The Landsat Data Continuity Mission

An increased potential to contribute to great lakes water resource assessment

Rochester Institute of Technology

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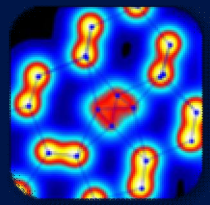
Sponsored

by

United States Geological Survey



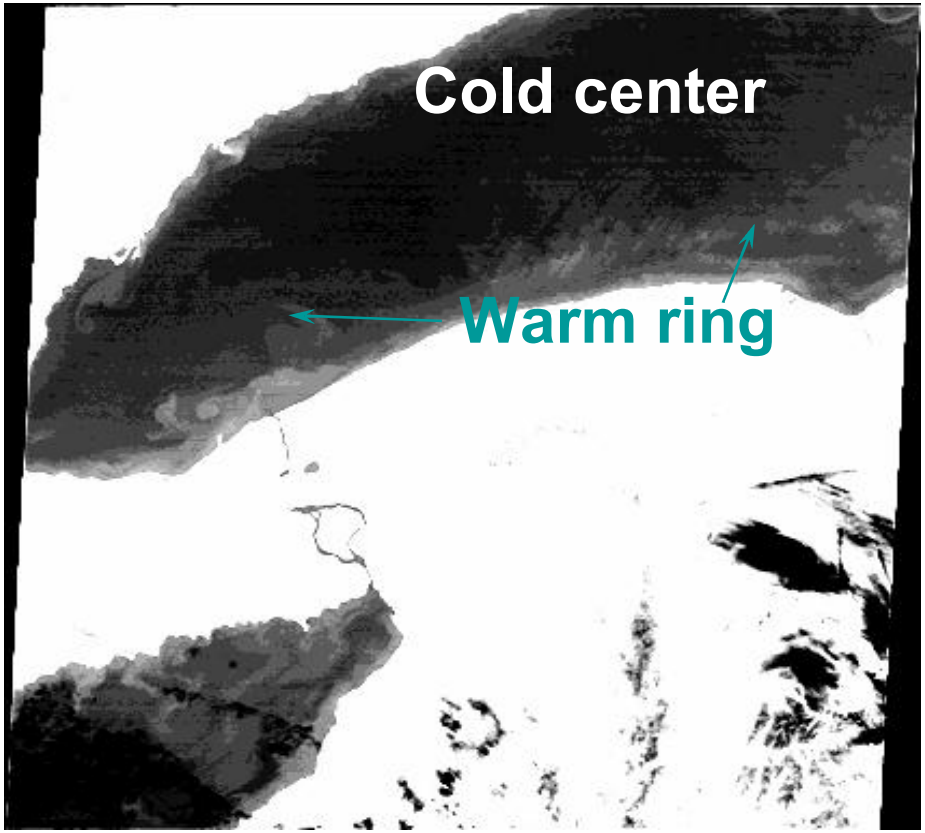
Digital Imaging and Remote Sensing Laboratory

