Paul.Huot@esa">Jean-Paul.Huot@esa</a>	2013.06.3	Participants agreed on the following workshops to revise the protc	Technical
31	2013	2013.07	Training	International Trai	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.07.1	More online / distance resources are required.	Training
32	2013	2013.07	Training	International Trai	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.07.2	Provide training on software and tools to support use of VIIRS and	Training
33	2013	2013.07	Training	International Trai	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.07.3	EUMETSAT's role in training may be best focused on the operatio	Training
34	2013	2013.07	Training	International Trai	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.07.4	Use Wikipedia for outreach and information provision to provide n	Training
35	2013	2013.07	Training	International Trai	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.07.5	Outreach activities aimed at the policy/decision making level	Training
36	2013	2013.07	Training	International Trai	<a href="mailto:Mark.Higgins@eumetsat.int">Mark.Higgins@eumetsat.int</a>	2013.07.6	Explore the value, and practicalities of competencies and certificat	Training
37	2013	2013.08	SVC	System Vicarious	<a href="mailto:Giuseppe.ZIBORDI@ec.europa.eu">Giuseppe.ZIBORDI@ec.europa.eu</a> , <a href="mailto:jeremy.w">jeremy.w</a>	2013.08.1	The vicarious calibration of VIS bands with respect to NIR bands, w	Technical

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Spreadsheet of all of  
the recommendations  
is now online:

<https://iocs.ioccg.org/iocs-recommendations/>





## Classify the Recommendations

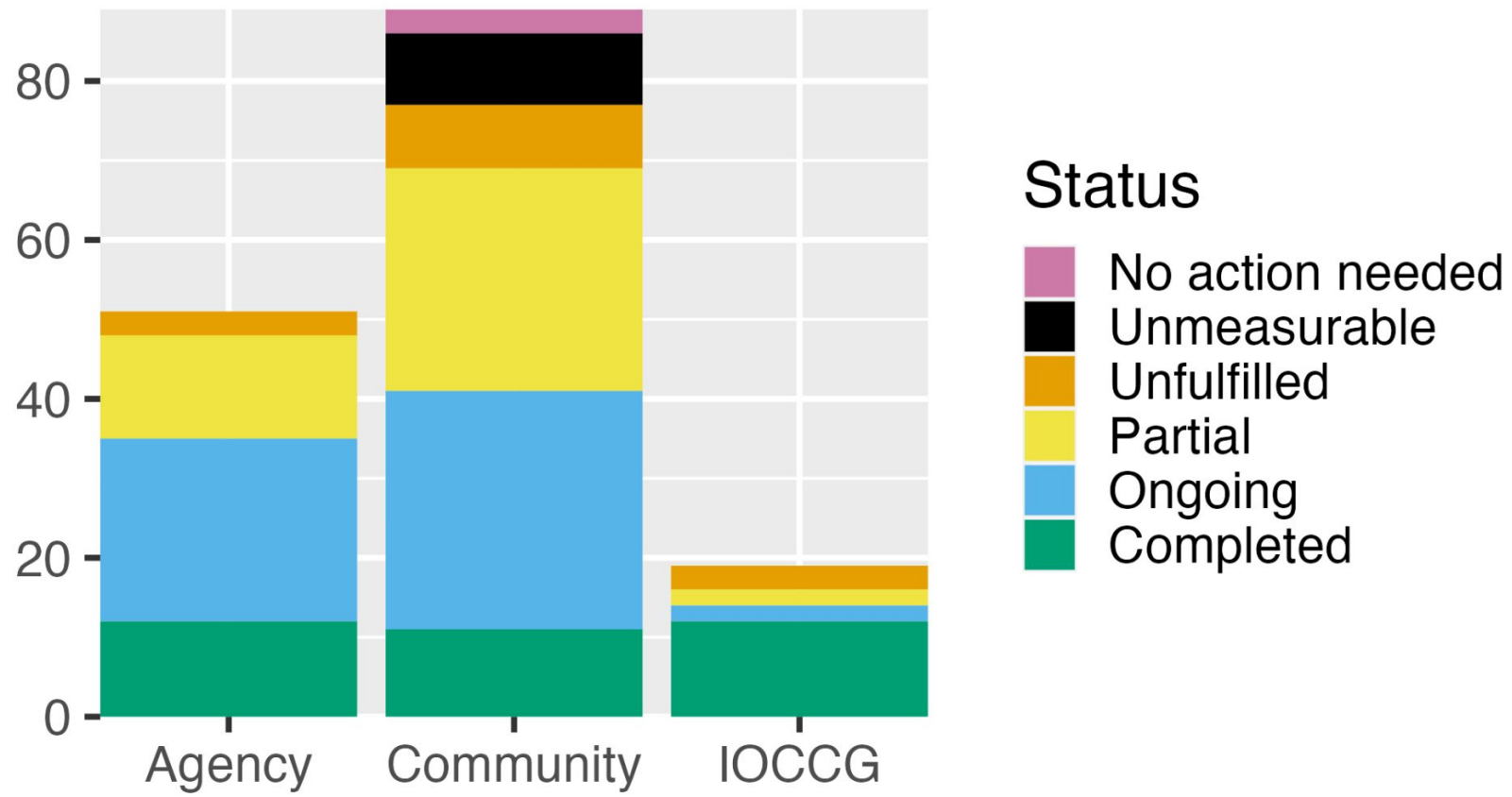
<b>Type</b> <i>What is it about?</i>	<b>Executor</b> <i>Who should do it?</i>	<b>Status</b> <i>Has it been done?</i>
<ul style="list-style-type: none"><li>• Technical (48%)</li><li>• Data (36%)</li><li>• User (15%)</li></ul>	<ul style="list-style-type: none"><li>• Agency (32%)</li><li>• IOCCG (12%)</li><li>• Community (56%)</li></ul>	<ul style="list-style-type: none"><li>• Completed (22%)</li><li>• Ongoing (35%)</li><li>• Partial (27%)</li><li>• Unfulfilled (8%)</li><li>• Unmeasurable (7%)</li><li>• No action needed (2%)</li></ul>



