SPACE IMAGING™
Visual Information. Visible Results.

IKONOS
Radiometric Stability and Relative Calibration

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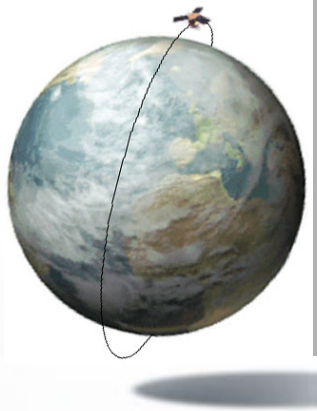
IKONOS Radiometric Stability Verification using Stellar Scene Data



- Stellar images have been collected at 3 annual intervals
- In 2002, 11 Stars have been collected
  - 7 Radiometrically characterized (Gunn & Stryker Catalog)
  - 4 Used during On-orbit Acceptance Testing (OOAT)

LMMS Priority #	1st Image Date	2001 Order	2nd Image Date	2002 Order	3rd Image Date	G&S#	Star Name	HIP#
2	7-Dec-99	5	13-Feb-01	4	30-Jan-02	7	Hya Eta-7	42799
11		15	17-Mar-01	10	22-Mar-02	83	Ras Alhague	86032
7	9-Dec-99	1	7-Feb-01	11	21-Feb-02	109	Tau Theta1-77	20885
4		7	15-Feb-01			118	LMi 46	53229
9		8	16-Feb-01			123	Crt Alpha-7	53740
13		14	3-Mar-01	7	1-Feb-02	127	UMa Psi-52	54539
12		13	2-Mar-01	9	22-Feb-02	134	Unukalhay	77070
5		2	8-Feb-01			135	Leo Mu-24	48455
8		6	14-Feb-01	5	31-Jan-02	142	Hya Iota-35	47431
10		3	9-Feb-01			149	CMa Theta-14	33160
15	9-Dec-99	4	9-Feb-01	3	30-Jan-02	150	Gem 81	37908
	20-Feb-00	9	17-Feb-01	6	31-Jan-02	OOAT1	Leo Epsilon-17	47908
	22-Feb-00	10	17-Feb-01	8	1-Feb-02	OOAT2	Zozca	54872
	18-Feb-00	11	1-Mar-01	2	29-Jan-02	OOAT3	Denebola	57632
	2-Feb-00	12	1-Mar-01	1	29-Jan-02	OOAT4	Gem Gamma-24	31681

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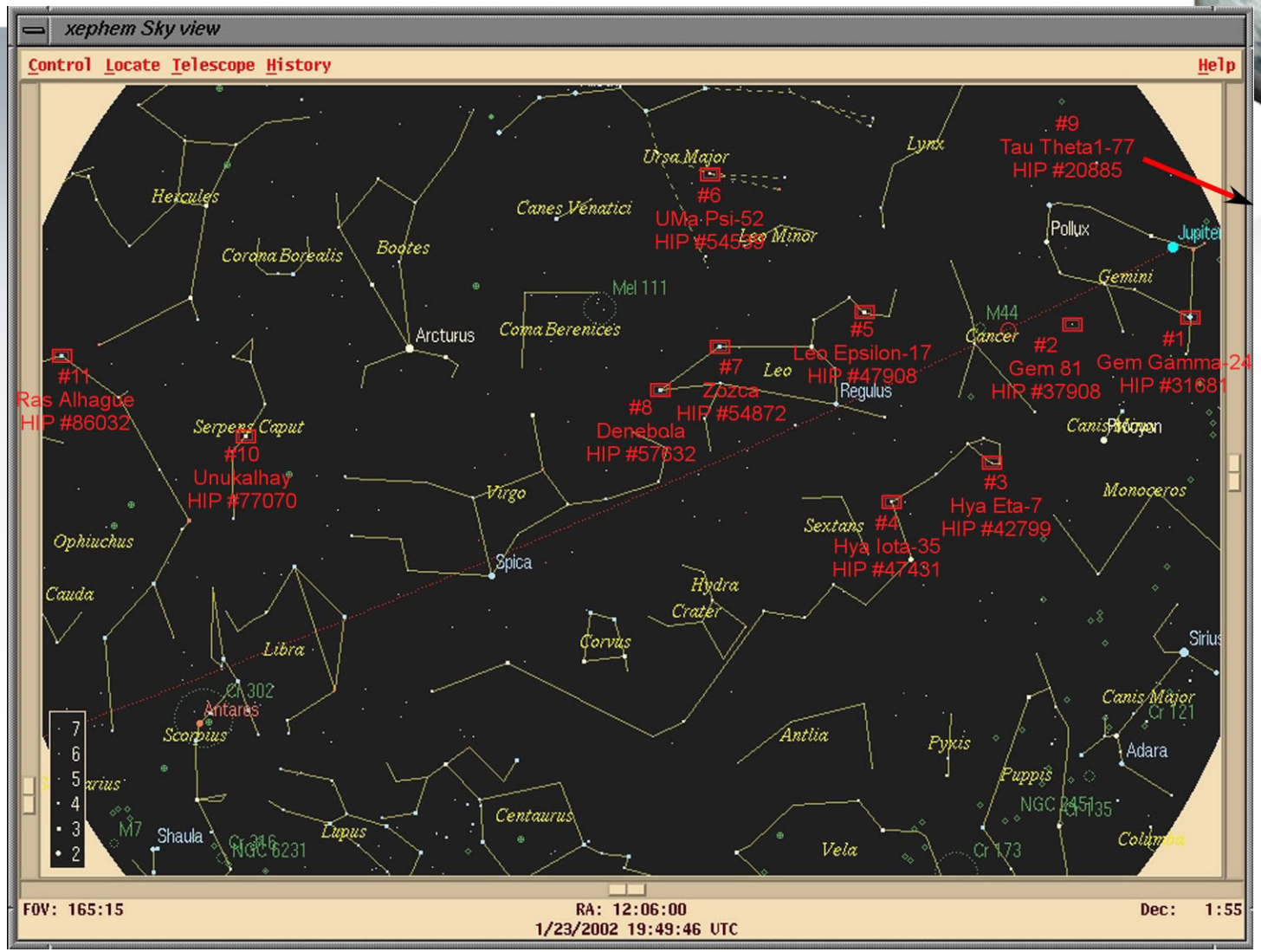
Celestial Stellar Imaging Scene



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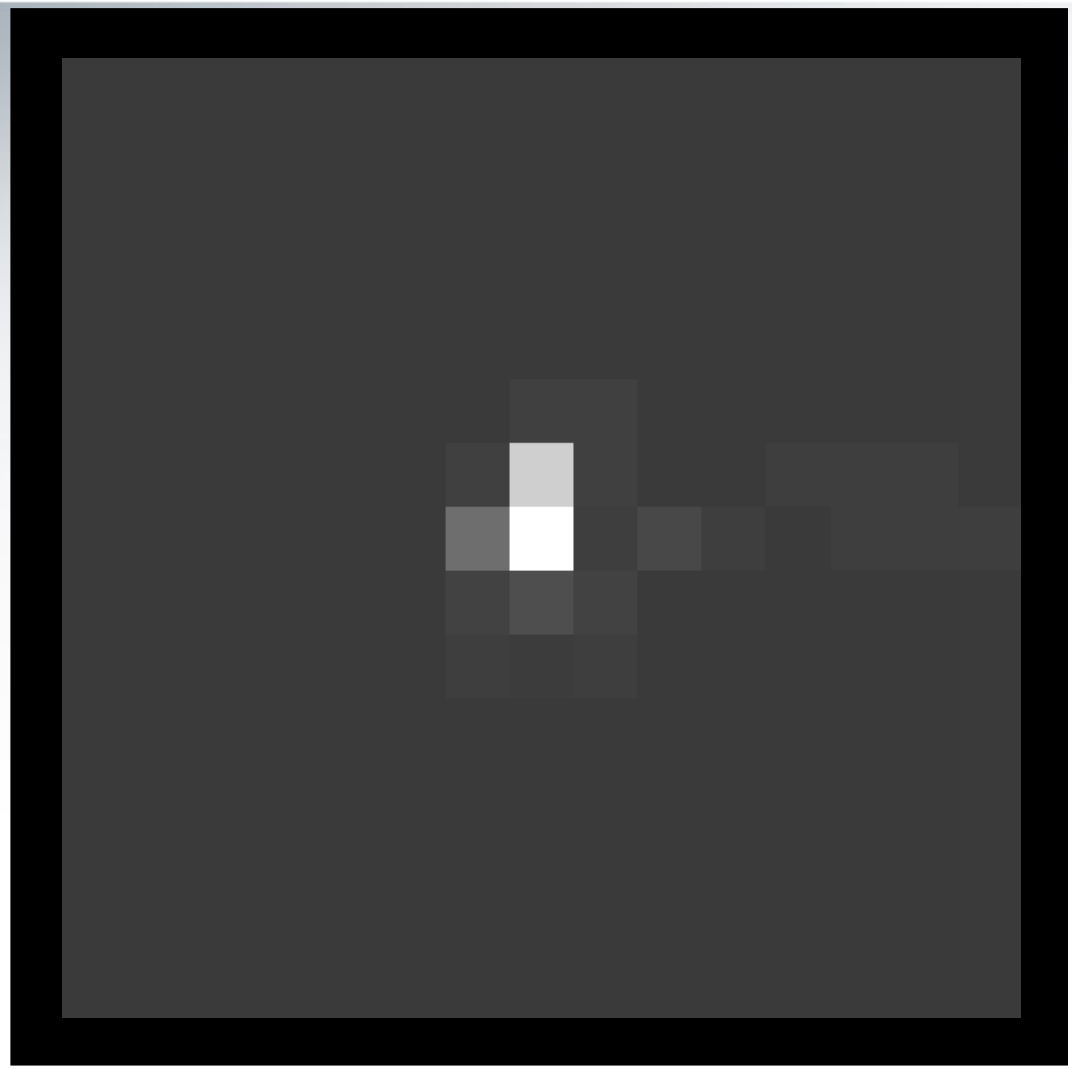
Tau θ2-77 Stellar Point Source (GRN)



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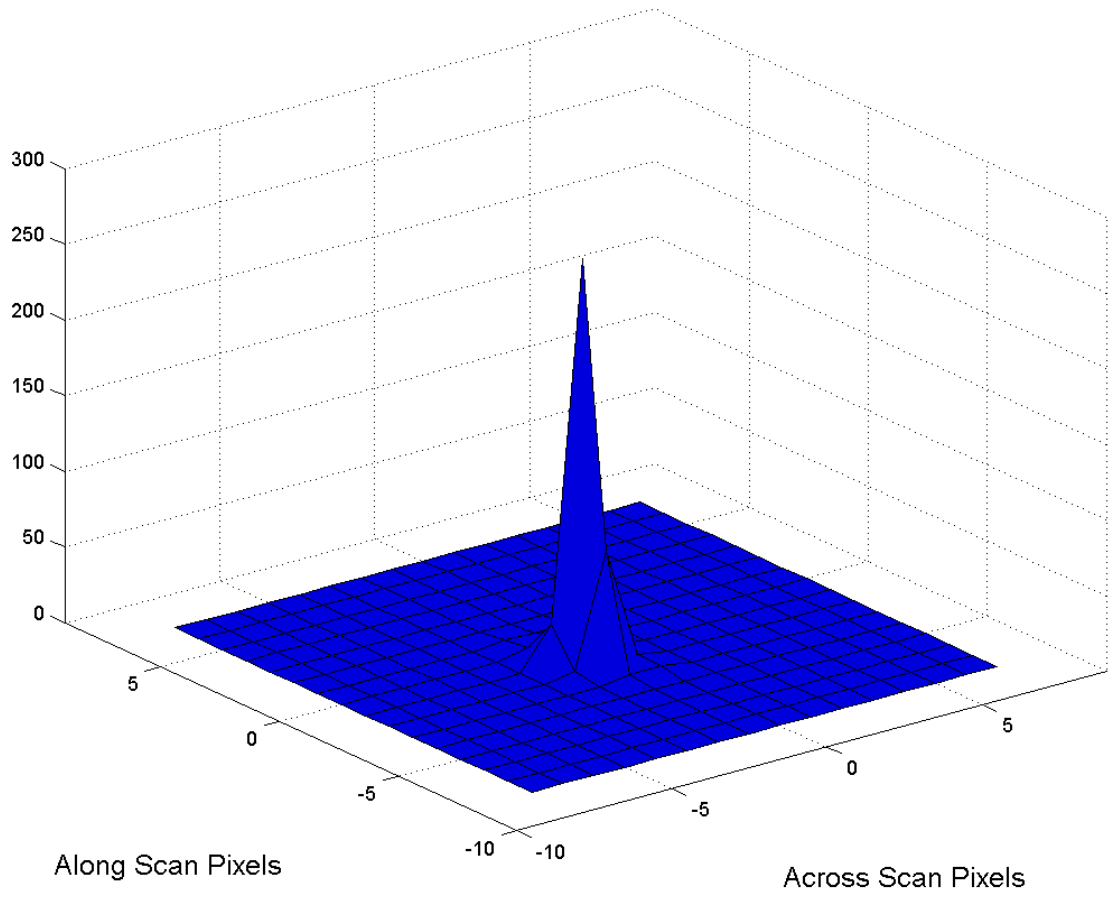
Visual Information. Visible Results.

