



NP-EMD.09.XXX.XXXX

NGAS Cal/Val Plans

(Status Update)

Ocean Color
2010_03_24

Sid Jackson & Patty Pratt
NPP System Performance &
Ocean CalVal

Outline



- Current Tasks -NGAS Tools for Ocean Color Lead
- Common Tool Tasks
- CalVal Tasks Status
- Algorithm Updates Status
- Government Inputs
 - Validation Data
 - Vicarious Calibration
- Summary

Current NGAS CalVal IMS Tasks (16299-16303) support ICV Review



- **05/19/2010 (base line finish date)**
 - **Polarization Verification Tools**
 - Ops-Algorithm Test Environment – ADA/NSIPS (Under Development)
- **07/27/2010**
 - **H-BRDF Tools**
 - Couples with atmospheric RTM (e.g., 6SV) to create ocean-atmosphere TOA radiances
 - Includes real data and models for ocean bio-optical properties
 - Provides integration tool for Optical Closure
 - Can isolate errors or fill in a realistic range of values for missing data
 - HydroLight 5.0 (In-house; Developed by Sequoia Scientific Inc.)
- **10/01/2010**
 - **Biogeochemical Optical Analysis Tools (BOAT)**
 - Archive
 - Current Climatology (expected values from selected sites)
 - In-situ Data (from priority sites SPG, Lucinda Jetty, MOBY site, Bermuda)
 - Satellite sub-granules
 - Analysis Tools (IDL)
 - Tools to automate Inputs to HydroLight, H-BRDF, NSIPS
 - HDF5 Tools Collection

Note: ICV Review = Launch-3mos & in replanning based on new launch date

Common Tasks Requirements “Partial” List

NPP Cal/Val Common Tools



- NSIPS Sub-granule Capture Tool
- Multi-granule Composite Tool
 - Anomaly resolution Reprocessing
- Overlapping Detectors Tool
- Others?
 - Currently exploring various tools that will benefit Ocean Color and other products

CalVal Tasks Status



- **“Technically” working Polarization Verification (start date 03-17-2010)**
 - Includes
 - functionality tasks for NSIPS automatic generation
 - performance verification with Global Synthetic Data (GSD)
 - Due to launch slip, priority tasks for VIIRS SDR took precedence for last 3 months
 - Only minimal efforts were delegated to EDR CalVal

- **IMS Task Re-plan could include**
 - changing dates to bring H-BRDF forward
 - May be beneficial to team members who want a BRDF with in-situ data
 - moving polarization verification due date out
 - May not be necessary to complete this year
 - Adding more tasks for BOAT based on new Val sites
 - ex. SeaPrism expansion creates more tasks

- **Recent Algorithm Updates support many on-orbit OC calibration tasks**
 - 1. Created polarization LUT from F1 test data
 - 2. Implemented detector dependent polarization correction in ACO code
 - 3. Delivered RSRs to Mengua Wang to use in the generation of the Rayleigh LUT (RSRs may be updated based on the T-SIRCUS test data)
 - 4. Computed Rayleigh reflectance detector dependent gain corrections using current RSRs. Not yet implemented in the code (may not be required based on the T-SIRCUS test data)
 - 5. Currently implementing and evaluating the effect of gaseous absorption to include ozone (currently in code), water vapor and constant species gases (O₂ impacts M6). Band dependent coefficients have been computed using current RSRs.

Needs from Government Ocean Color Team (1/2)



- **Vicarious Calibration values that are optimized for the VIIRS algorithms**
 - Comprised of seven coefficients (band dependent)
 - Applied to TOA
 - » Currently in existing operational algorithm
 - The vicarious calibration numbers must be computed for VIIRS algorithms
 - Currently, the default algorithm is changing to OC3V (OC3M equivalent)
 - » New change includes switch to use default algorithm
 - Additional algorithm is existing Semi-Analytical Algorithm
 - Expected time line for VC numbers
 - 3 times during the first year of life/data
 - 3 additional checks on the order of annually to 18 month intervals
- **Vicarious Calibration values must be computed from data in open ocean waters**

Needs from Government Ocean Color Team (2/2)



- **Correlative Validation Data to be delivered via NRL Team**

- Stationary/semi stationary site data (Sea Prism, BBOP, HICO, etc)
- Cruise of opportunity data
- Needs (from mostly open-ocean sites)
 - Chlorophyll Concentrations
 - Inherent Optical Properties (absorption & scattering)
 - Water-Leaving Radiance
 - Other *in-situ* data (humidity, cloud cover, pressure, wind speed, SST, AOT)
- Known Sites