# IOCS Breakout Group Recommendations

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## Recommendations by Executor

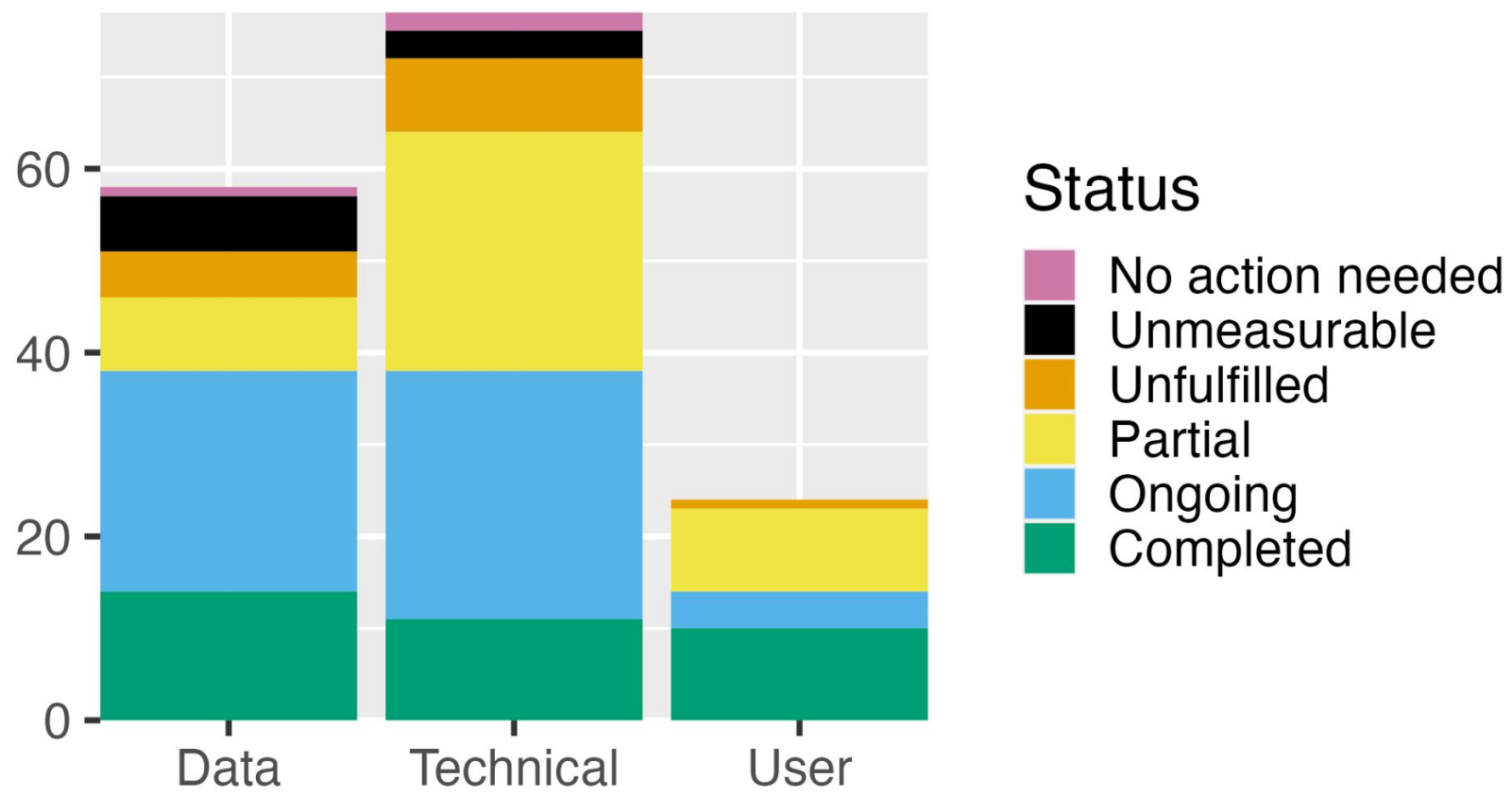