Tau θ2-77 PSF (GRN)



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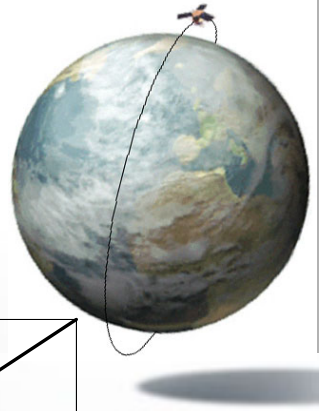
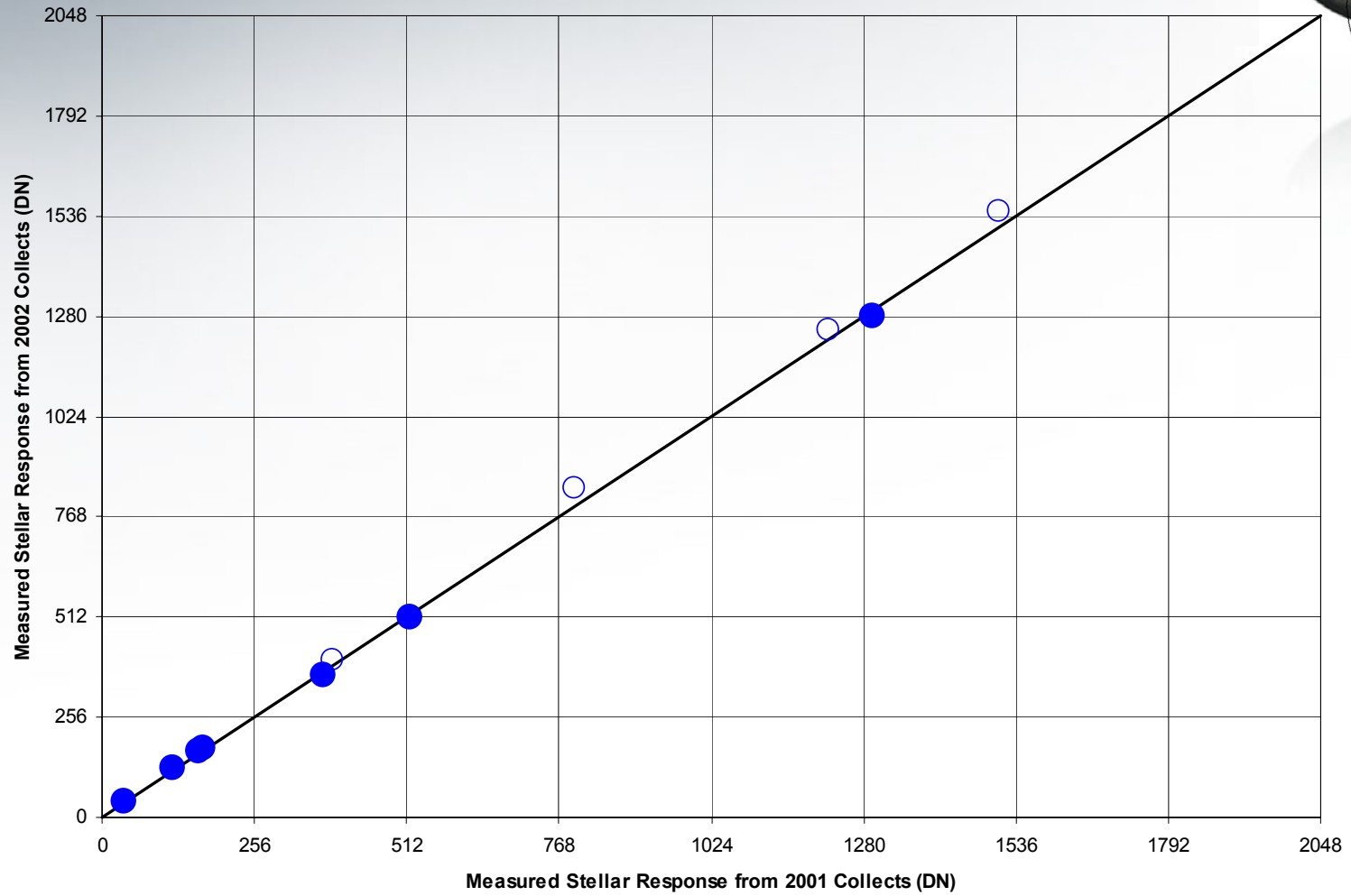
Visual Information. Visible Results.

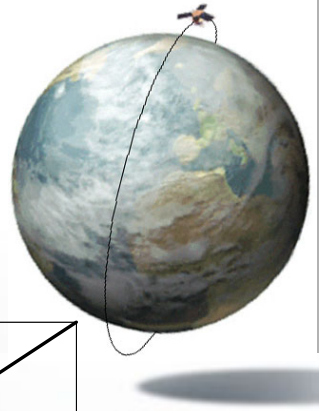
Blue Band 2002 versus 2001

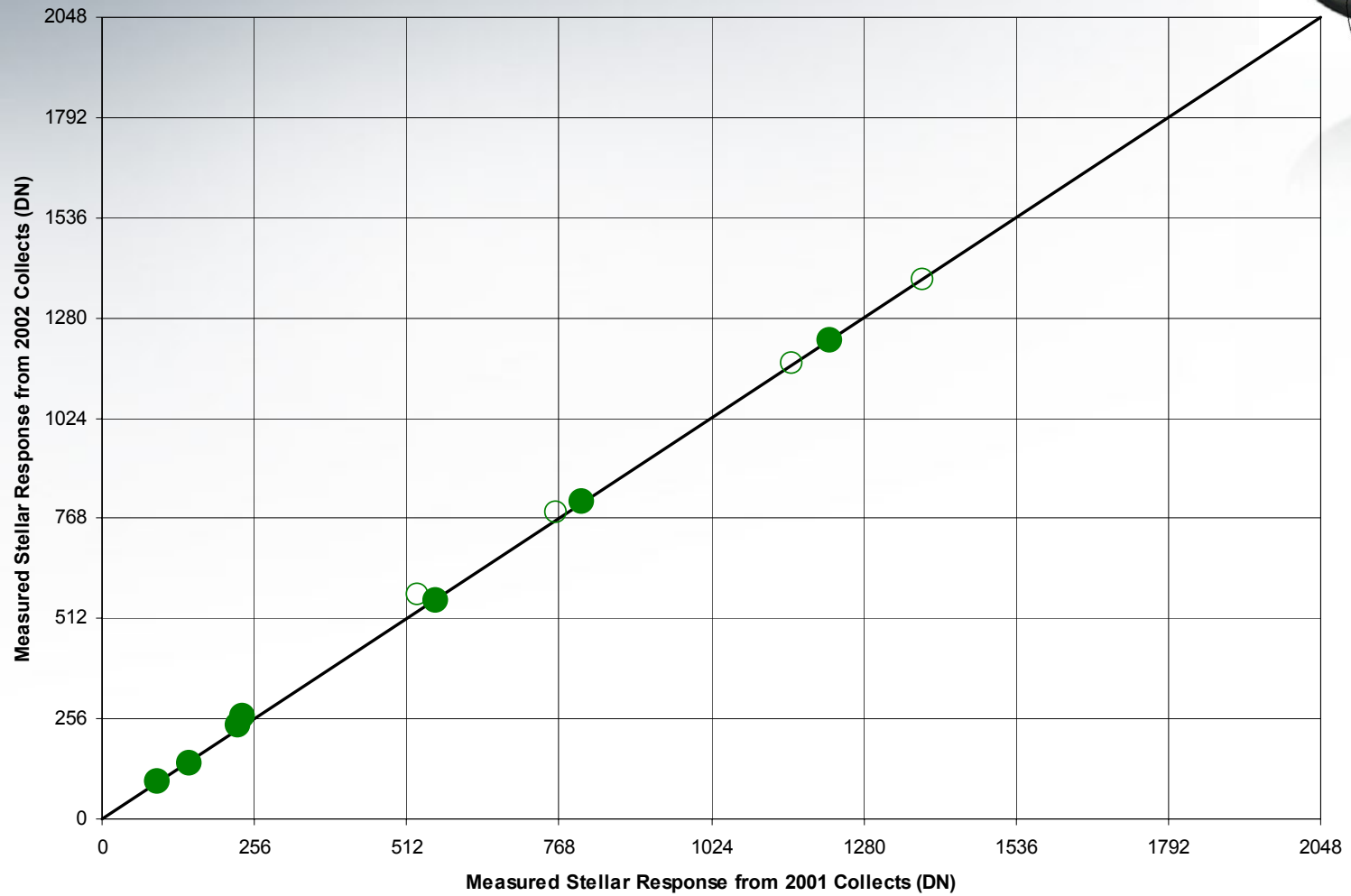




SPACE IMAGING™WGM
Visual Information. Visible Results.

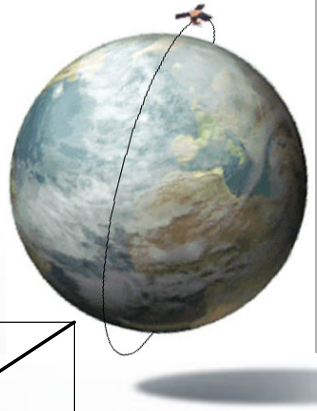
Green Band 2002 versus 2001

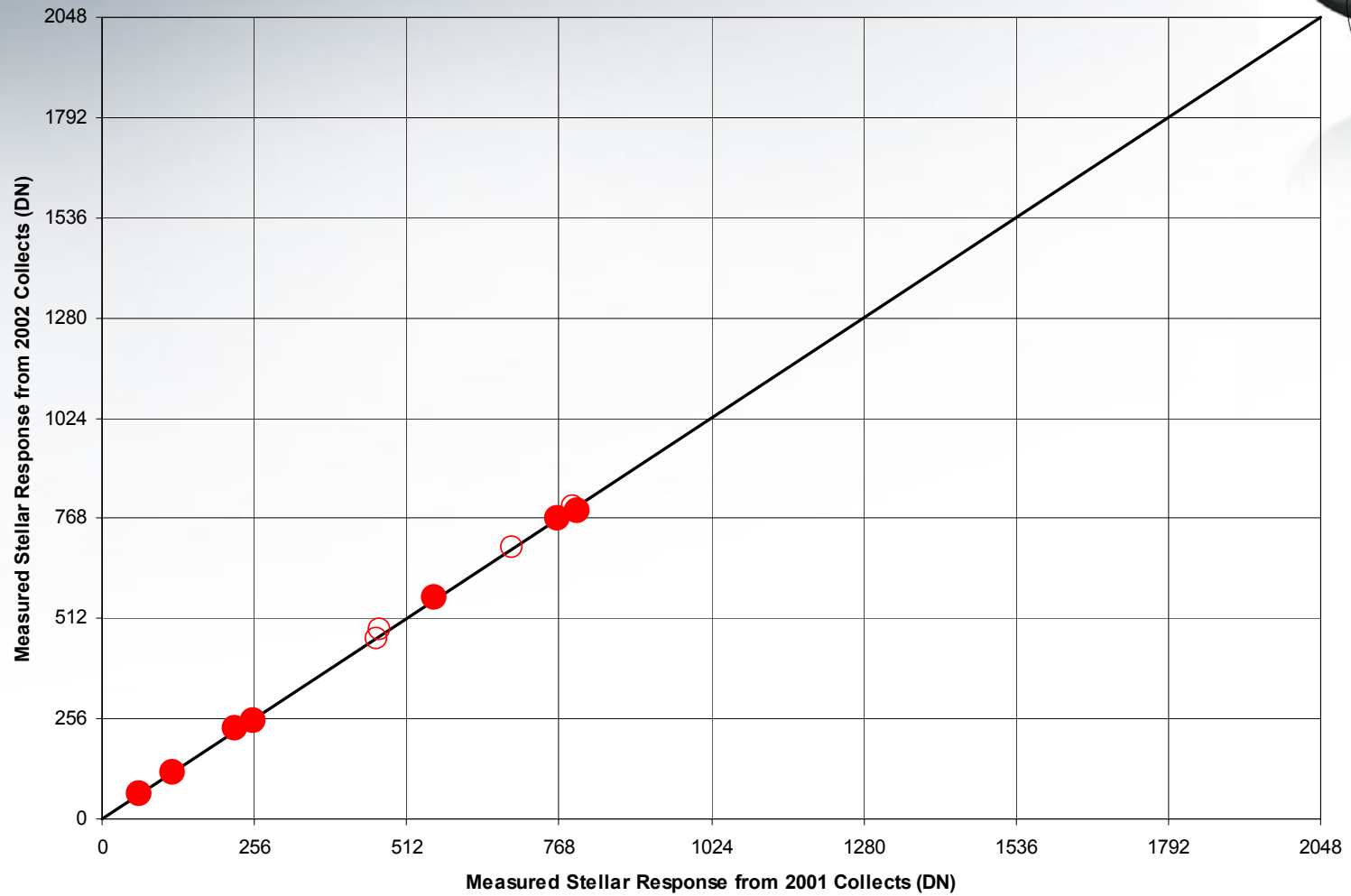




SPACE IMAGING
Visual Information. Visible Results.