Data	Demo Use	Sensor	SDR/EDR	EDRs
SeaBASS	Y	V	E	OC
Aeronet / SeaPrism	Y	V	E	OCC,AOP
MOBY	Y	V	E	OCC
MERIS	N	V	E	OC
OCC Vicarious Calibration	N	V	E	OCC
BOUSSOLE	N	V	E	OCC
GHRSSST	N	X	E	AVxP, OCC

- **NGAS IMS Task Plans**

- Verify Ocean Color performance against System Spec Requirements
 - Data archived in multi-task tool BOAT
- Verify the polarization characterization of the VIIRS sensor
 - Develop automated processing in conjunction with NSIPS/ADA common tools developers
- Work with the OCC Community in utilizing H-BRDF to provide optical closure for validation at *in-situ* sites

- **NGAS baseline finish dates of CalVal Tasks are currently being re-planned based on re-scheduled launch date**

- **Algorithm updates are in place for polarization and RSR LUT**

- New default algorithm OC3V is approved

- **NGAS needs Government Inputs**

- Vicarious Calibration values that are optimized for the VIIRS algorithms
- Correlative validation data includes open-ocean data needs

Backup Charts

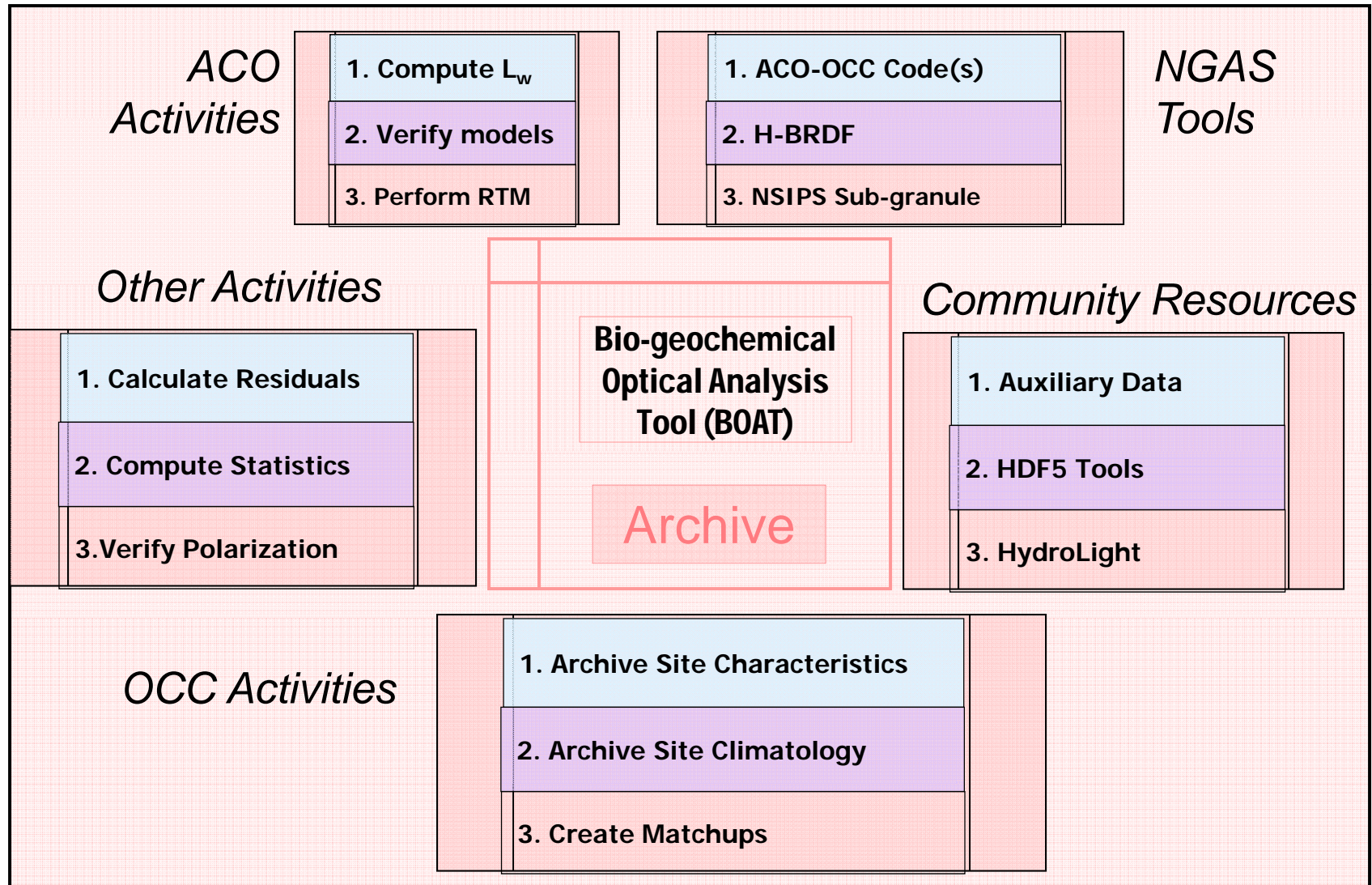
Benefits of Using H-BRDF



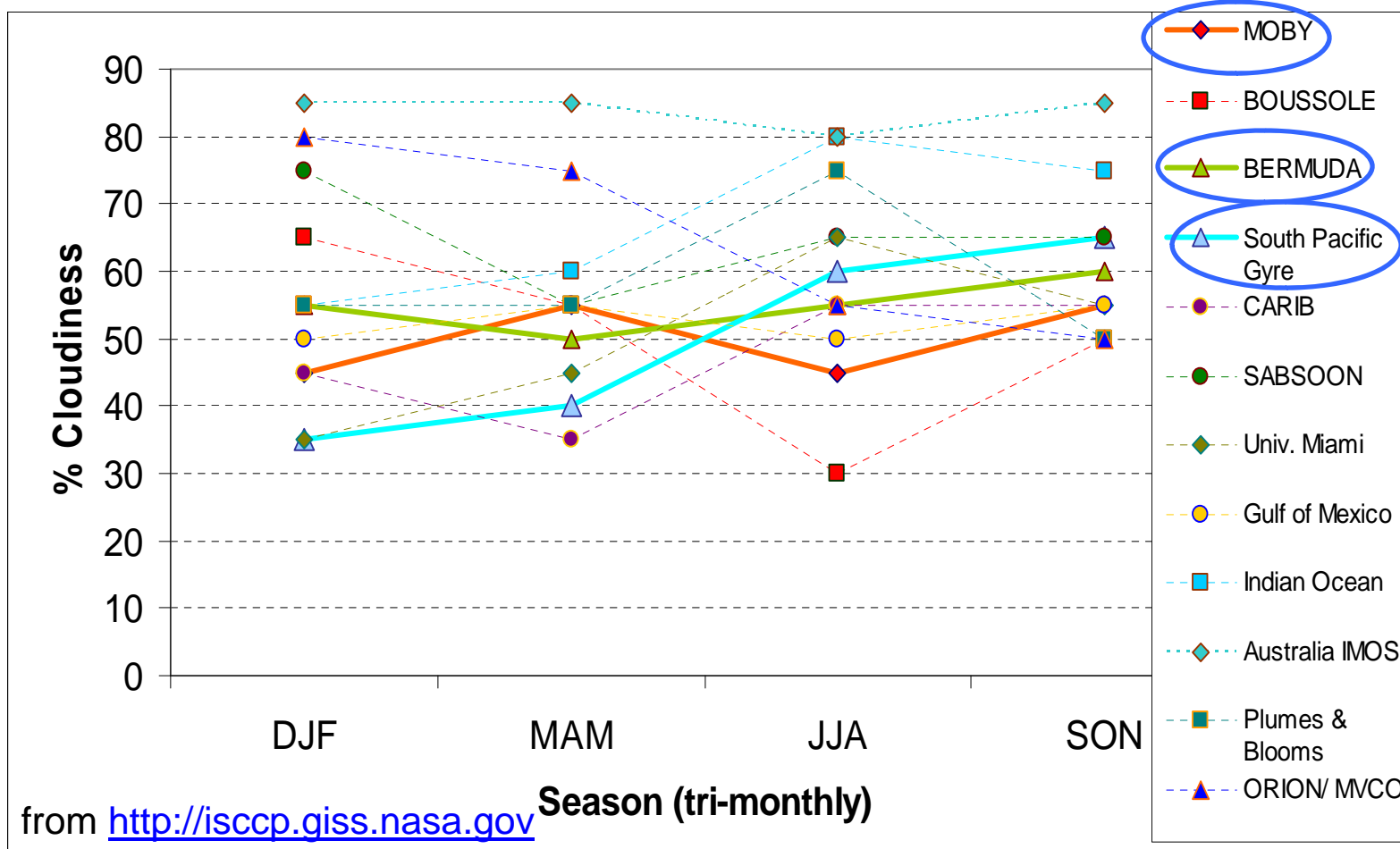
- HydroLight-BRDF is an extension of the water RTM found in HydroLight except that it can produce a BRDF allowing for greater function
- H-BRDF creates a BRDF from the in-water properties, either modeled or measured
 - Models of various functions are contained in both HydroLight and H-BRDF that are well known and used in a broad community
 - H-BRDF also contains a set of measured in-water properties that includes a realistic set of natural variations for determining ranges of unknown properties
 - Rrs can be calculated at the surface with measured E_d and compared to the satellite retrieval
- Broad comparisons can be made between any two sensors
 - *In-situ* measurements can be compared to any satellite for any geometry
 - For stable atmosphere and water, the window for simultaneous observation is increased; this potentially expands the constraints of the current protocol for collecting Vicarious Calibration data
 - Both the sensor specifications (e.g. specific bandpasses) and solar geometries can be eliminated leaving an optimized comparison
 - H-BRDF coupled with any atmospheric RTM allows for comparisons to be made at various altitudes, from at the surface to airborne sensors to TOA
- Both HydroLight and HBRDF can be used to isolate various components
 - This allows quality checks for verifying individual components
 - Missing data can be computed from actual data providing realistic results allowing utilization of “in complete” cruise data