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## Recommendations by Type

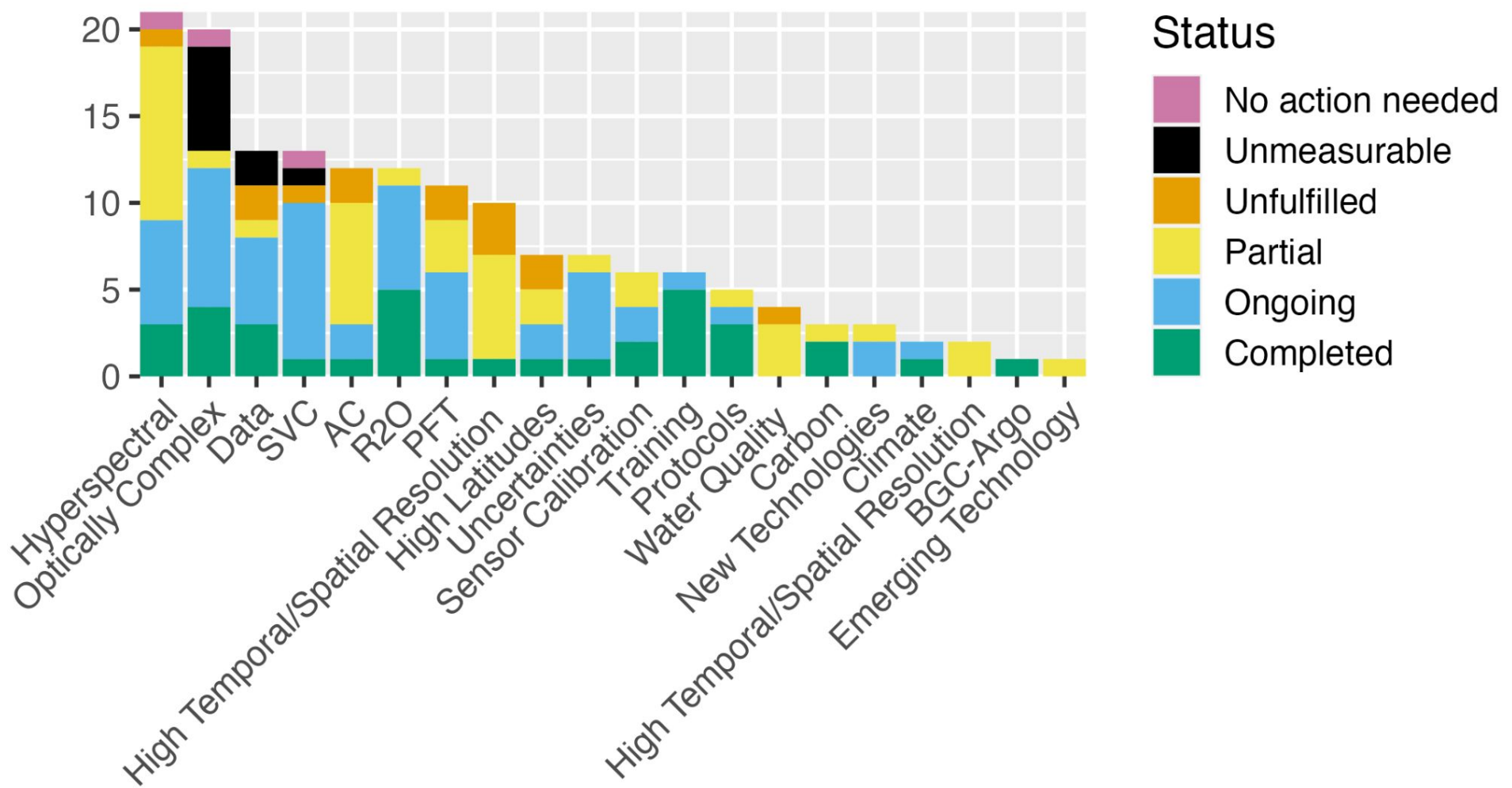