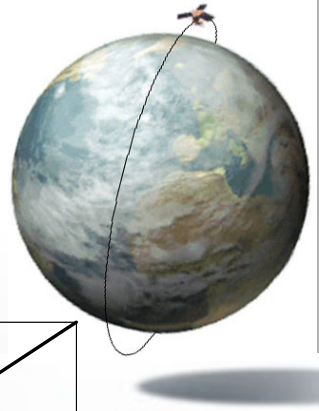
Red Band 2002 versus 2001

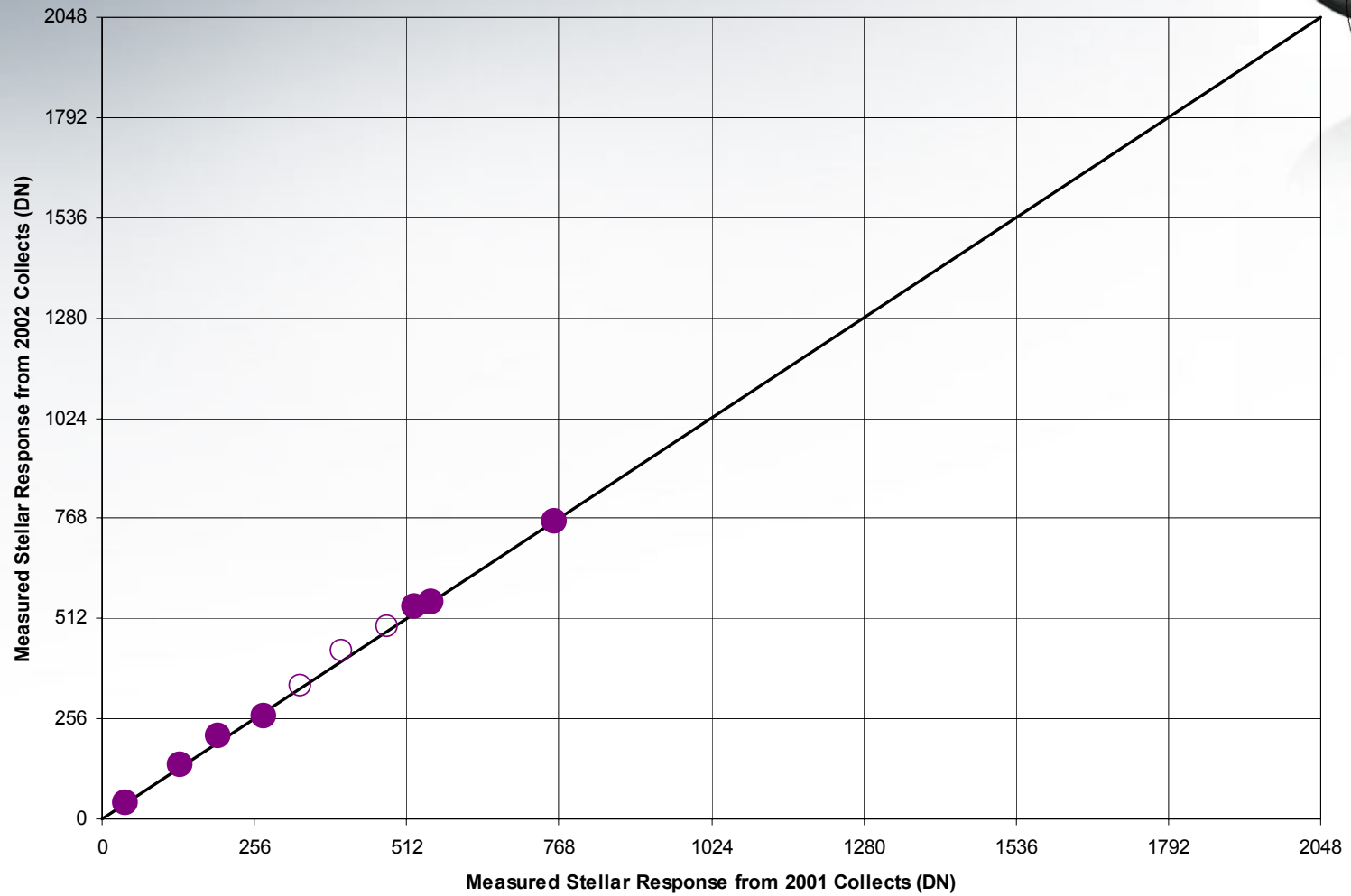




SPACE IMAGING
Visual Information. Visible Results.

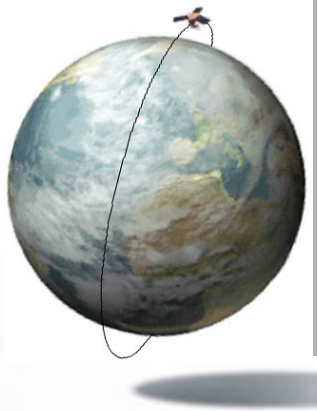
Near-IR Band 2002 versus 2001





SPACE IMAGING™WGM
Visual Information. Visible Results.

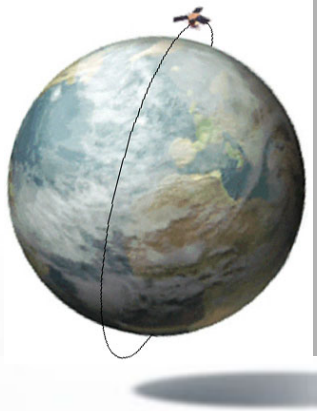
Multi-spectral Stellar Response Data



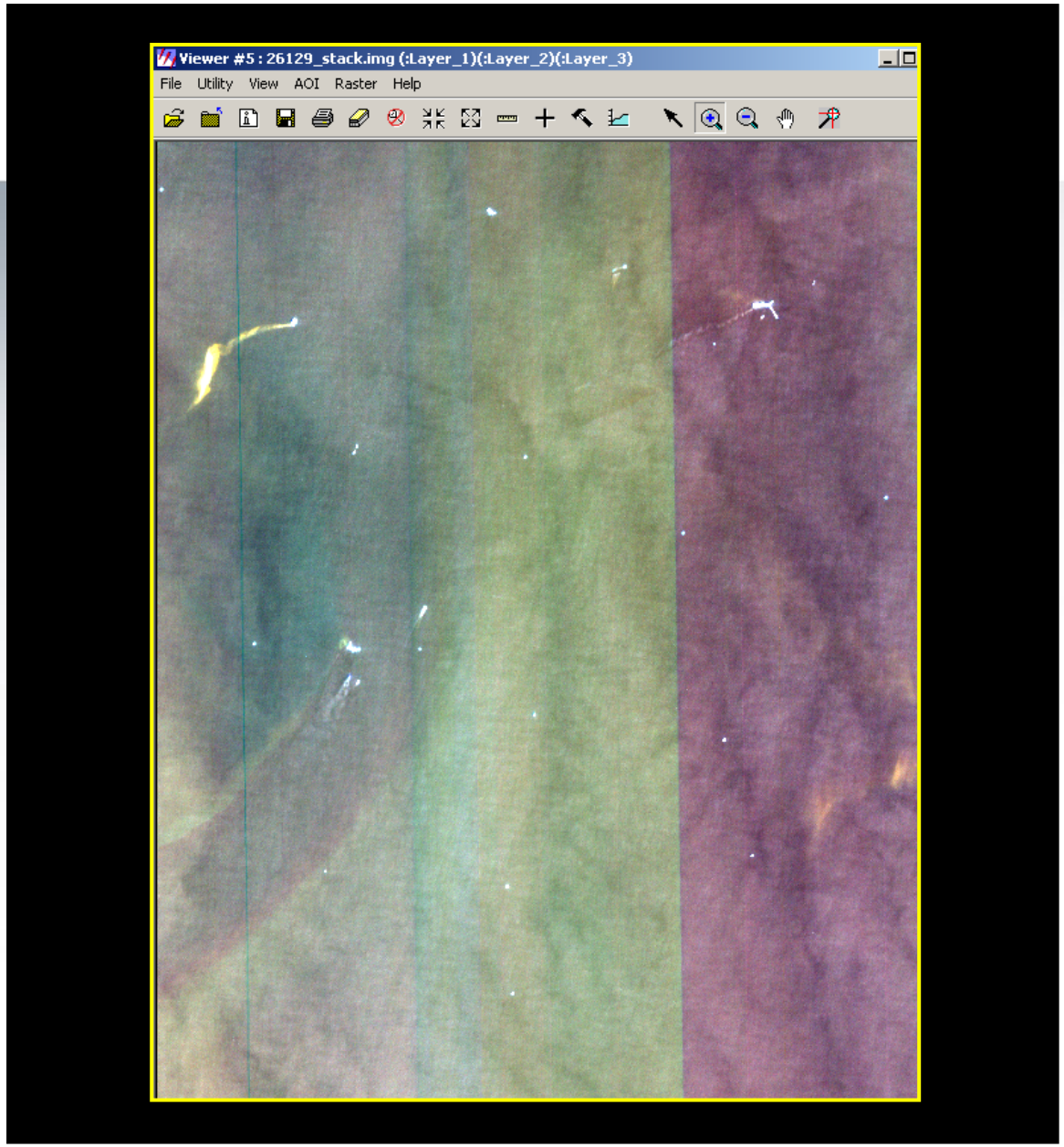
		February 2001 Image Data				February 2002 Image Data				% difference between 2002 & 2001Stellar Data			
		BLU '01	GRN '01	RED '01	NIR '01	BLU '02	GRN '02	RED '02	NIR '02	BLU	GRN	RED	NIR
Star Name	HIP#	(counts)	(counts)	(counts)	(counts)	(counts)	(counts)	(counts)	(counts)	(counts)	(counts)	(counts)	(counts)
Hya Eta-7	42799	169	145	62	38	178	144	66	44	4.9	0.4	7.5	14.3
Ras Alhague	86032	1295	1223	763	552	1282	1226	771	556	1.0	0.2	1.0	0.7
Tau Theta1-77	20885	160	234	222	194	173	265	234	216	7.8	13.3	5.3	11.0
LMi 46	53229	149	244	242	217								
Crt Alpha-7	53740	108	182	179	172								
UMa Psi-52	54539	371	559	557	523	366	560	566	545	1.1	0.2	1.5	4.3
Unukalhay	77070	515	805	797	760	511	811	790	762	0.7	0.8	0.9	0.3
Leo Mu-24	48455	135	225	238	238								
Hya Iota-35	47431	117	228	254	271	129	242	253	265	10.0	5.9	0.3	2.2
CMa Theta-14	33160	88	188	241	274								
Gem 81	37908	35	91	117	130	42	96	119	142	17.5	6.0	1.7	8.7
Leo Epsilon-17	47908	385	529	466	402	403	575	486	430	4.8	8.8	4.2	7.0
Zozca	54872	792	763	461	333	845	783	463	343	6.8	2.7	0.4	3.1
Denebola	57632	1220	1158	688	477	1249	1168	695	493	2.4	0.8	1.1	3.3
Gem Gamma-24	31681	1507	1377	790	546	1551	1378	802	551	3.0	0.0	1.6	0.8

SPACE IMAGING™ WGM
Visual Information. Visible Results.