Optical Closure with H-BRDF will be used to the performance of OC EDR's

BOAT Provides an Integration Tool for Various Activities and Databases

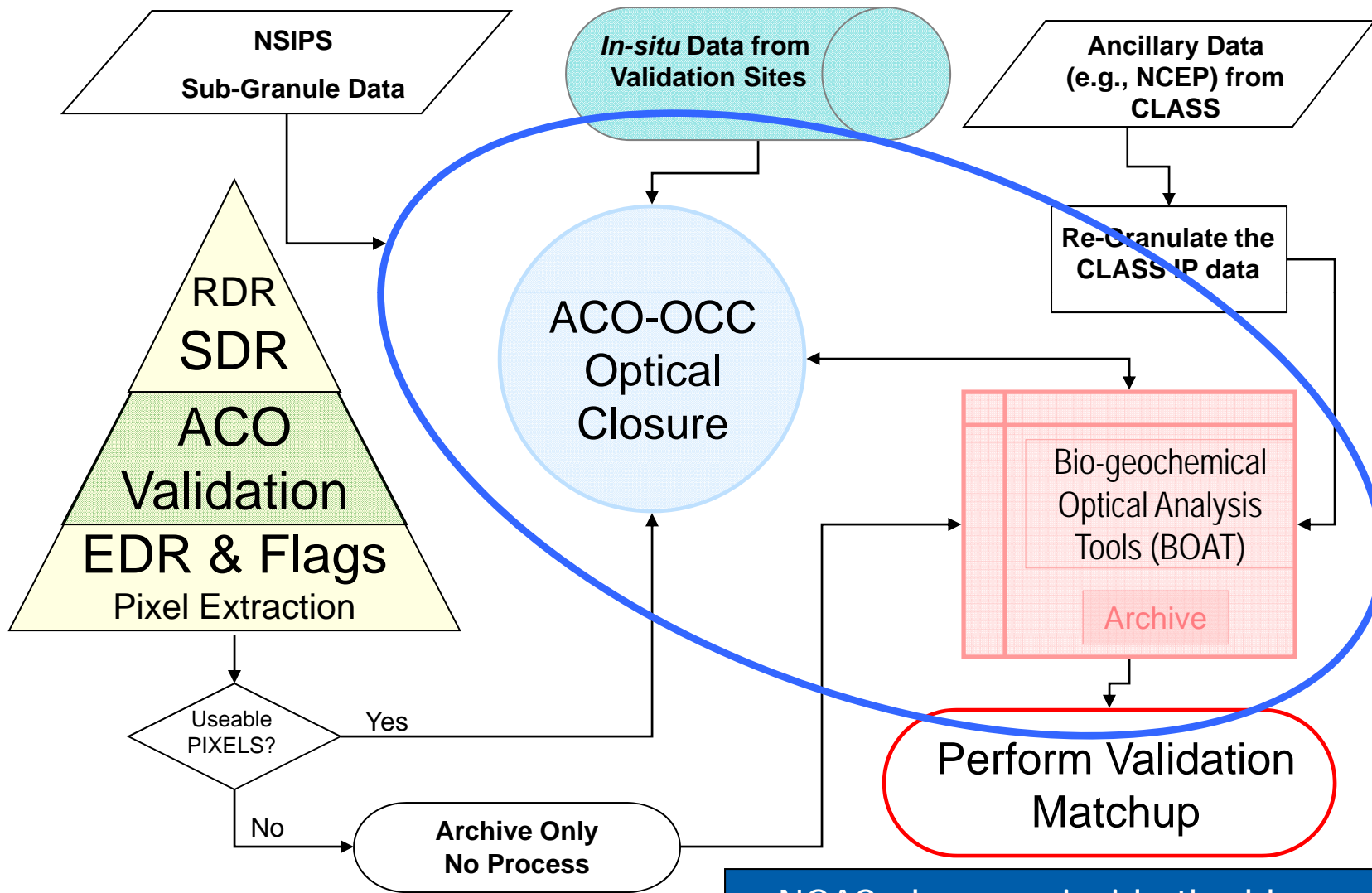


In-situ Sites (Seasonal Outlook) for Potential Matchups



Pending availability, NGAS can access these data through common websites or acquire through NPP/NRL OC Lead (needs update with Lucinda Jetty info)