# IOCS Breakout Group Recommendations

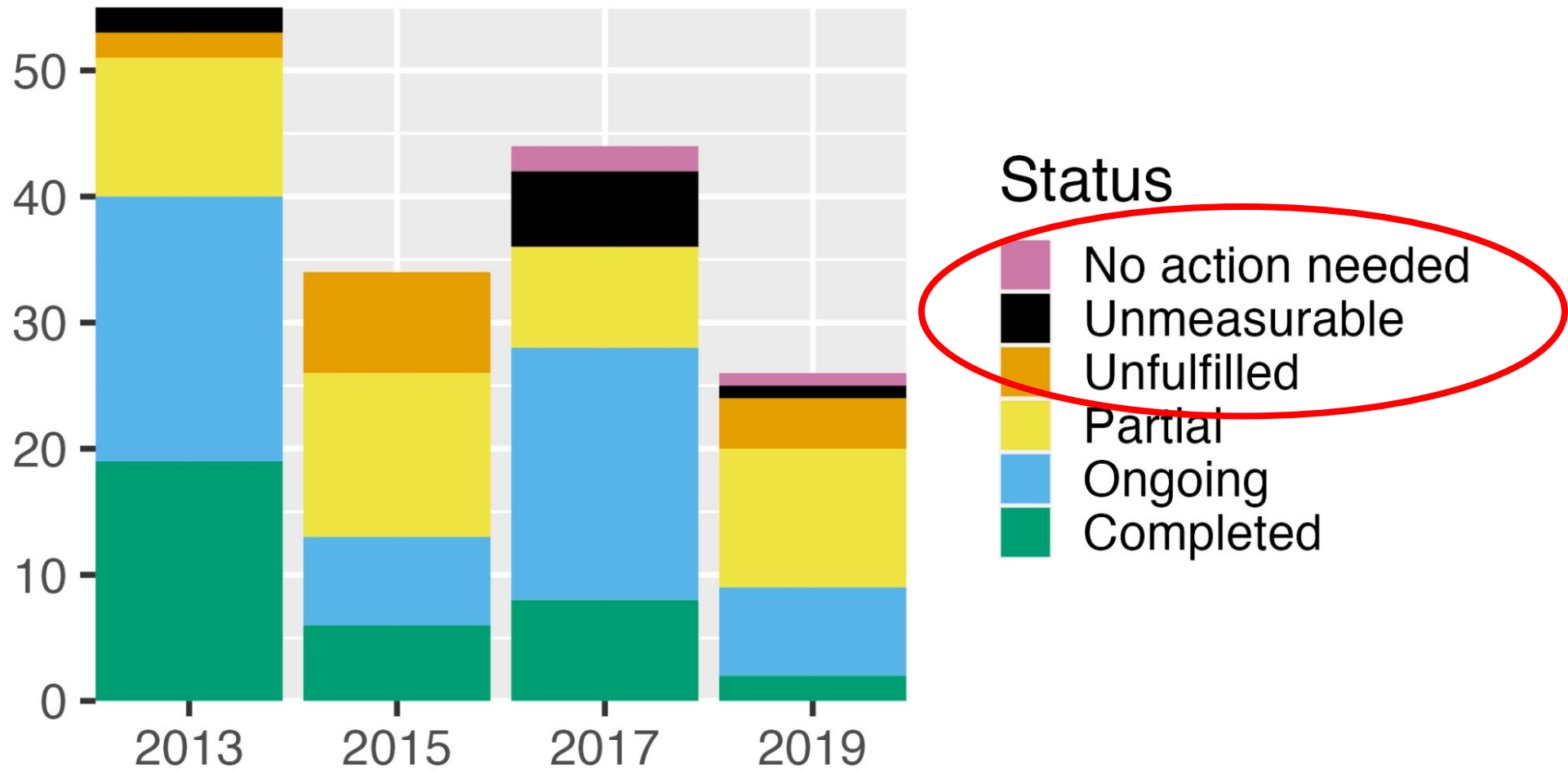
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## Recommendations by Theme