Relative Calibration Differences for Extremely Narrow Histogram Images



- The following images will depict various relative calibration differences across an image as a function of the original scene content dynamic range
- The intensity differences that are visible are relatively small in magnitude; however, because of the overall image content data range, these small differences will become observable
- These differences are not observable in data sets that have a significantly broader range of scene content data



Example #1

Default Two Sigma Stretch

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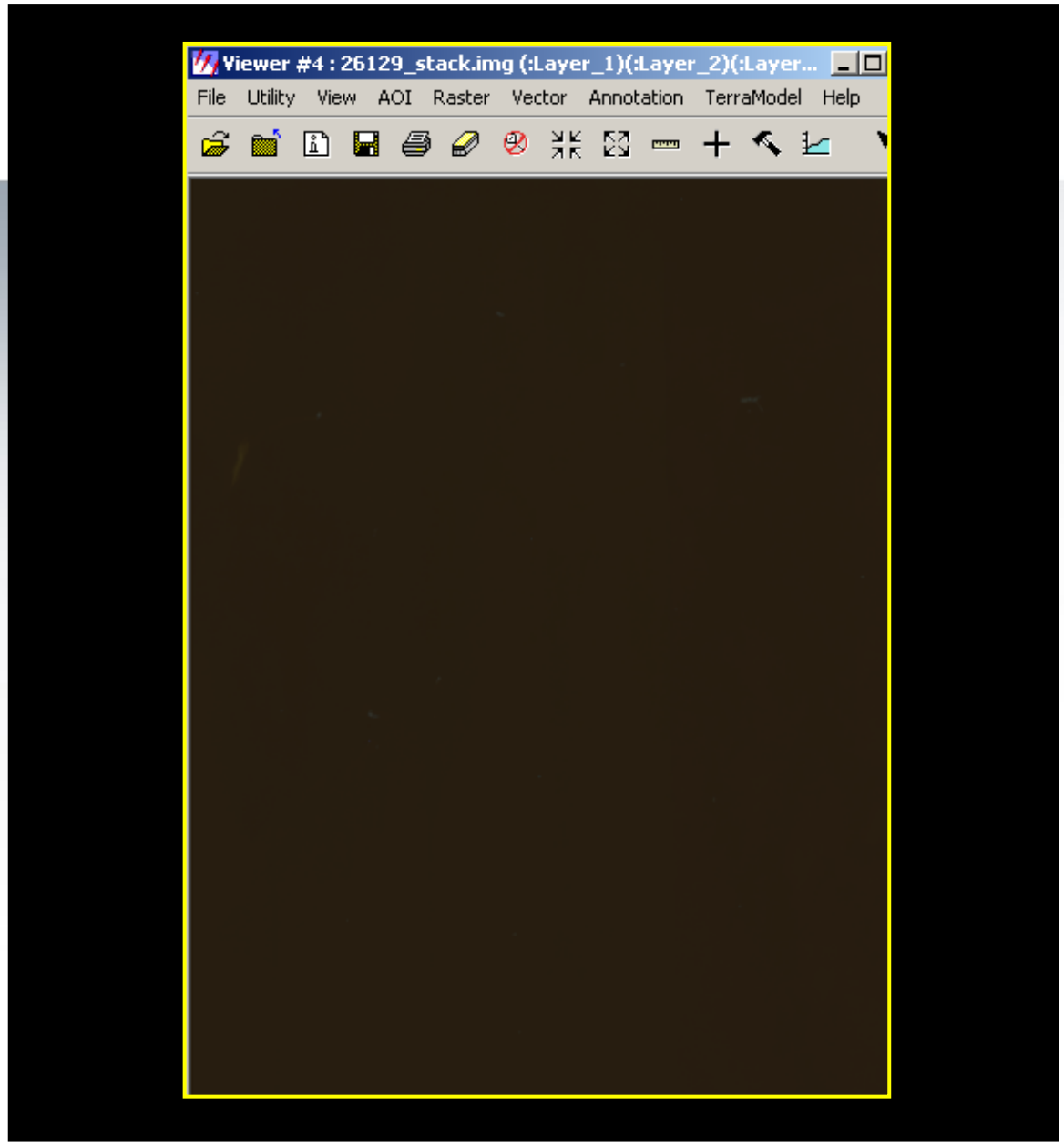
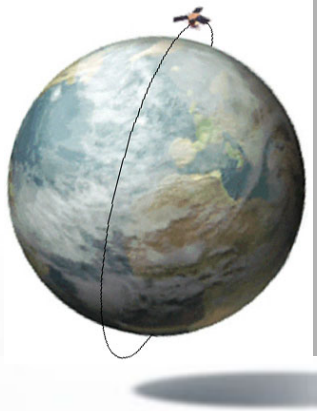
Visual Information. Visible Results.

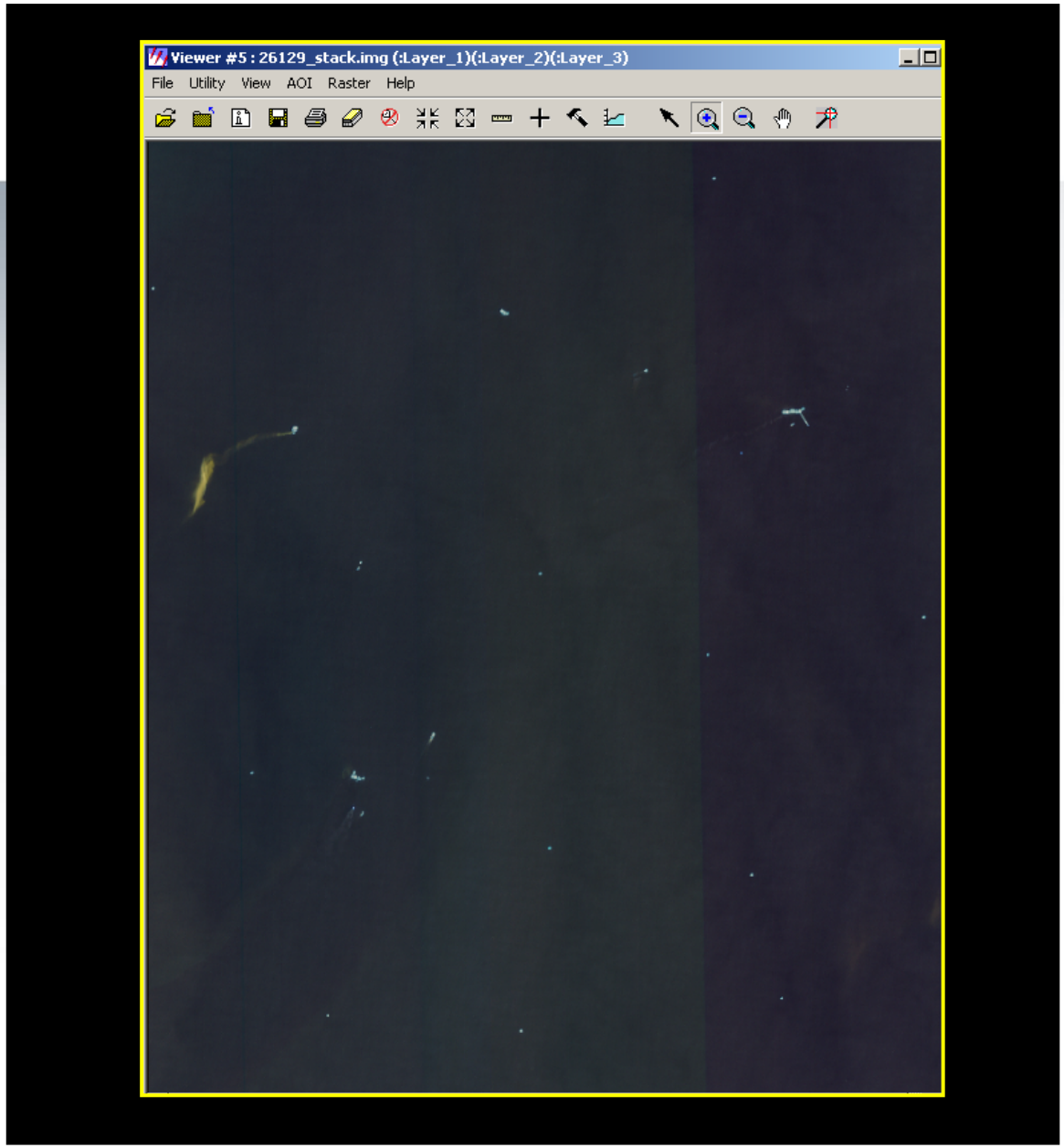




Example #1

Stretched To Depict How The Data Was Presented To the Sensor During Acquisition

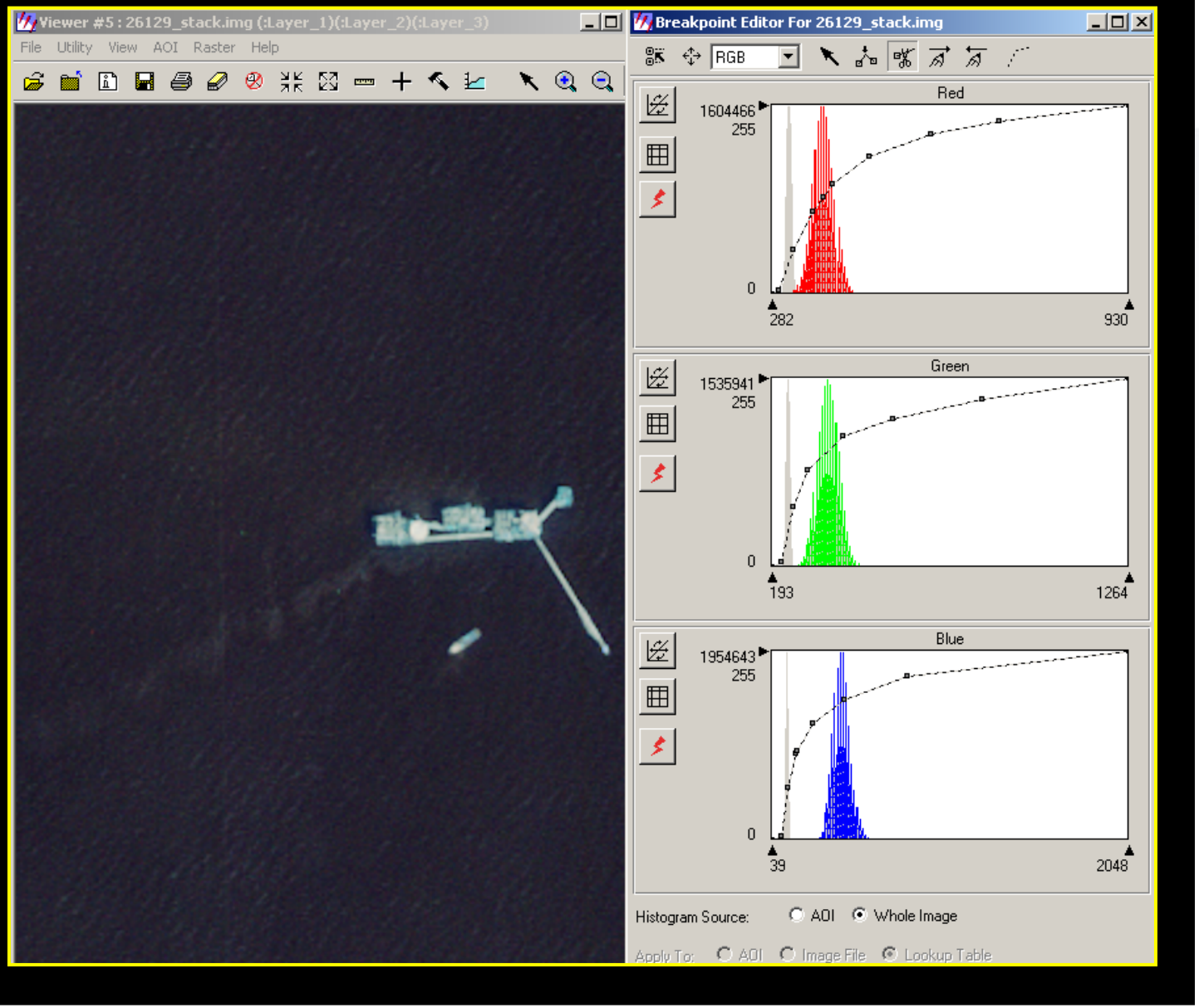
SPACE IMAGING™
Visual Information. Visible Results.