Chester F. Carlson Center for Imaging Science

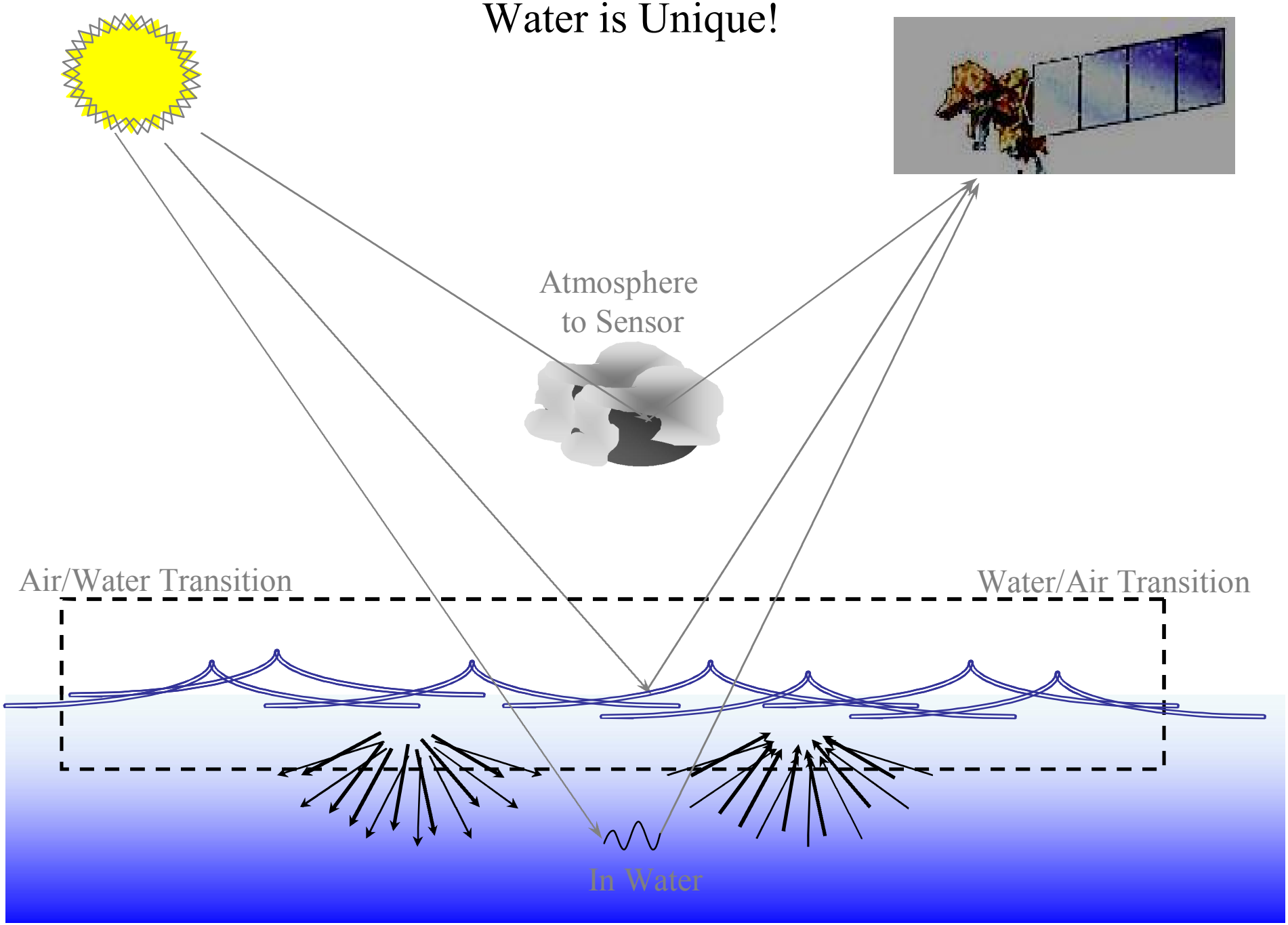
LANDSAT SCENE

True Color Composite

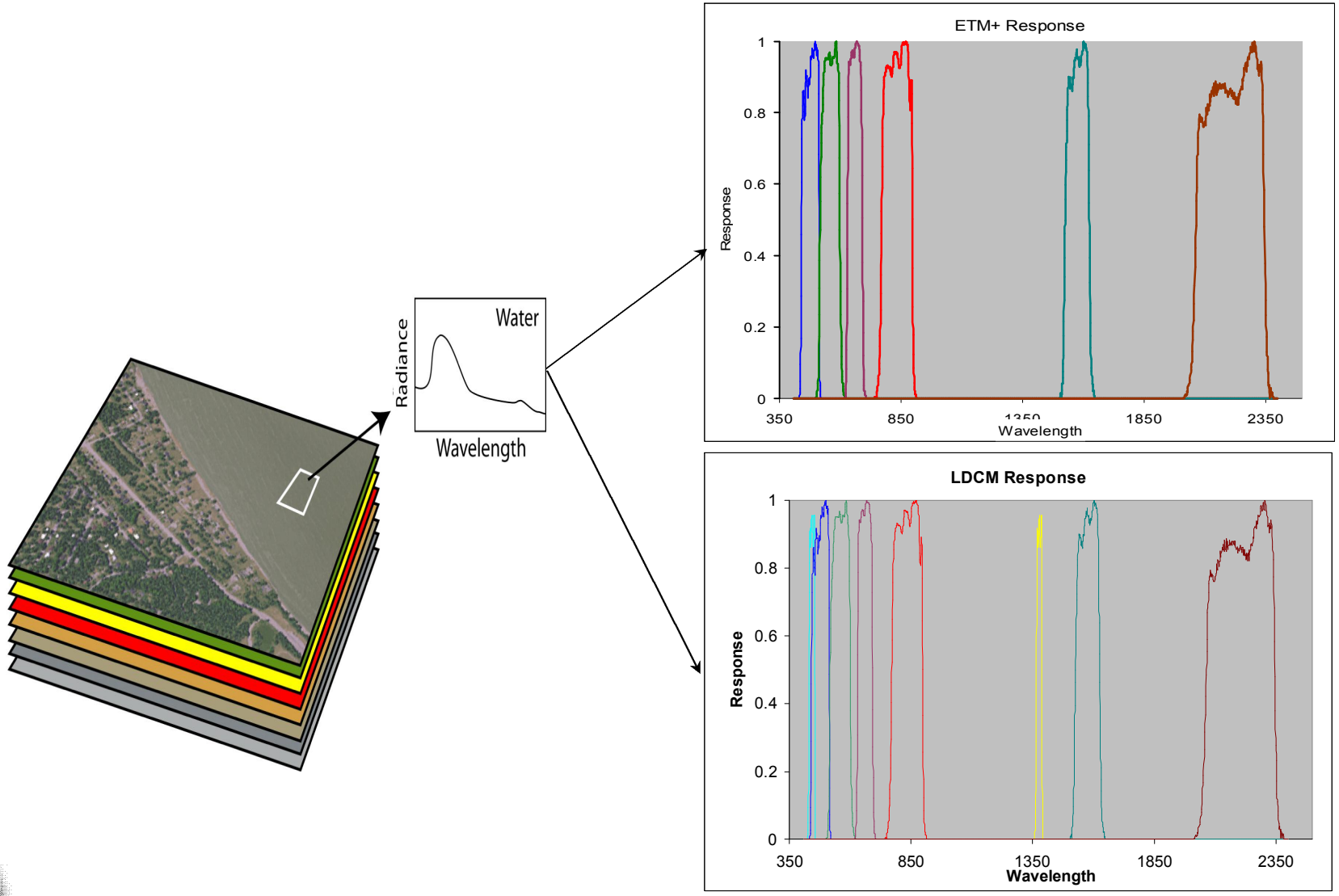
Thermal Channel



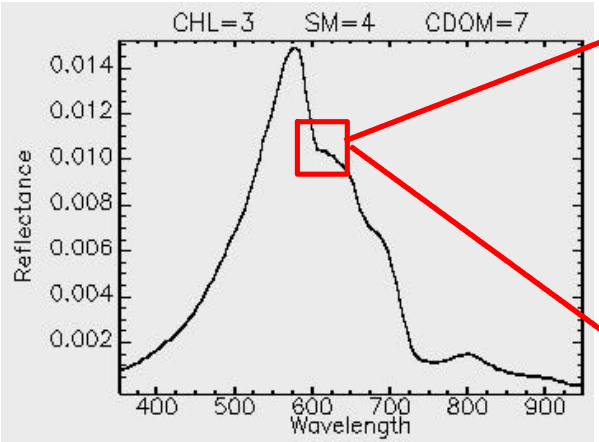
Water is Unique!