Planned Validation Activities Leading to ACO-OCC Optical Closure

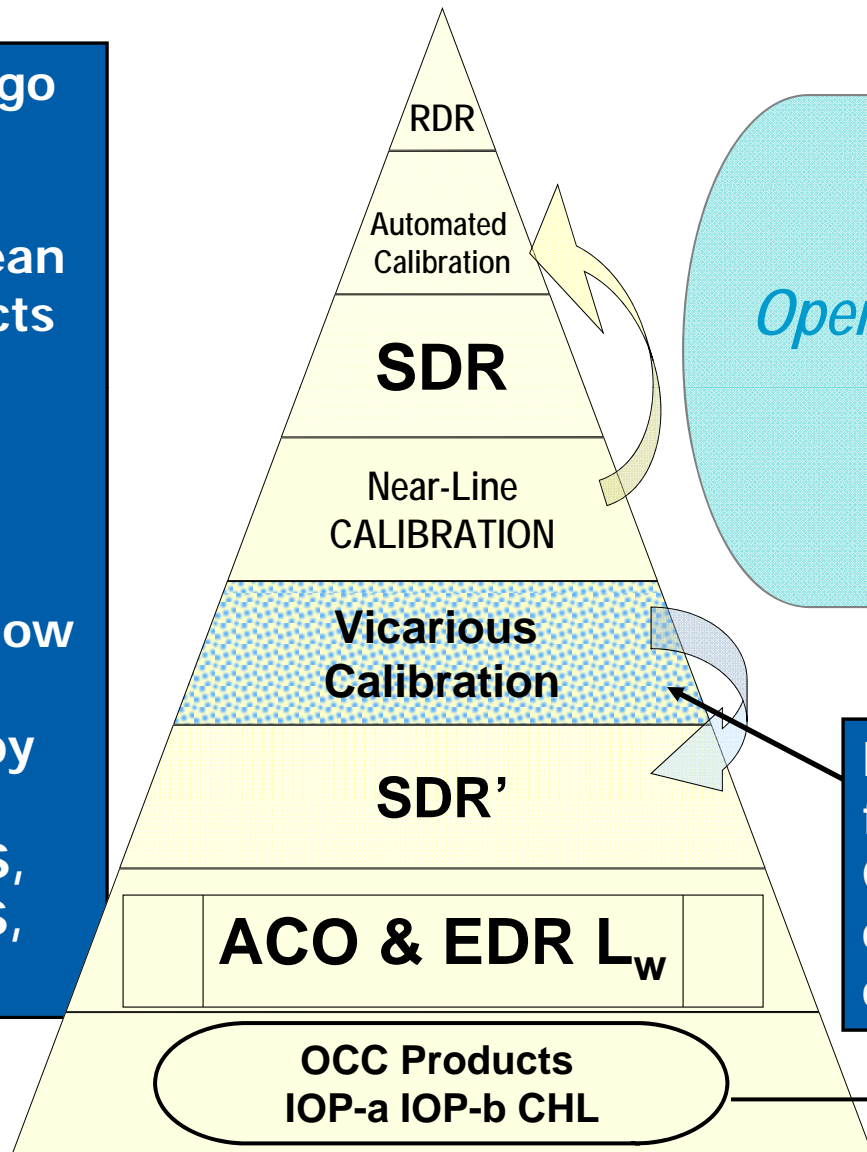


NGAS plans are inside the blue oval

NGAS CalVal Would Like to Leverage Validation Data Collected by Gov't Teams

Many steps go into the process of creating ocean color products involving a broad spectrum of teams.

Steps in yellow will be completed by the various teams: IDPS, NASA, NGAS, NSIPS, etc.



Validation Data:
 Chlorophyll
 Open Ocean Cruise Data
 In-situ IOP-a
 In-situ IOP-b
 In-situ L_w

NGAS "leverage needs" from Government CalVal OC Lead &/or community are in colored in turquoise

NORTHROP GRUMMAN