Example #1

Visualization Stretch

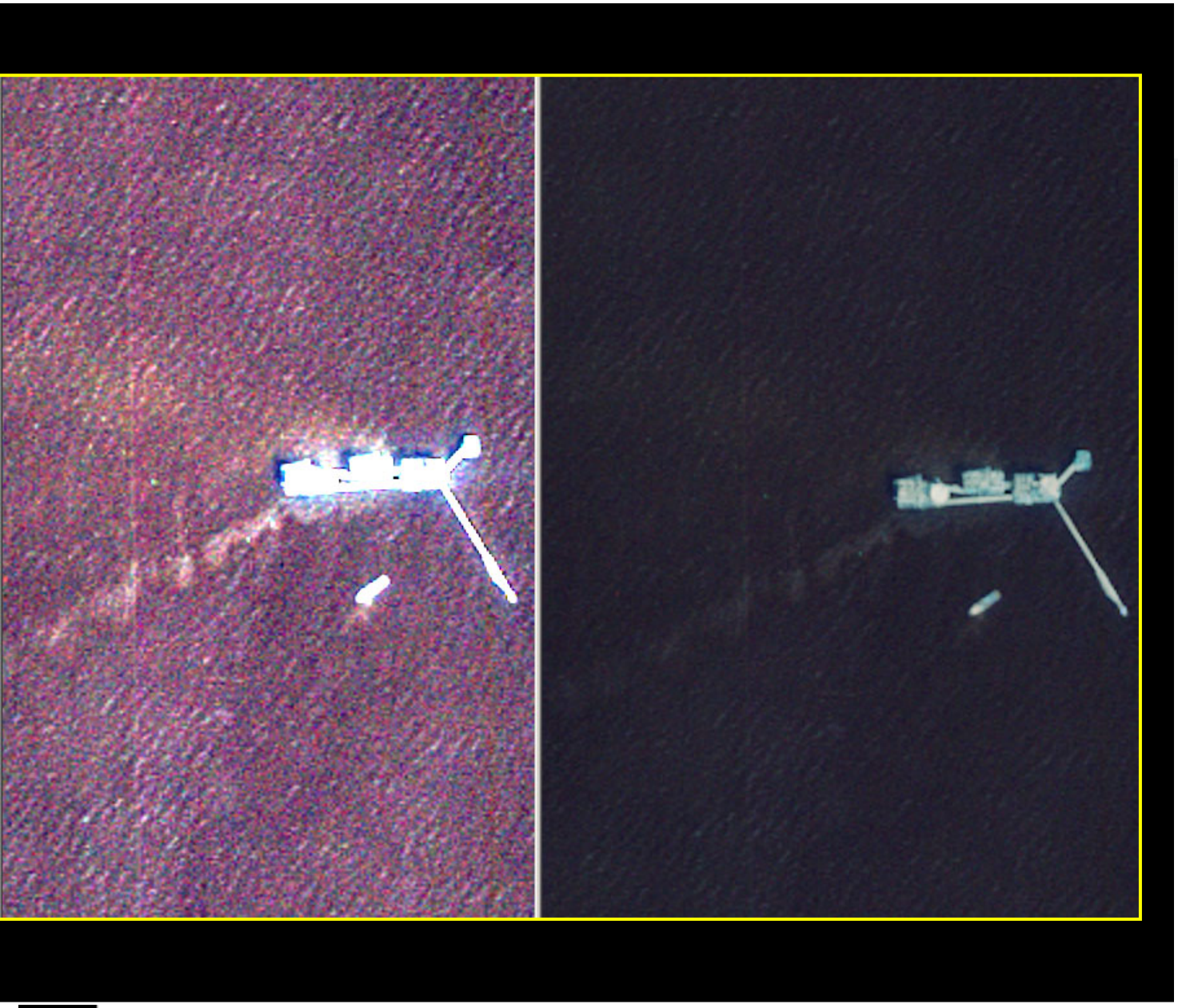
SPACE IMAGING™
Visual Information. Visible Results.



Example #1

Visualization Stretch with Histogram

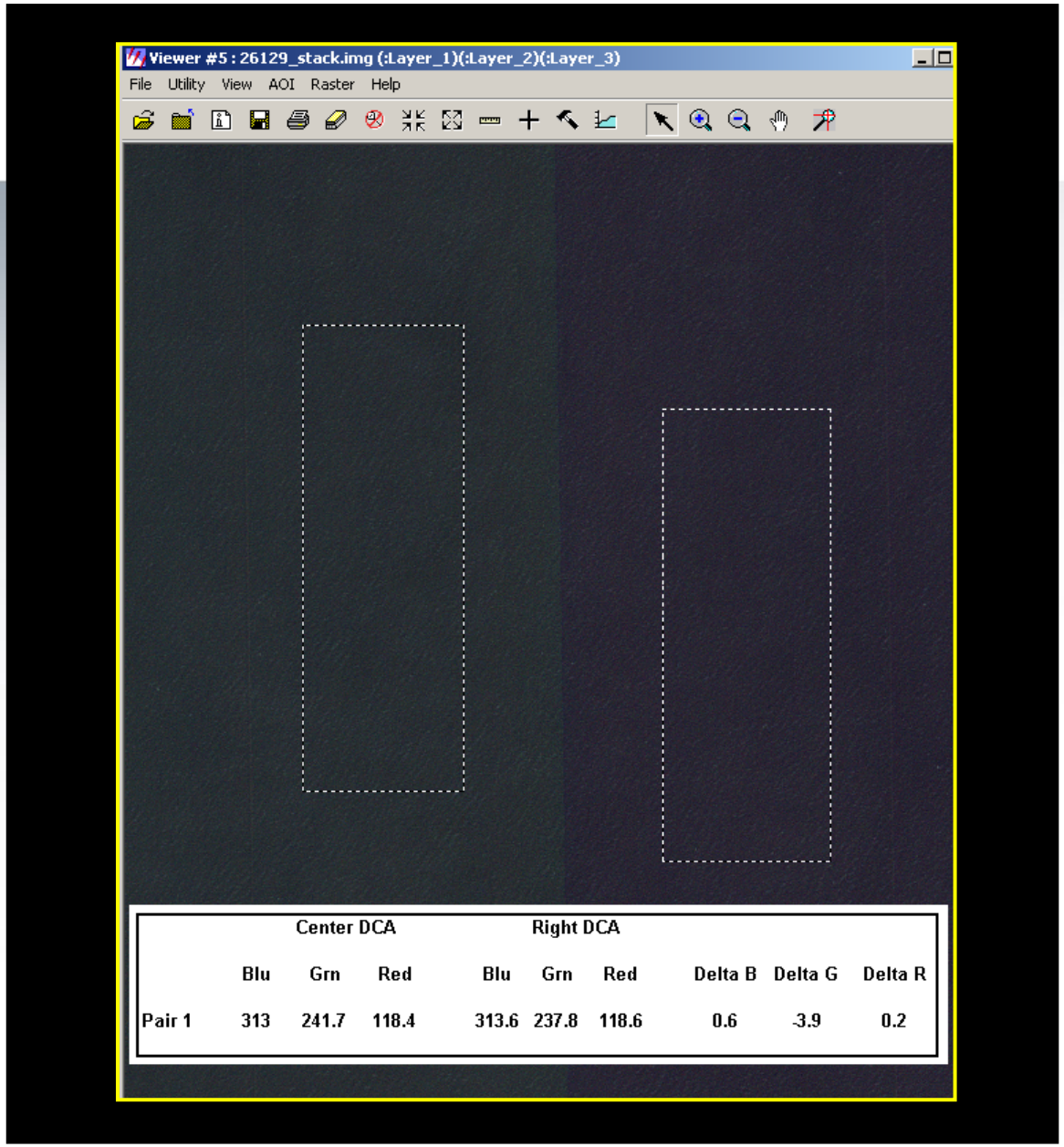
SPACE IMAGING
Visual Information. Visible Results.



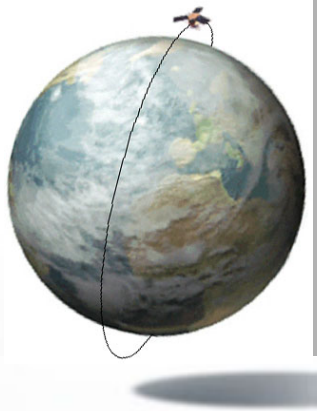
Example #1

Comparison of Two Sigma Stretch and Visualization Stretch

SPACE IMAGING™WGM
Visual Information. Visible Results.



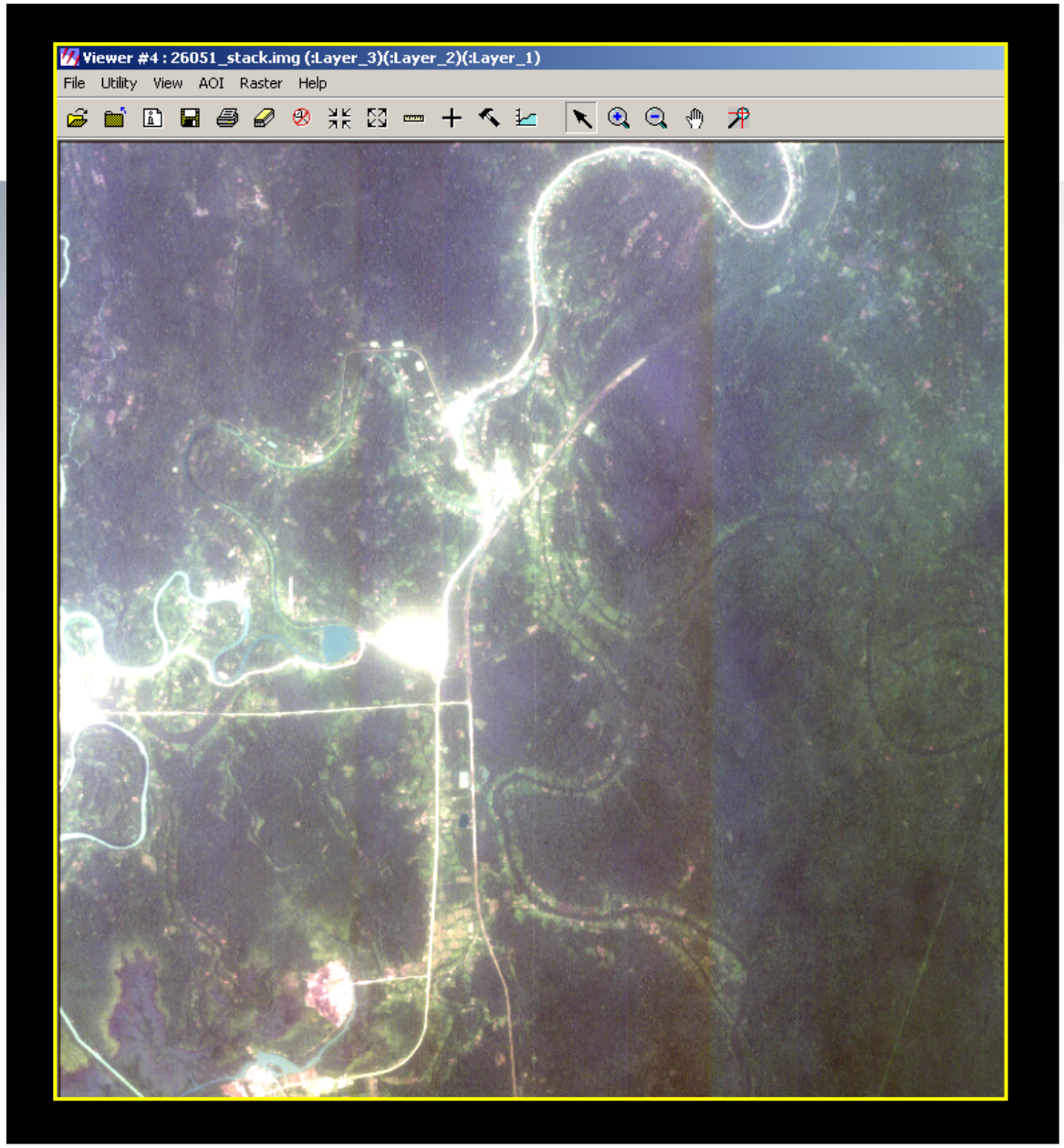
	Center DCA			Right DCA					
	Blu	Grn	Red	Blu	Grn	Red	Delta B	Delta G	Delta R
Pair 1	313	241.7	118.4	313.6	237.8	118.6	0.6	-3.9	0.2

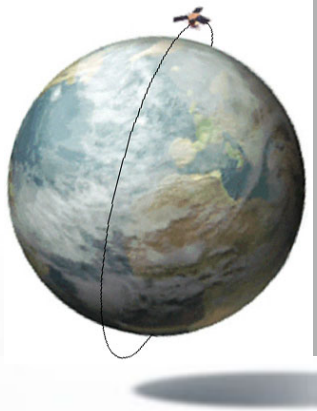


Example #1

Quantification Of Delta DN Across Two Arrays

SPACE IMAGING™
Visual Information. Visible Results.