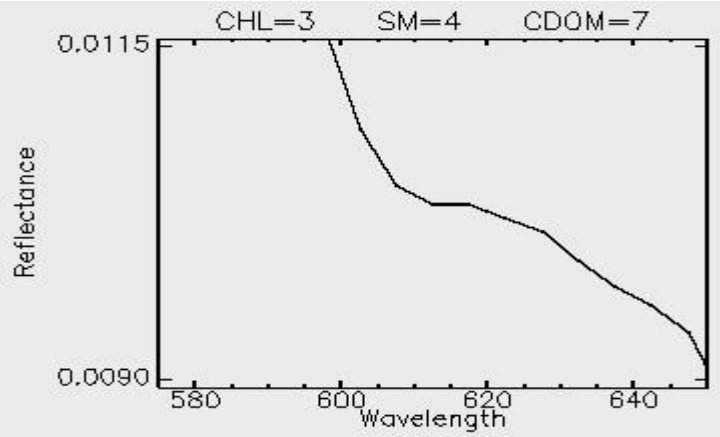
LDCM Features: Response



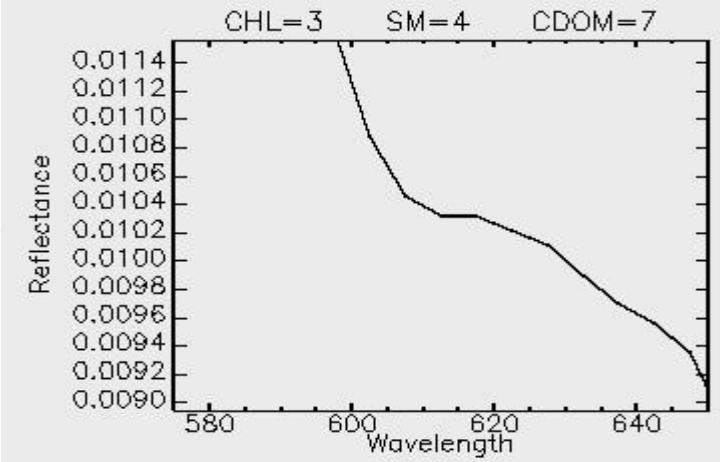
LDCM Features: Quantization



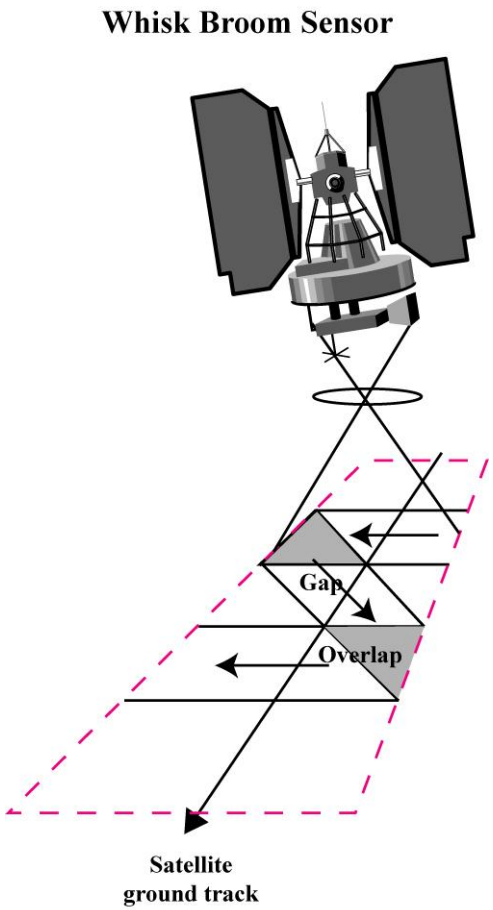
ETM+

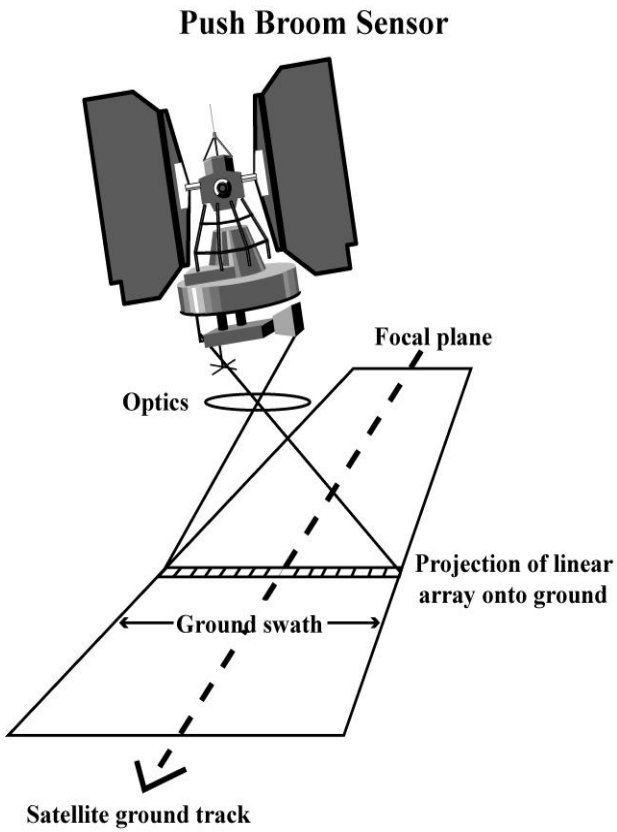


LDCM



LDCM Features: Signal to Noise