## Recommendations by Year





# IOCS Breakout Group Recommendations

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## No Action Needed (Statements): 3

Year	Break Out Group	Recommendation
2017	Trichodesmium	Geostationary satellites could resolve temporal variations of biomass and this maybe the key for models
2017	Inland & Coastal Waters	Measurements of mass-specific Inherent Optical Properties are critical for algorithm development
2019	VC & calibration	There is still disagreement of how to define protocols for some aspects of matching data for analysis (i.e. box size, time lag)



# IOCS Breakout Group Recommendations

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## Unmeasurable (1 of 2): 11

Year	Break Out	Recommendation
2013	Advances in AC	New techniques suggest sensors should not saturate over Sun glint and clouds, and that it may not be necessary to tilt them, but strategy should keep continuity while allowing improvements based on gained knowledge.
2013	Advances in AC	Aerosol model determination is useful to constrain the inverse ocean-colour problem, but errors may be too large to compute the perturbing signal with sufficient accuracy
2013	Multi-Agency Data Sharing	When using data from MERMAID in publications, the PIs of <i>in situ</i> data should always be contacted for approval, be offered co-authorship and acknowledged.
2013	Multi-Agency Data Sharing	Researchers should archive satellite data sets used in publications. The agencies are not responsible for keeping older versions once the data has been reprocessed.
2017	SVC	Do not write definitive numbers in public documents if they cannot be justified



# IOCS Breakout Group Recommendations

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## Unmeasurable (2 of 2): 11

Year	Break Out	Recommendation
2017	Inland & Coastal Waters	Encourage researchers to collect optical properties of aerosols/trace gases together with bio-optical data and share the data on public databases such as SeaBASS and Limnades
2017	Inland & Coastal Waters	Apply spectral unmixing approaches to correct for adjacency effects from adjacent land/ice.
2017	Inland & Coastal Waters	Explore glint mitigation strategies such as tilting the sensor or shifting the orbits to maximize the utility of satellite observations; explore beneficial uses of sun-glint signal
2017	Inland & Coastal Waters	Quantitative studies evaluating the impact of various spatial resolutions on retrievals are needed in order to establish reasonable limits on desired spatial resolution
2017	Inland & Coastal Waters	Building trust with the management community will require documented protocols, validation efforts and rigorous QA/QC
2019	Inland & Coastal Waters	Promote the application of IOPs, as it is the first-order inversion products from Rrs





# IOCS Breakout Group Recommendations

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## Unfulfilled (1 of 2): 12

Year	Break Out	Recommendation
2015	PFT	Develop unified protocols and data repository for phytoplankton composition observations
2015	PFT	Coordinate use of identical independent datasets in the development and validation of algorithms
2015	Geostationary	Form a new IOCCG Geostationary WG
2015	Geostationary	Develop methods to detect different types of absorbing aerosols
2015	Geostationary	Explore the possibility of using aerosol transport models such as GOCART to identify and correct for different types of aerosols
2015	High Latitudes	Increase the number of remote sensing observations over polar seas
2015	High Latitudes	Establish constituent-IOP relationships for the estimation of biogeochemical stocks