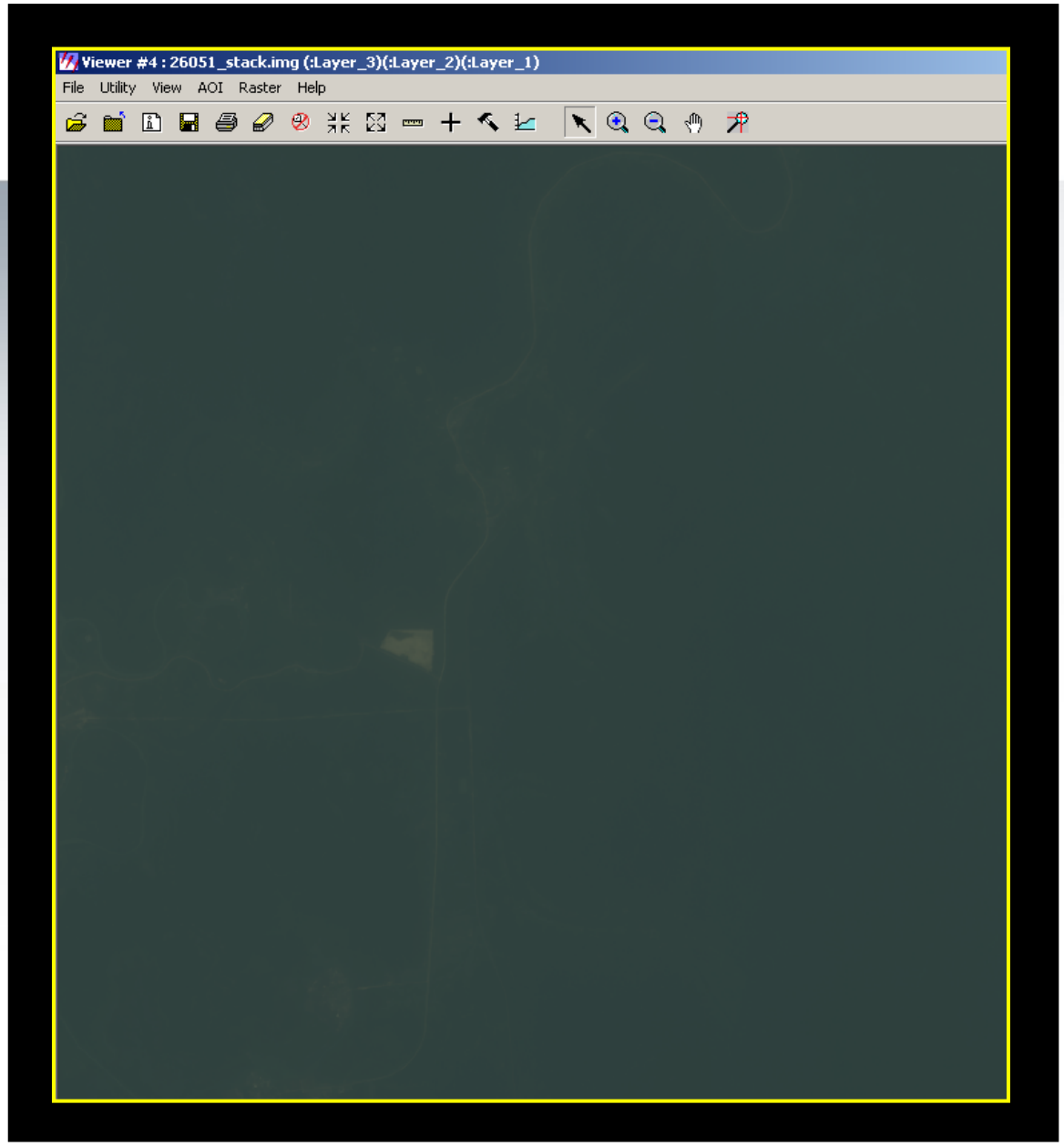


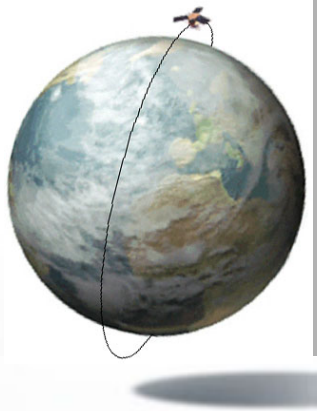


Example #2

Default Two Sigma Stretch

SPACE IMAGING™
Visual Information. Visible Results.

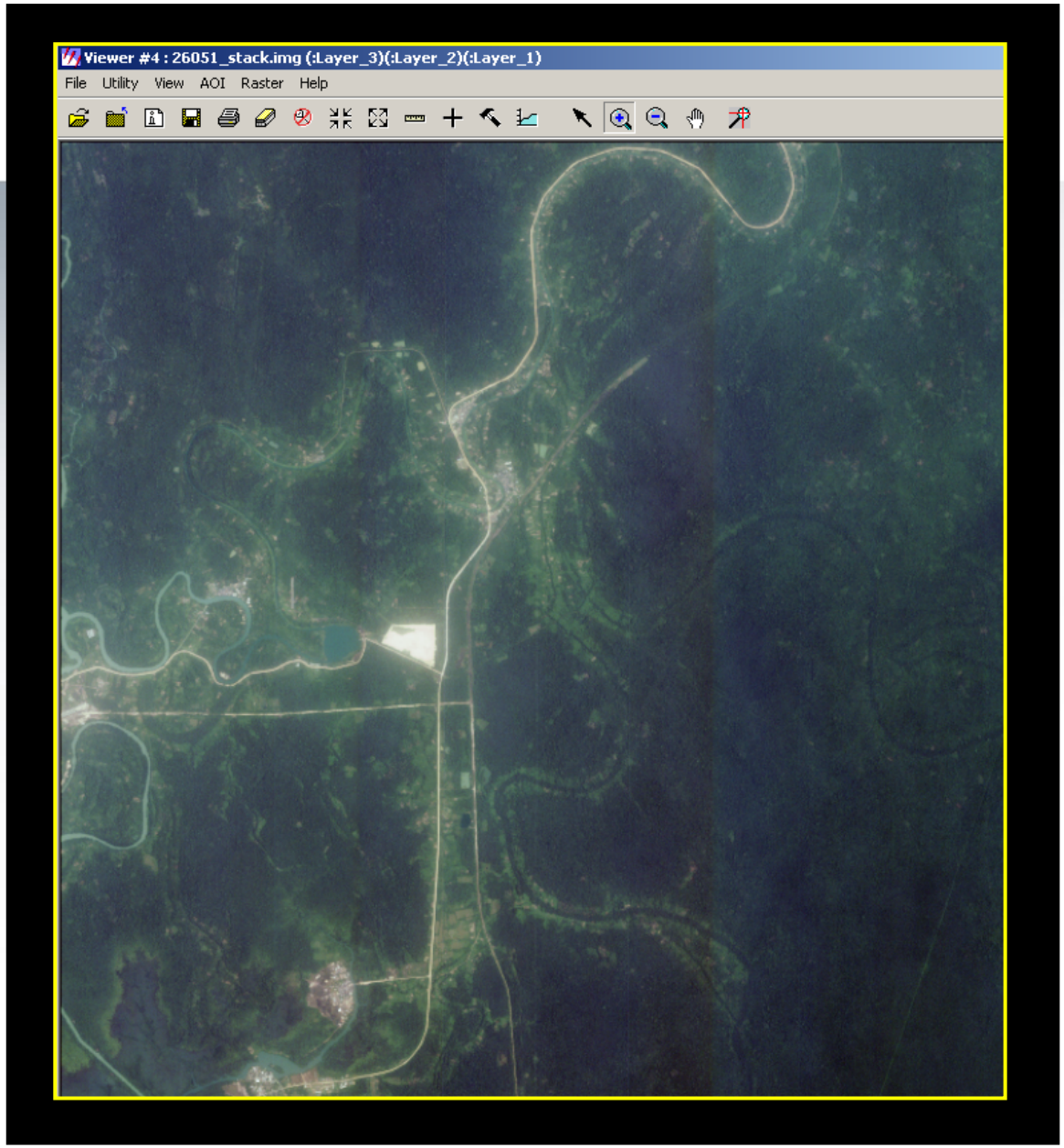




Example #2

Stretched To Depict How The Data Was Presented To the Sensor During Acquisition

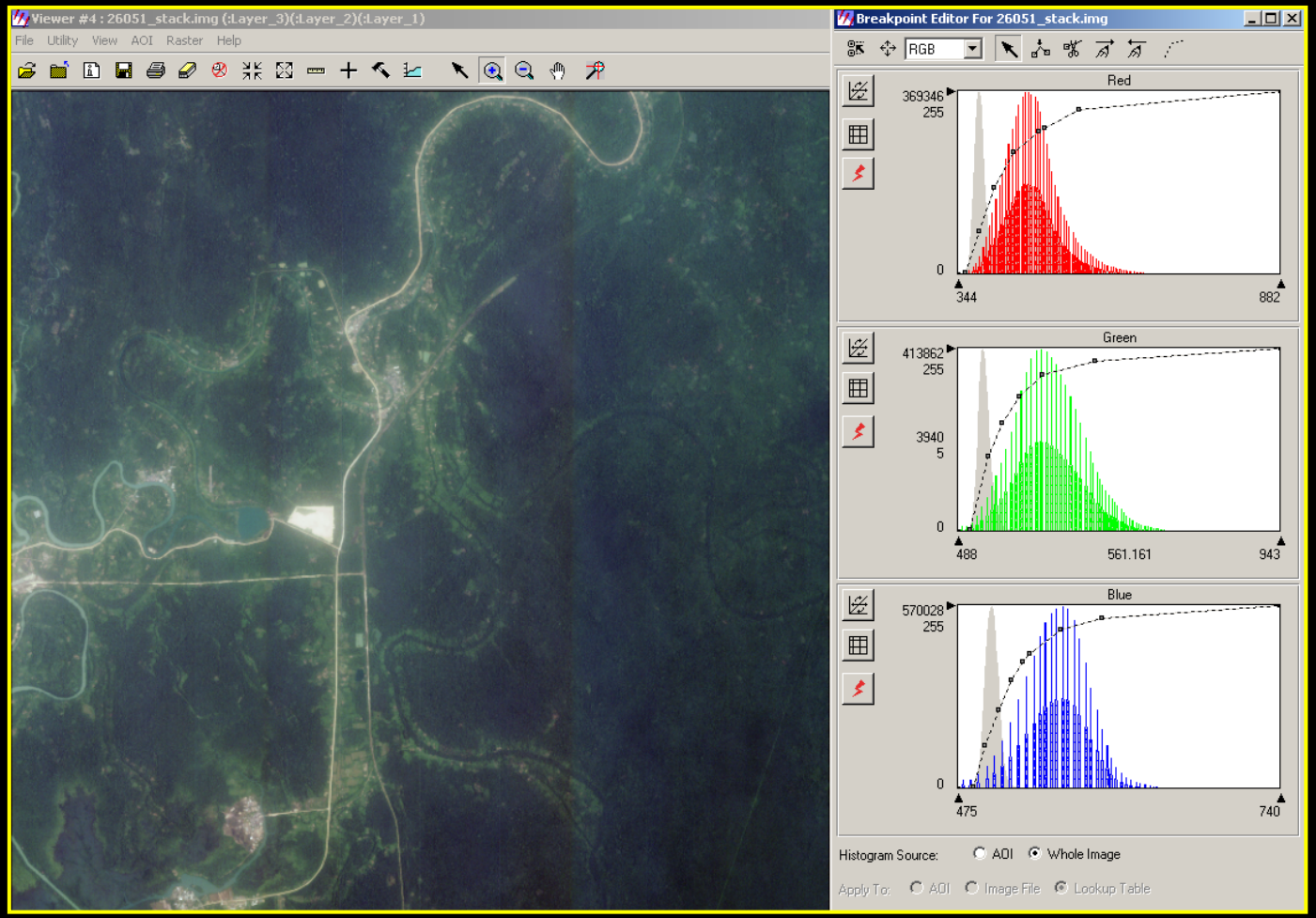
SPACE IMAGING™
Visual Information. Visible Results.