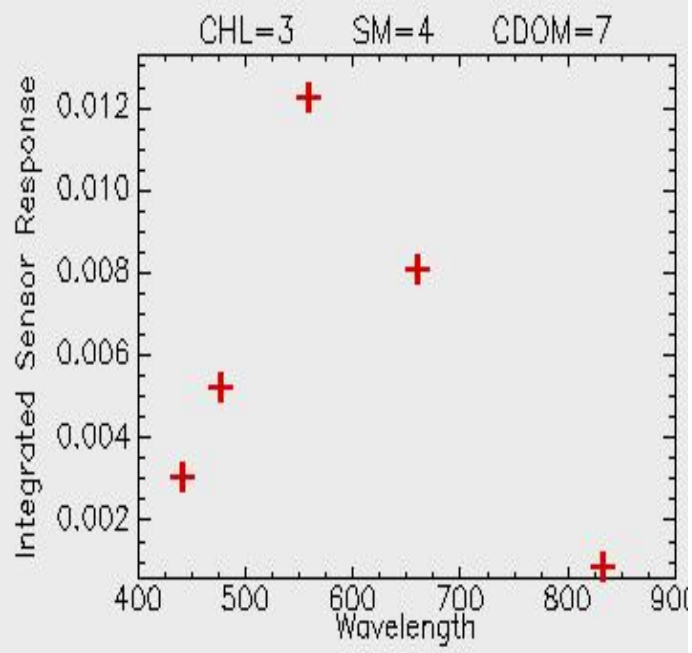




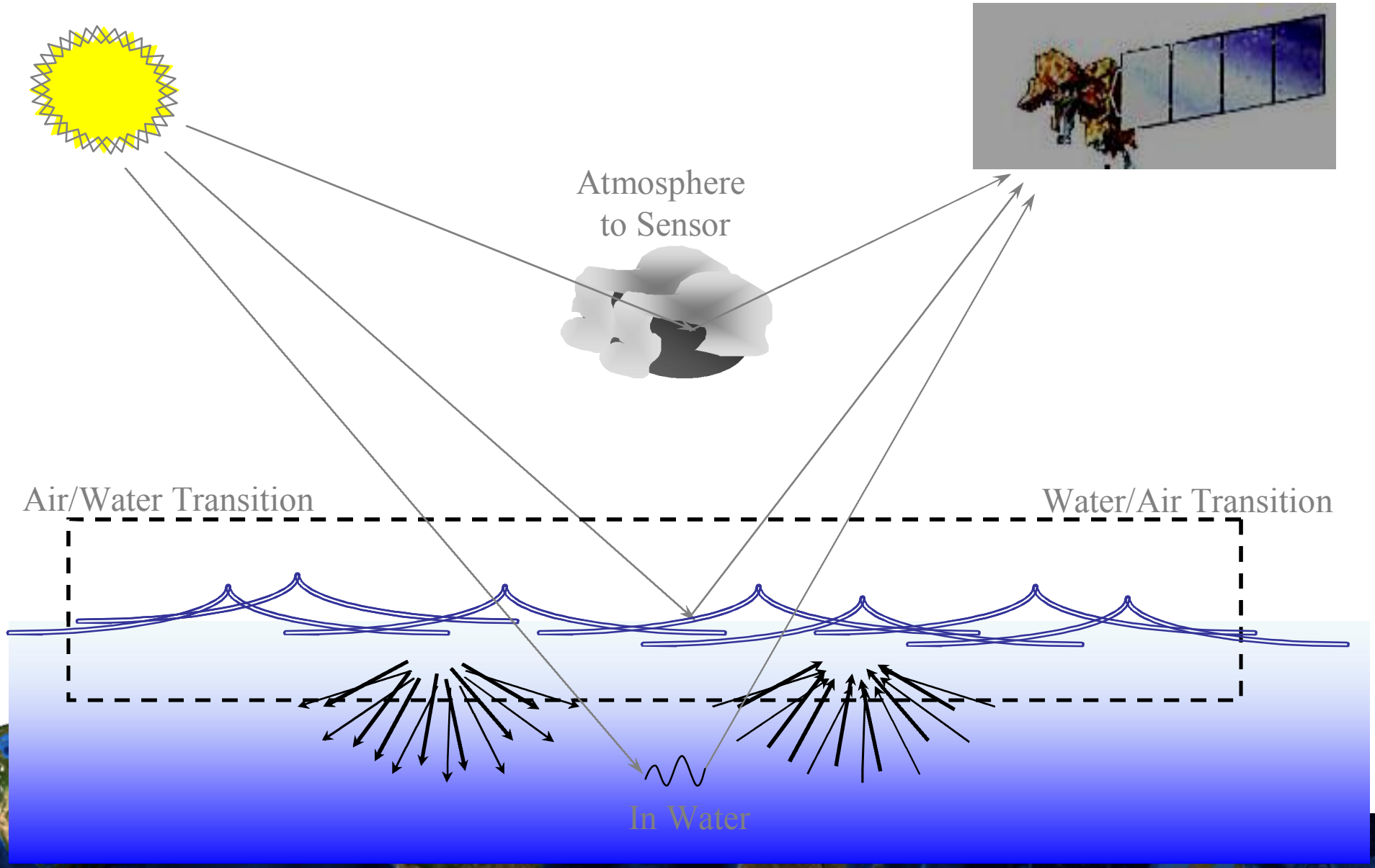
Modeling the Process

- Our job is to model the new features of LDCM.
- What do we gain from addition of …
  - blue band
  - 12 bit quantization
  - Pushbroom sensor
- Will LDCM be effective in constituent retrieval?