# IOCS Breakout Group Recommendations

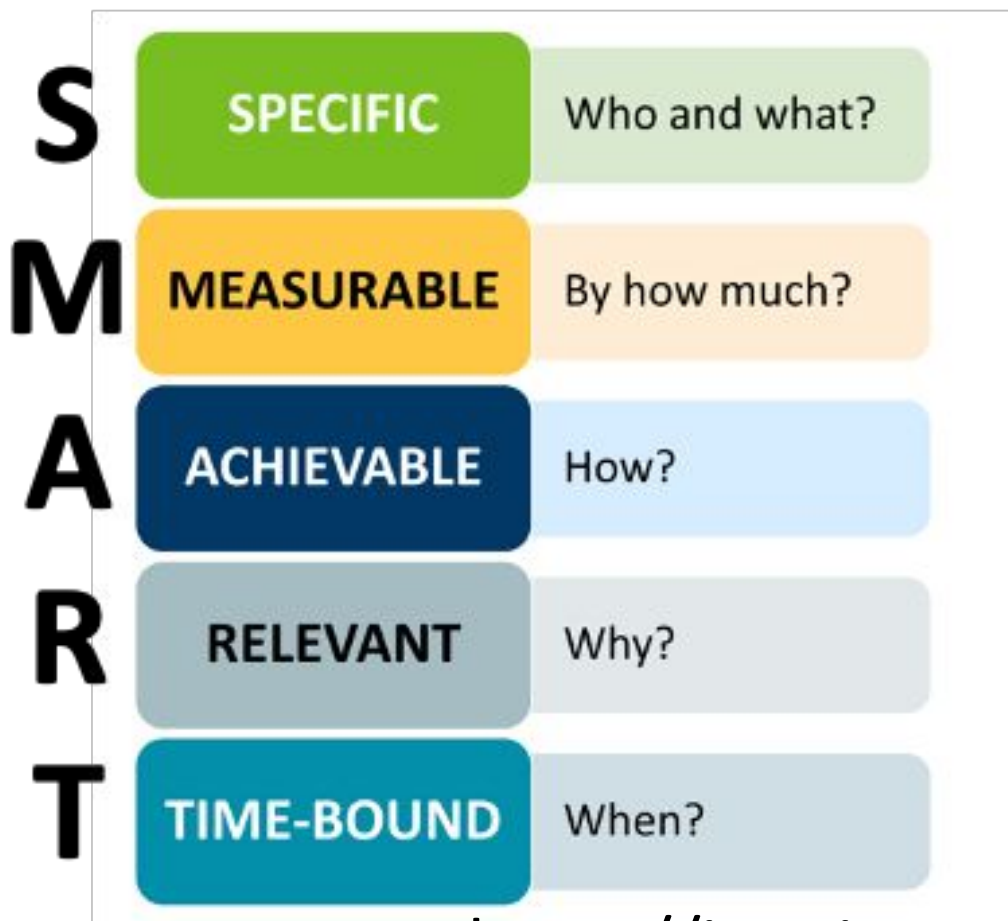
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## Unfulfilled (2 of 2): 12

Year	Break Out	Recommendation
2015	Water Quality	End users provide examples of when less accurate data is better than no data
2019	Tools & Resources	Develop a community 'open science' statement to encourage making data, code, and software open and discoverable.
2019	Tools & Resources	Establish a code repository to exist as a live IOCCG report
2019	Phyto from Hyperspectral	Need to have an appropriate operational (i.e. not a scene-by-scene approach) atmospheric correction for surface slicks, appropriate spectral bands to resolve phycoerythrin and spatial resolution to detect slicks
2019	VC and calibration	Develop white paper to try to achieve agreement



## New SMART Guidelines for Breakout Group Recommendations



For each recommendation indicate:

- Who should execute it? The space agencies, the IOCCG or the community
- Is there agreement from the executor that they are willing to implement it?
- What specific actions need to be taken?
- A target date for implementation

<https://iocs.ioccg.org/iocs-recommendations/>



# IOCS Breakout Group Chairs

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## Thanks to all 91 (2013-2023) Breakout Group Chairs!