Example #2

Visualization Stretch

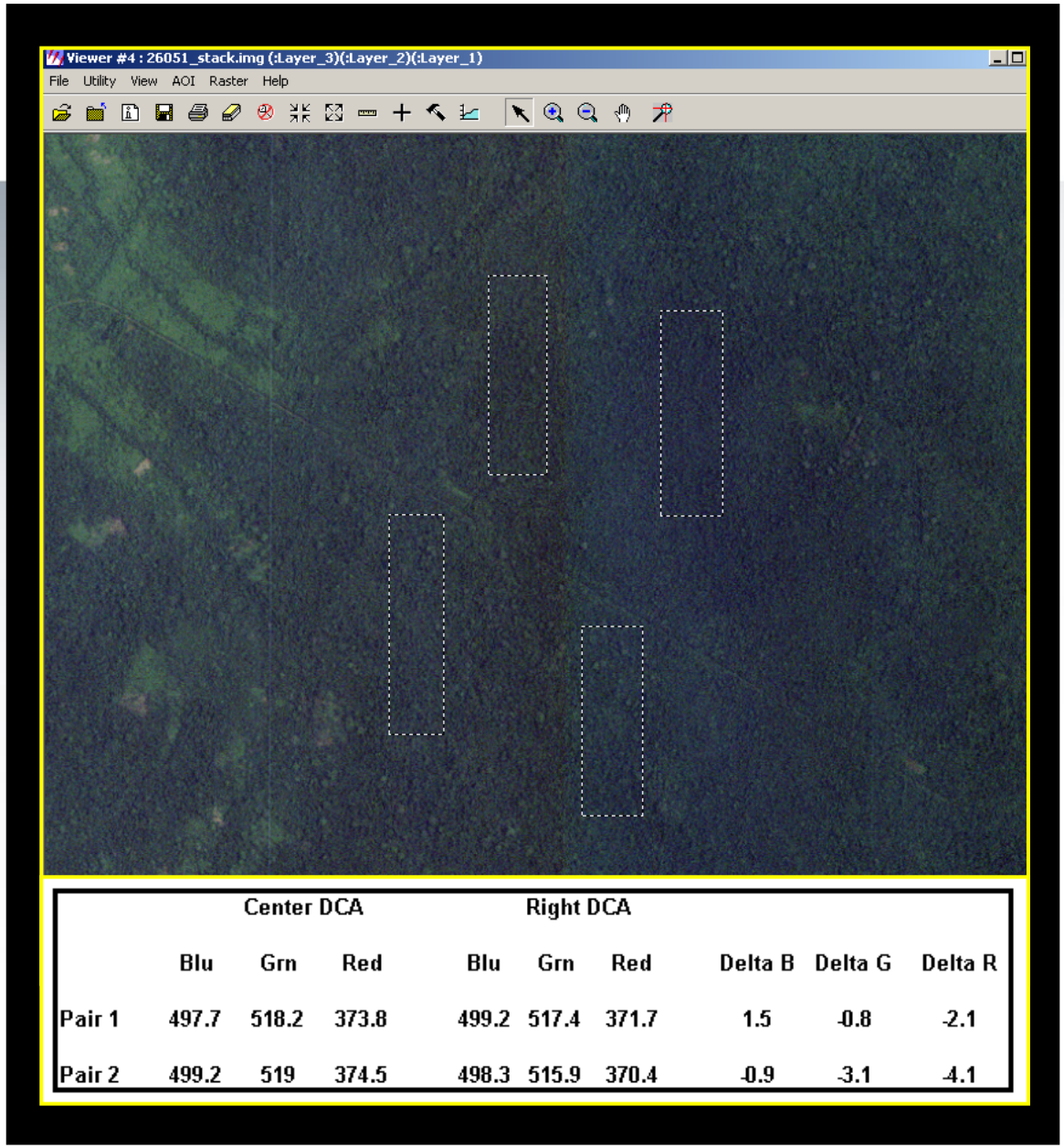
SPACE IMAGING™MGM
Visual Information. Visible Results.



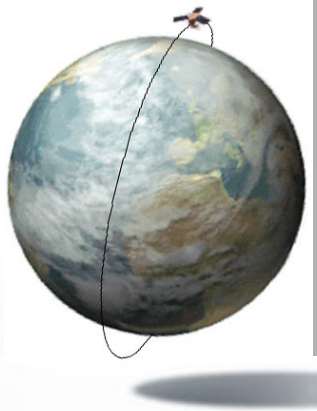
Example #2

Visualization Stretch with Histogram

SPACE IMAGING™ MGM
Visual Information. Visible Results.



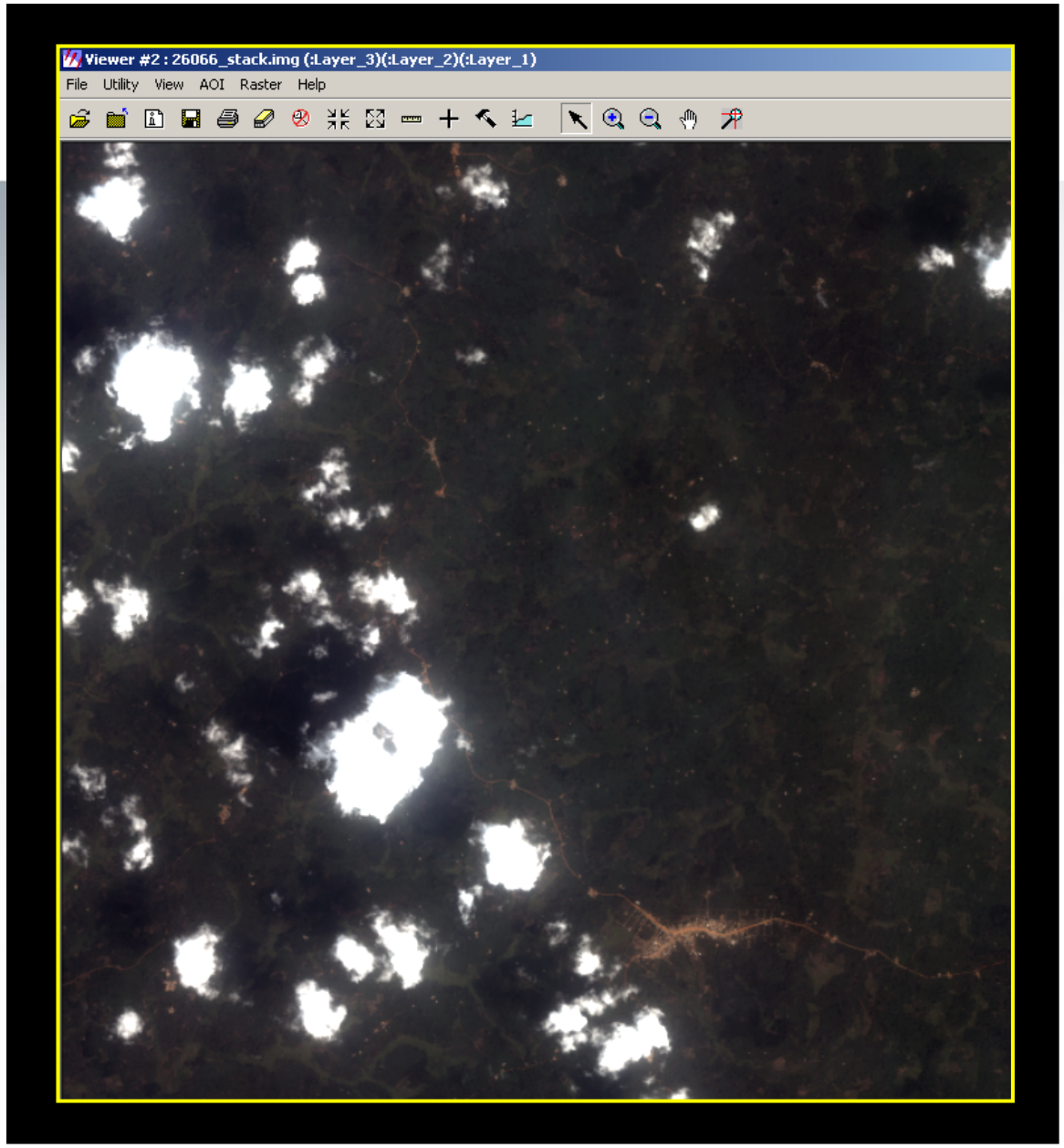
	Center DCA			Right DCA					
	Blu	Grn	Red	Blu	Grn	Red	Delta B	Delta G	Delta R
Pair 1	497.7	518.2	373.8	499.2	517.4	371.7	1.5	-0.8	-2.1
Pair 2	499.2	519	374.5	498.3	515.9	370.4	-0.9	-3.1	-4.1



Example #2

Quantification Of Delta DN Across Two Arrays

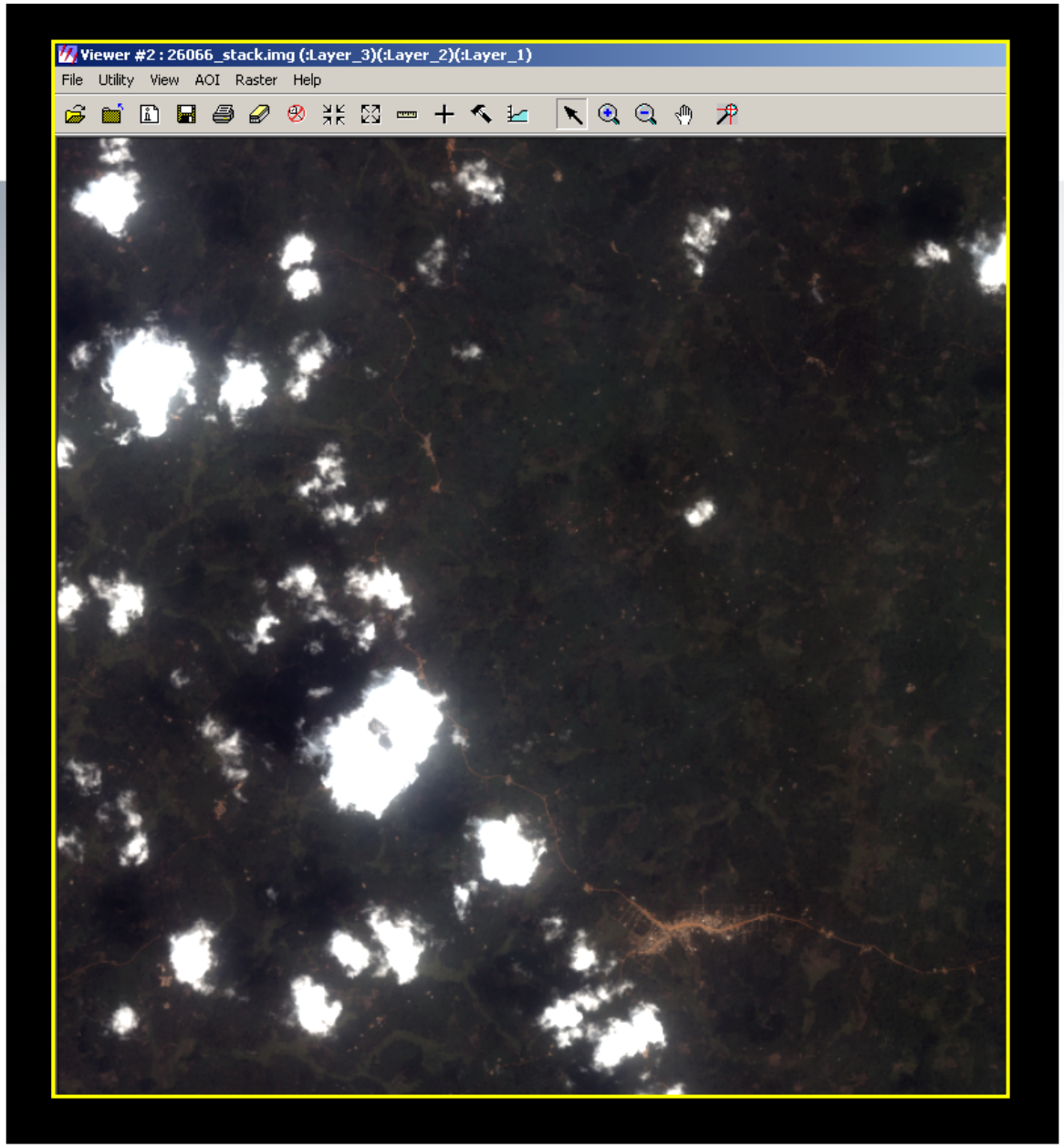
SPACE IMAGING
Visual Information. Visible Results.