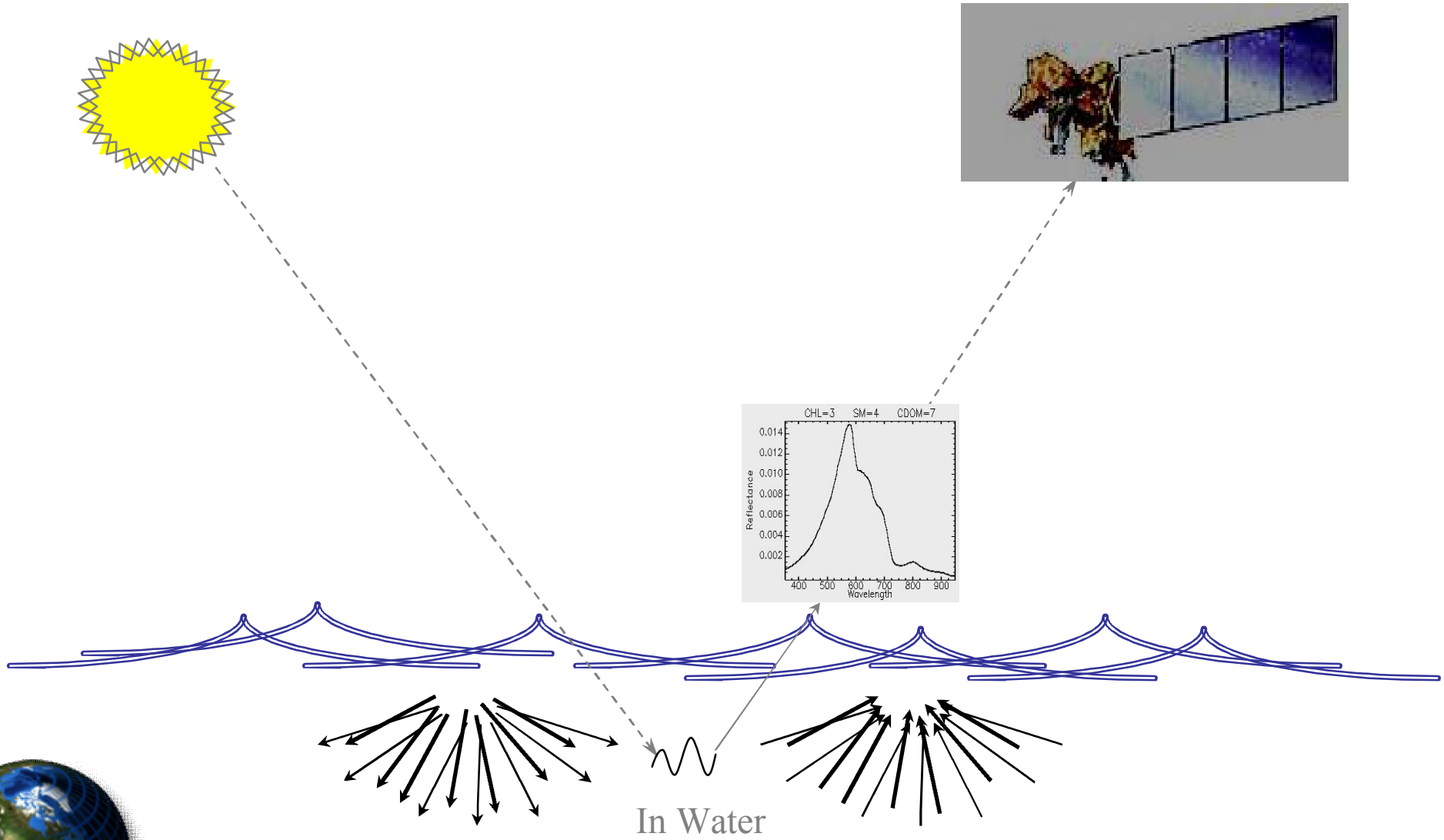
Modeling the Process



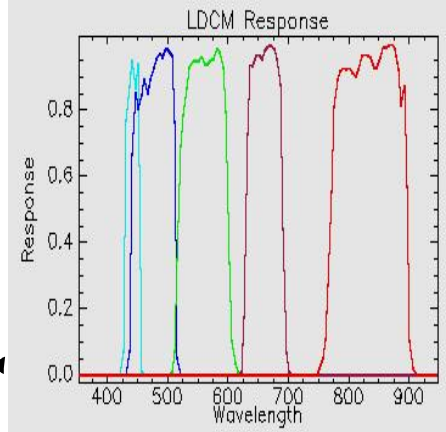
Modeling the Process

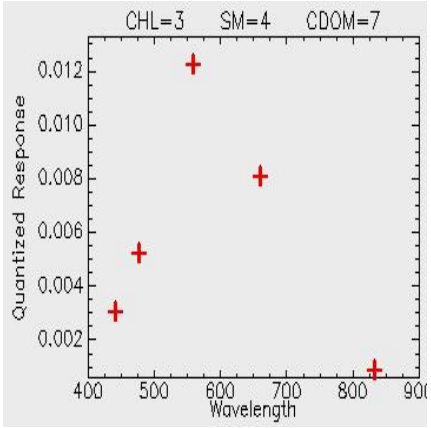


Modeling the Process: Hydrolight



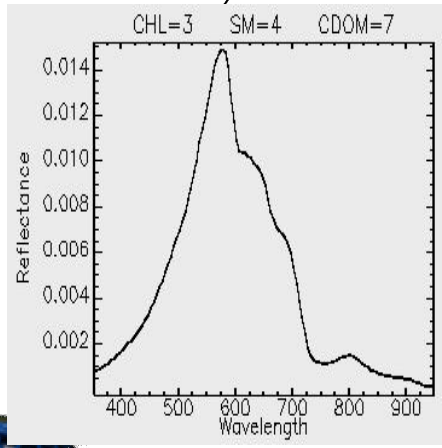
Modeling the Process: Resampling

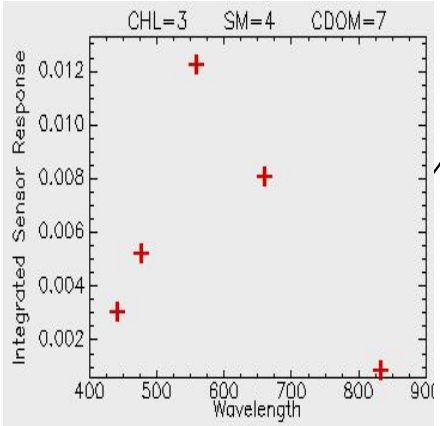




Resampling

Quantization

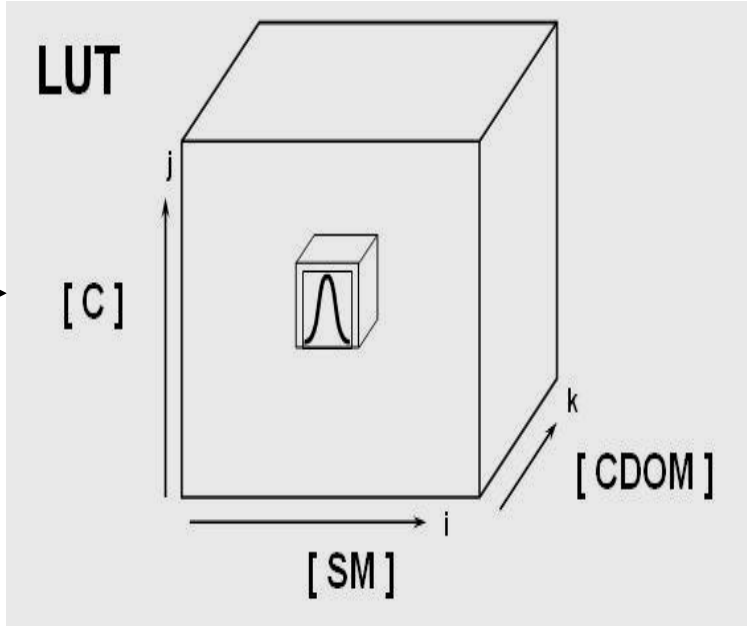




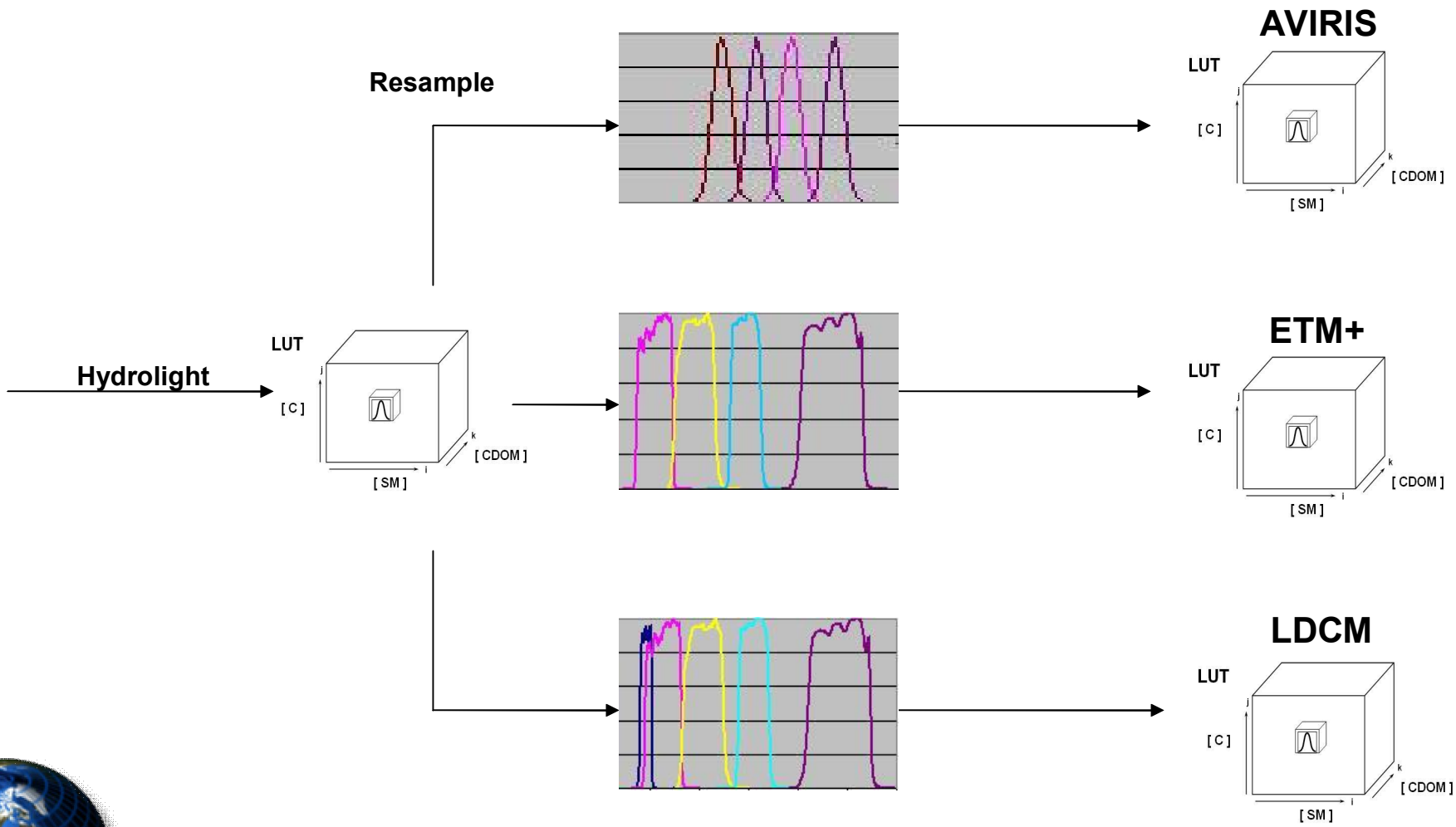
LUT Development

C	SM	CDOM