David [Antoine](#), Dirk [Aurin](#), Sean [Bailey](#), Brian [Barnes](#), Stewart [Bernard](#), Kelsey [Bisson](#), Emmanuel [Boss](#), Astrid [Bracher](#), Carsten [Brockmann](#), Joaquin [Chaves-Cedeño](#), Peng [Chen](#), Jim [Churnside](#), Madeline [Cowell](#), Susanne [Craig](#), Emmanuel [Devred](#), Paul [DiGiacomo](#), Davide Dionisi, Mark [Dowell](#), Cecile [Dupouy](#), Stephanie [Dutkiewicz](#), Simon [Elliott](#), Giulietta [Fargion](#), Bertrand [Fougnie](#), Bryan [Franz](#), Robert [Frouin](#), Shungu [Garaba](#), Claudia [Giardino](#), Michelle [Gierach](#), Steve [Greb](#), Nick [Hardman-Mountford](#), Mark [Higgins](#), Takafumi [Hirata](#), Toru [Hirawake](#), Chris [Hostetler](#), Jean-Paul [Huot](#), Amir [Ibrahim](#), Cedric [Jamet](#), Carol [Johnson](#), Mati [Kahru](#), Erdem [Karakoylu](#), Ewa [Kwiatkowska](#), Veronica [Lance](#), Zhongping [Lee](#), Christophe [Lerebourg](#), Hubert [Loisel](#), Antoine [Mangin](#), Antonio [Mannino](#), Stephane [Maritorea](#), Victor [Martinez Vicente](#), Constant [Mazeran](#), Lachlan [McKinna](#), Gerhard [Meister](#), Frederic [Mélin](#), Francois [Montagner](#), Tim [Moore](#), Wesley [Moses](#), Colleen [Mouw](#), Frank [Muller-Karger](#), Merrie Beth [Neely](#), Griet [Neukermans](#), Daniel [Odermatt](#), Emanuele [Organelli](#), Nima [Pahlevan](#), Sherry [Palacios](#), Robert [Reynolds](#), Cecile [Rousseaux](#), Kevin [Ruddick](#), Joo-Hyung [Ryu](#), Joseph [Salisbury](#), Shubha [Sathyendranath](#), Michael [Sayers](#), Blake [Schaeffer](#), Joel [Scott](#), Bridget [Seegers](#), Emily [Smail](#), Alice [Soccodato](#), Ajit [Subramaniam](#), Kevin [Turpie](#), Mike [Twardowski](#), Andrew [Tyler](#), Maria [Tzortziou](#), Ryan [Vandermeulen](#), Quinten [Vanhellemont](#), Maria [Vernet](#), Brando [Vittorio](#), Ken [Voss](#), Jeremy [Werdell](#), Cara [Wilson](#), Xiao-Gang [Xing](#), Jim [Yoder](#), Giuseppe [Zibordi](#)





# IOCS Breakout Groups

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Designed for group discussion to solicit community input and recommendations for future action for the IOCCG and space agencies.

<b>PFTs (4)</b> 2013, 2015, 2017, 2019	<b>Hyperspectral (2)</b> 2015, 2017	<b>Uncertainties</b> 2015
<b>High Temporal/Spatial Resolution (4)</b> 2013, 2015, 2015, 2019	<b>R2O (2)</b> 2013, 2019	<b>Water Quality</b> 2015
<b>Sensor Calibration (3)</b> 2013, 2015, 2019	<b>File Formats &amp; Open Source Tools (2)</b> 2013, 2019	<b>Multi-water Algorithms</b> 2017
<b>Vicarious Calibration (3)</b> 2013, 2017, 2019	<b>Emerging New Technology (2)</b> 2017, 2019	<b>Carbon from Space</b> 2017
<b>Atmospheric Correction (2)</b> 2013, 2017, 2019	<b>Ecosystems &amp; Climate Change (2)</b> 2013, 2015	<b>Training &amp; Outreach</b> 2013
<b>Protocols (2)</b> 2013, 2017	<b>High Latitudes (2)</b> 2015, 2017	<b>Multi-agency data sharing</b> 2013
<b>Optically Complex Waters (2)</b> 2017, 2019	<b>BGC-Argo</b> 2015	

## IOCCG Reports/WG

- Rep #12 Geostationary (2012)
- Rep #13 Mission Requirements (2012)
- Rep #14 Calibration (2014)
- Rep #15 PFTs (2014)
- Rep #16 Polar Seas (2015)
- Rep #17 Water Quality (2018)
- Rep #18 Uncertainties (2019)
- HABs WG/Report
- Modelling WG/Report #19 (2020)
- Vicarious Adjustment WG

## IOCS Break-Out Groups

- PFTs (4)
- High Temporal/Spatial Resolution (4)
- Sensor Calibration (3)
- Vicarious Calibration (3)
- Atmospheric Correction (2)
- Protocols (2)
- Optically Complex Waters (2)
- Hyperspectral (2)
- R2O (2)
- File Formats & Open Source Tools (2)
- Emerging New Technology (2)
- Ecosystems & Climate Change (2)
- High Latitudes (2)
- Uncertainties
- Water Quality
- Multi-water Algorithms
- Carbon from Space
- BGC-Argo
- Multi-agency data sharing
- Training & Outreach

## Other IOCCG Activities

- TR1: AC in Optically-Complex Waters
- Protocol Series
- Task Force: Satellite Sensor Calibration
- New Task Force: Hyperspectral
- Carbon Special Issue
- Summer Lecture Series & Training Courses