Example #3

Default Two Sigma Stretch

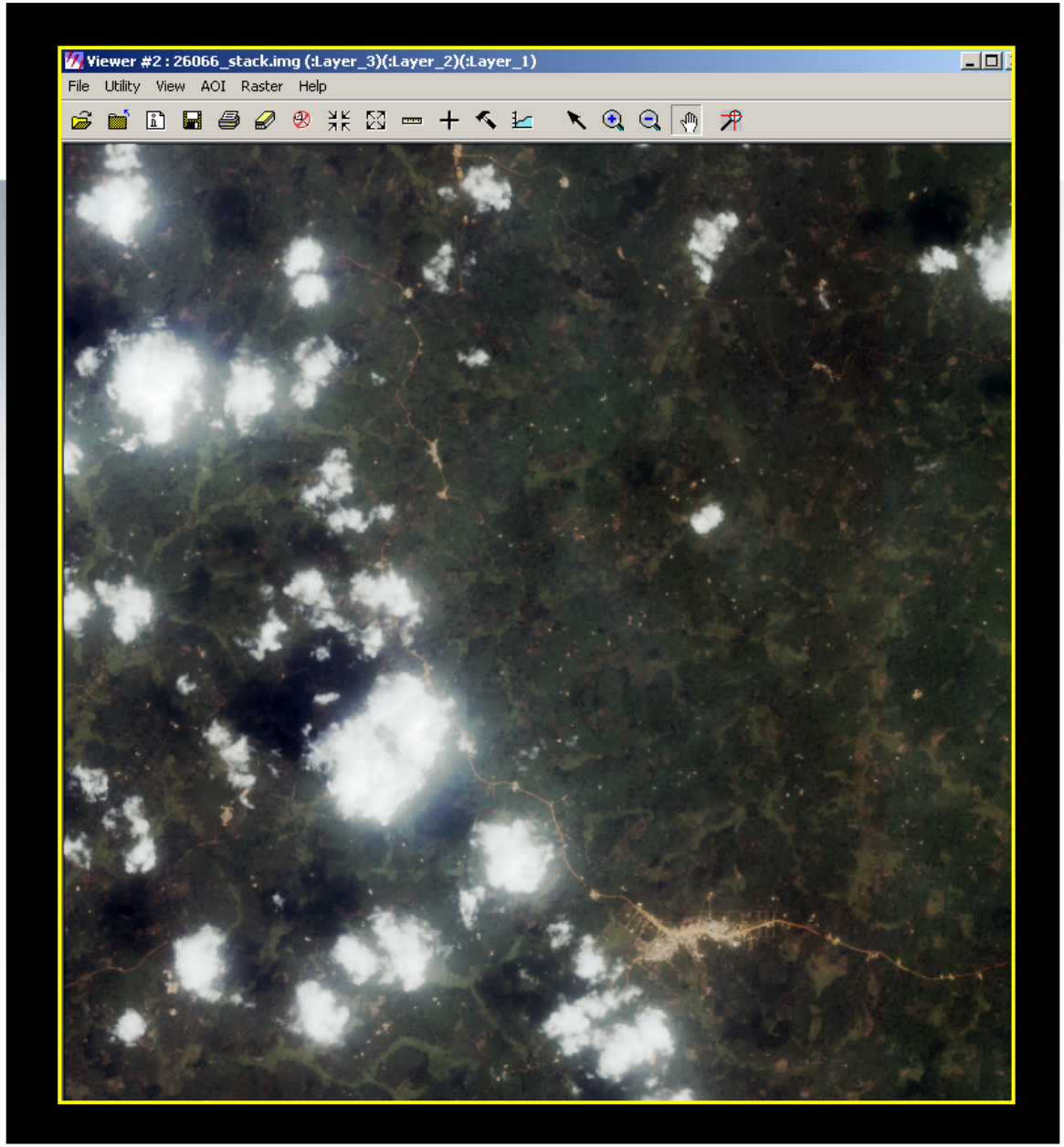
SPACE IMAGING
Visual Information. Visible Results.



Example #3

Stretched To Depict How The Data Was Presented To the Sensor During Acquisition

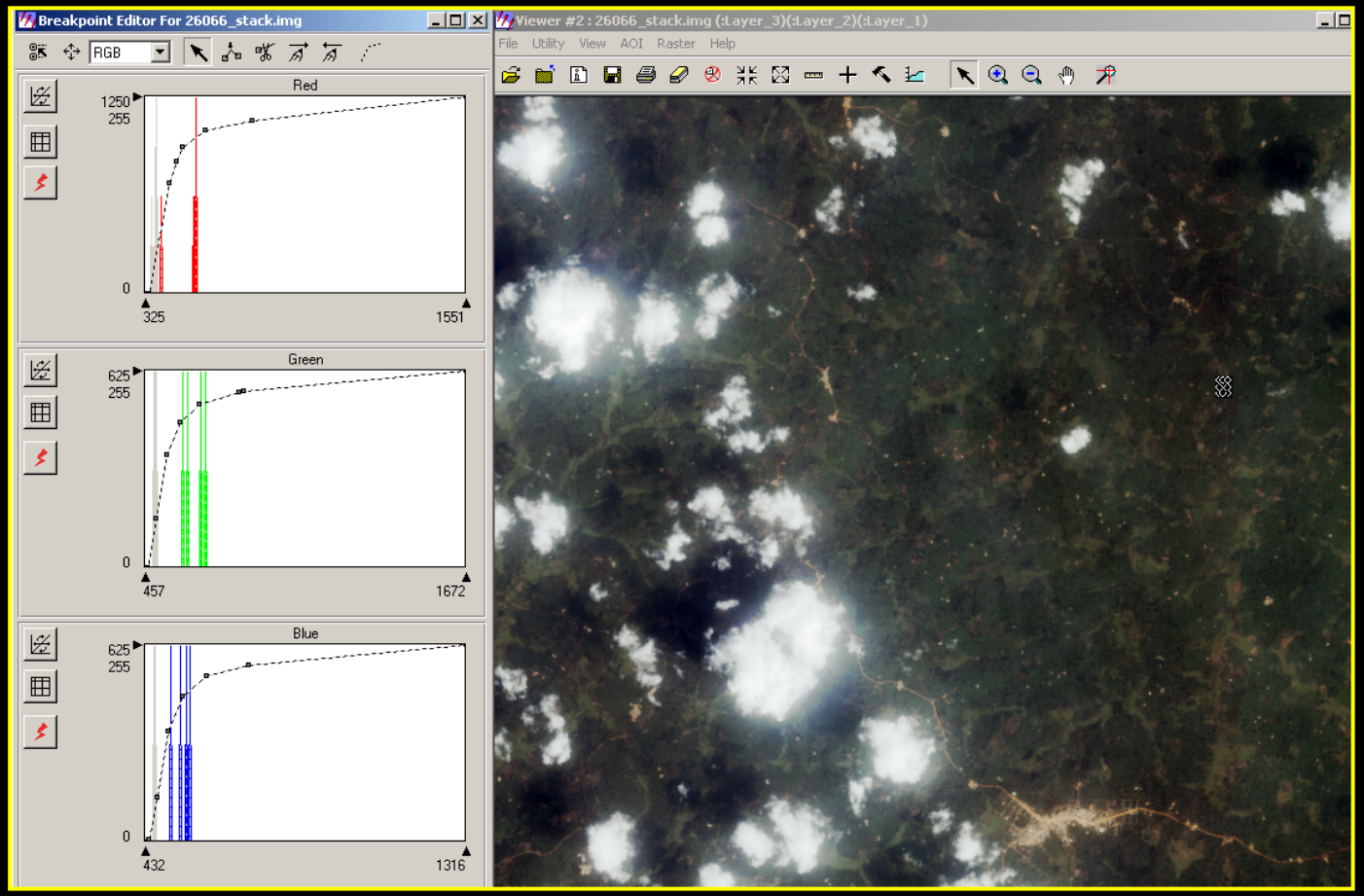
SPACE IMAGING™
Visual Information. Visible Results.



Example #3

Visualization Stretch

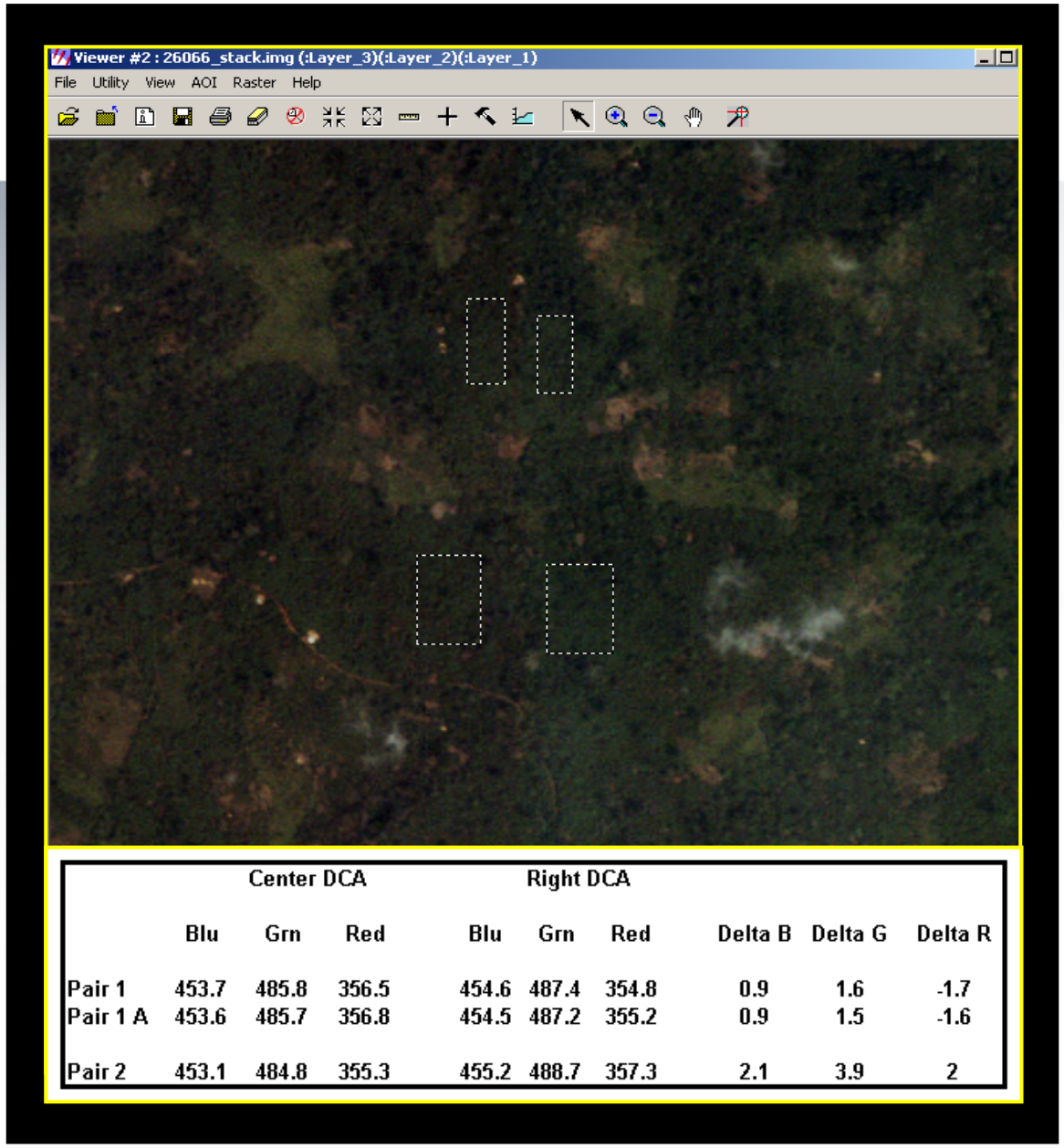
SPACE IMAGING
Visual Information. Visible Results.



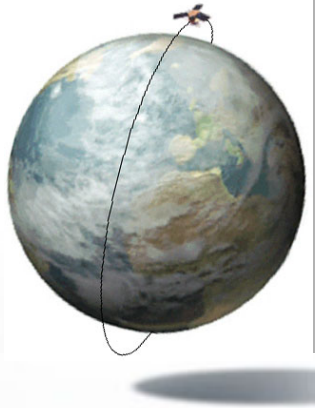
Example #3

Visualization Stretch with Histogram

SPACE IMAGING™
Visual Information. Visible Results.



	Center DCA			Right DCA					
	Blu	Grn	Red	Blu	Grn	Red	Delta B	Delta G	Delta R
Pair 1	453.7	485.8	356.5	454.6	487.4	354.8	0.9	1.6	-1.7
Pair 1 A	453.6	485.7	356.8	454.5	487.2	355.2	0.9	1.5	-1.6
Pair 2	453.1	484.8	355.3	455.2	488.7	357.3	2.1	3.9	2



Example #3

Quantification Of Delta DN Across Two Arrays

SPACE IMAGING
Visual Information. Visible Results.