0	0	0
.5	.5	.5
1	1	.75
3	2	1
5	4	2
7	8	4
12	10	7
24	14	10
46	20	12
68	24	14

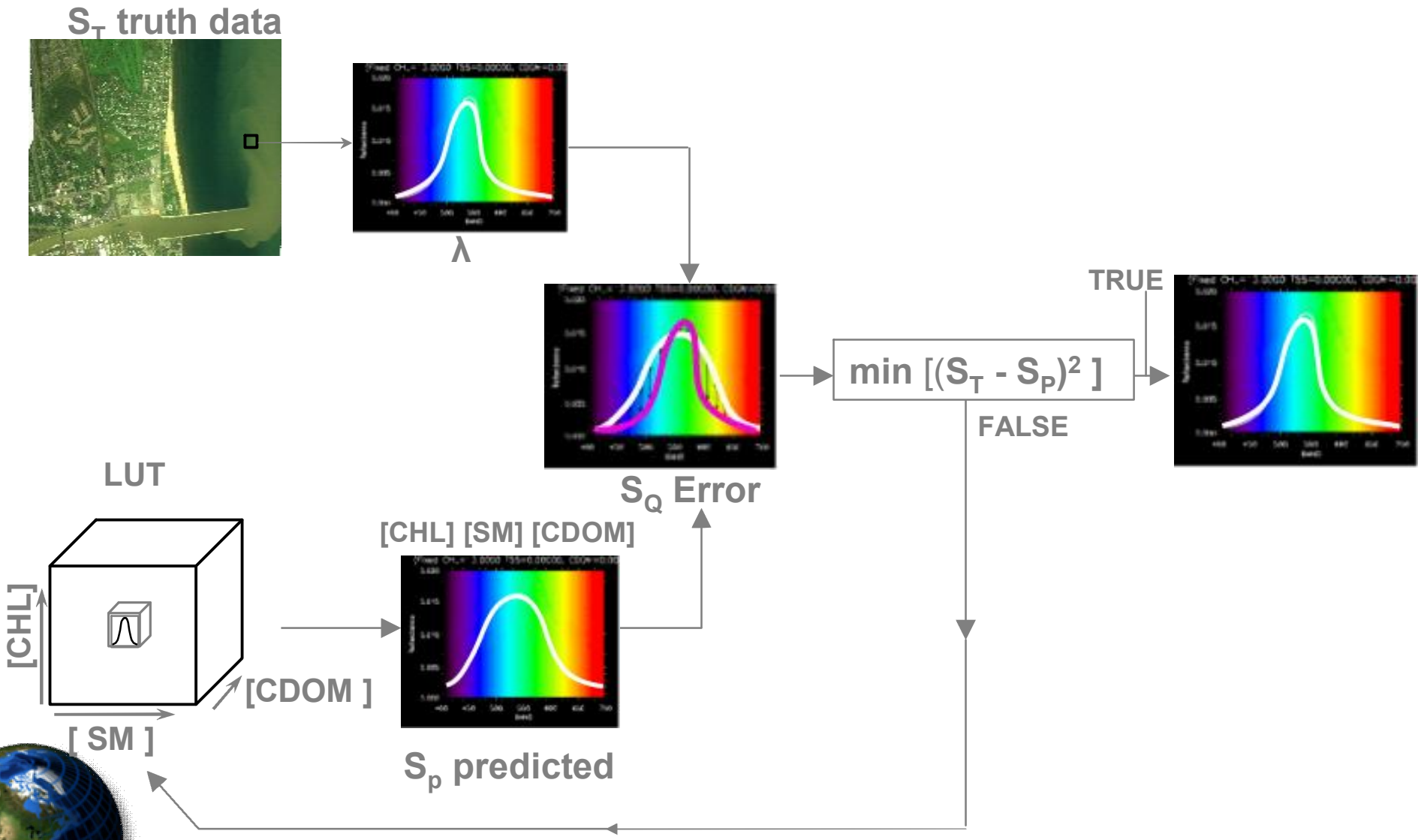
Hydrolight



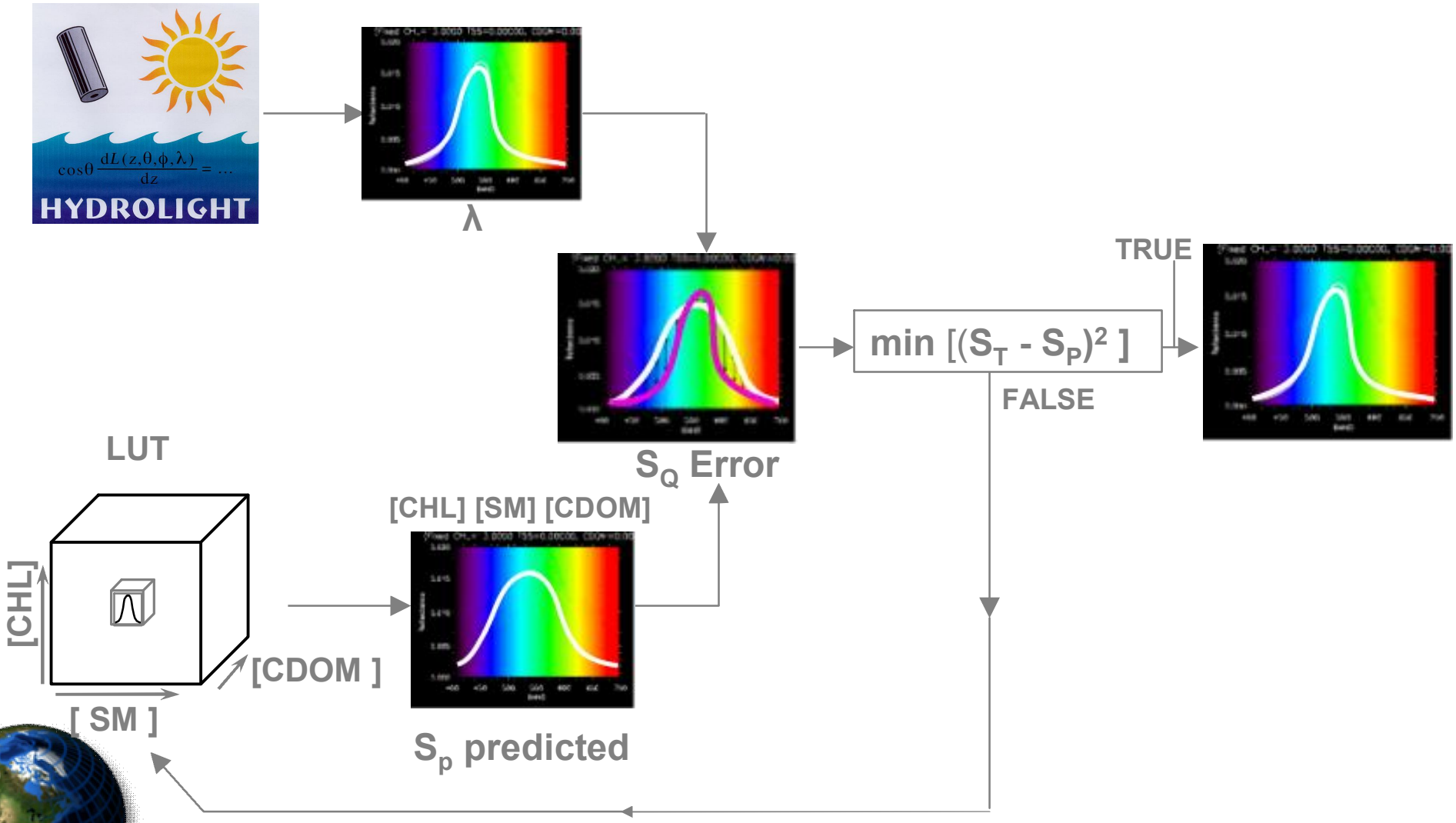
LUT Development



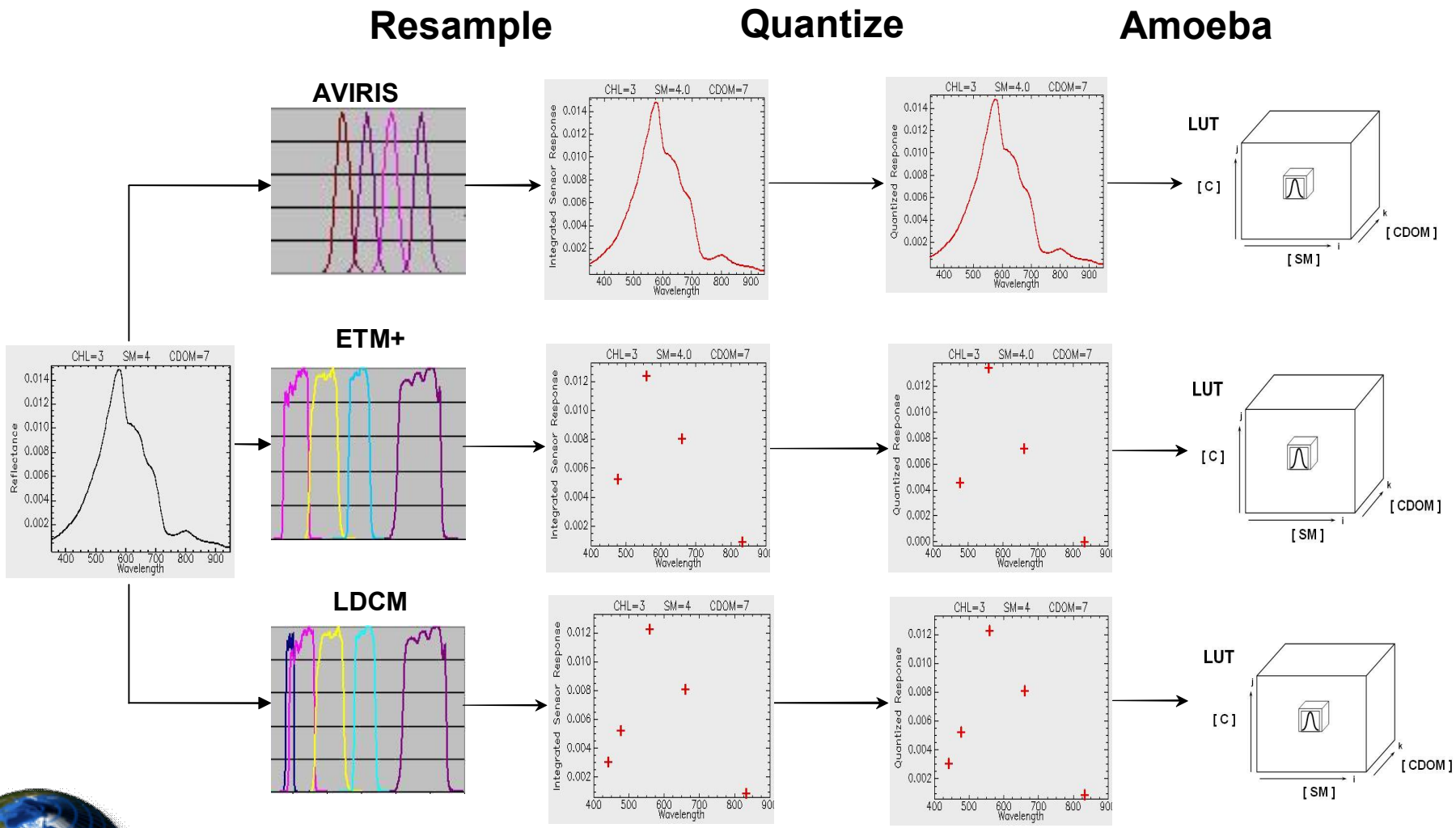
Interpolation Process



Interpolation Process



The Process


Resample
Quantize
Amoeba
AVIRIS
ETM+
LDCM
CHL=3 SM=4 CDOM=7
Reflectance
Wavelength
Integrated Sensor Response
Quantized Response
LUT
[C]
[SM]
[CDOM]

Results

RMS of Residual Errors

	CHL (μg/L)	SM(mg/L)	CDOM(1/m)
AVIRIS	0.5	0.1	0.1
ETM+	1.1	0.5	0.1
LDCM	1.1	0.1	0.1
ETM+ Quantized	5.7	2.7	1.8
LDCM Quantized	1.7	0.2	0.2

Results

RMS of Residual Errors

	CHL (μg/L)		SM(mg/L)		CDOM(1/m)	
AVIRIS	0.5		0.1		0.1	
ETM+	1.1		0.5		0.1	
LDCM	1.1		0.1		0.1	
ETM+ Quantized	5.7	**8.4%**	2.7	**11.3%**	1.8	**12.9%**
LDCM Quantized	1.7	**2.5%**	0.2	**0.8%**	0.2	**1.4%**

Expressed as percentages of total range of concentrations

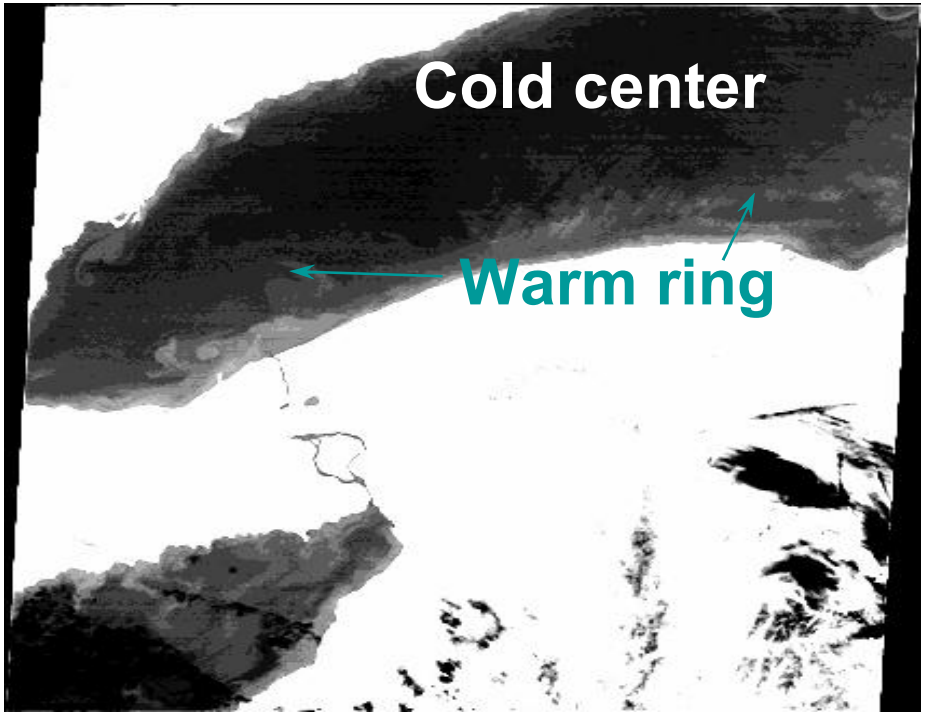
Conclusions

- Blue band contributes to retrieval of suspended materials.
- Major progress with addition of 12 bit quantizer.
- There is promise moving forward that LDCM will be effective in constituent retrieval.

Future Work

True Color Composite

Thermal Channel



- Add in LDCM and ETM+ sensor noise.
- How much is blue band contributing to atmosphere correction?
- Role of thermal band in predicting hydrodynamics of receiving water.