Strawman GEO-CAPE Coastal Ecosystem Sensor PRELIMINARY Specifications - rev. 18 Sept 2012

		Raytheon GLIMR	*Raytheon GOI*	*Ball MOS*	*GSFC COEDI IDL Aug 2012*	*JPL COCOA*	*GSFC CEDI IDL Jan. 2010*
GSD at nadir		250 x 250 m	225 x 225 m	375 x 375 m	375 x 375 m	200 x 200 m	*375 x 375 m*
Spectral Range (multi- or hyper-spectral)		340-885 nm 980-2200nm	340-885 nm 980-2200nm	340-900 nm SWIR bands	340-1100 nm 1.245 & 1.64 um	350-1050 nm multispectral	*340-1100 nm 1.2-2.5 um*
Spectral sampling/resolution		~5 nm (HS) 20-50nm	~5 nm (HS) 20-50nm	~5 nm	0.4/0.5nm SWIR 20-40nm	< 5 nm multispectral	*0.5/0.5nm SWIR - 5nm*
iFOV (E/W x N/S pixels)		1 x 8192	1 x 8192	1 x 2048	1 x 2048	2048 x 2048	*1 x 2048*
iFOV Stare Interval		4 sec	0.9 sec	4 sec	0.8 sec	0.2 sec	*0.8 sec*
SNR **1000:1 required**	@ 443nm; 10nm FWHM; Ltyp=45.0 W m^{-2} μm^{-1} sr^{-1}	2310	2500	2320	1748	1000	*2148*
	@ 678nm; 10nm FWHM; Ltyp=8.66 W m^{-2} μm^{-1} sr^{-1}	1150	1200	1866	1031	800	*1195*
Time to scan $3x10^5 km^2$ @ SNR & Ltyp listed above		26.4 min	10.9 min	6.1 min	17.36 min	11.96 min	*17.8 min*
Scan Rate (km^2 min^{-1})		11,364	27,523	49,180	17,281	25,084	*16,854*
Geo design life (years)		3 yrs	3 yrs		3 yrs	2 yrs	*3 yrs*
Power CBE #		360 W^	390 W^		220 W	50 W	*392 W^*
Size CBE – (length x width x height) (meters)		0.7 x 0.6 x 0.8 m	1.7 x 1.5 x 2.0 m	1.5 x 1.5 x 1.7 m	1.5 x 1.7 x 1.1 m	cylinder 0.9m dia. x 1.3m	*2.1 x 0.95 x 2.8 m^*
Mass CBE		132 kg	283 kg^	147 kg	220 kg	71 kg	*548 kg^*
Comply w/ Medium Commercial Host Size?		Yes	Yes	Yes	Yes	Yes	*Yes^*
Data Rate CBE		3.2 Mbps	14.4 Mbps		93 Mbps	20 Mbps	*88.4 mbps*
Solar & Lunar Calibration		Yes & Yes	Yes & Yes	No & Yes	Yes & Yes	Yes & Yes	*Yes & Yes*
FOR (E-W x N-S)		20.8° x 19°	20.8° x 19°	20.8° x 19°	20.8° x 19°	20.8° x 19°	*20.8° x 19°*

CBE – Current Best Estimate; ^ exceeds requirement for one of three Medium Commercial Hosted Spacecrafts

- **Sensor specifications provided by Raytheon (J. Puschell), Ball (M. Stephens & T. Valle), JPL (R. Key), and GSFC (J. Smith, C. Marx, J. Budinoff & A. Mannino).**
- **INSTRUMENT COST WAG: GEO-CAPE caliber ocean color instruments with a mass of 100kg to 200kg would cost on the order of $154 to $308 million, based on the cost/mass ratio of $720K/kg obtained from a similar type of instrument (Geo-MAC IDL study Sept. 2011) and doubling that value to achieve a higher level of confidence level for this mass-based estimate.**

Table 1: Strawman GEO-CAPE Coastal Ecosystem Sensor PRELIMINARY Specifications

		GSFC Geo-MDI	GSFC CEDI	GSFC pre-COEDI	Raytheon 4th Gen	Astrium/KARI GOCI #
*GSD at nadir		250 x 250 m	375 x 375 m	500 x 500 m	150 x 150 m	~360 m
*Spectral Range (multi- or hyper-spectral)		300-940 nm 1.2-2.35 um	340-1100 nm 1.2-2.5 um	340-1100 nm 1.64 um	0.34–4.8 μm	412, 443, 490, 555, 660, 680, 745, 865 nm
*Spectral sampling/ resolution		0.8/0.8nm SWIR – 0.8nm	0.5/0.5nm SWIR - 5nm	0.4/0.5nm SWIR 40nm	~5 nm	20, 10 (680 band) or 40 nm (865 band)
*iFOV (E/W x N/S pixels)		1 x 2048	1 x 2048	1 x 2048	1 x 42,000	1400 x 1400
*iFOV Stare Interval		≤1 sec	0.8 sec	0.7 sec	1.6 sec	~8 sec per band
*SNR 1000:1 required	@ 443nm; 10nm FWHM; Ltyp=45.0 **W m^{-2}μm^{-1}sr^{-1}**	2224; 12nm bw; Ltyp=77.5	2148	1890	2200	741; 20nm bw; Ltyp=69.8^
	@ 678nm; 10nm FWHM; Ltyp=8.66 **W m^{-2}μm^{-1}sr^{-1}**	1295; 12nm bw; Ltyp=14	1195	1020	1100	607; 10nm bw; Ltyp=11.9^
*Time to scan 3x10^{5}km^2 @ SNR & Ltyp listed above		26.7 min	17.8 min	8.8 min	9.5 min	1.05 min 285,000 km^2/min
*Geo design life (years)		3 yrs	3 yrs	3 yrs	3 yrs	7 yrs
Power CBE		557 W	392 W			100 W
*Size CBE – (length x width x height)		4.4x3x1.2m	2.1x0.95x2.8m	1.2 x 1.7 x 0.37 m	3.0 x 4.4 x 4.6 m	1.4 x 0.8 x 0.8 m#
*Mass CBE		738 kg	548 kg	<220 kg		78 kg
Data Rate CBE		~60 mbps	88.4 mbps		328 Mbps	
Solar Calibration		Yes (lunar)	Yes (lunar)	Yes & Yes	Yes (lunar)	Yes (no)
*FOR (E-W x N-S)		20.8° x 19°	20.8° x 19°	20.8° x 19°	20.8° x 19°	4° cone
Cost ($720K/kg * 2)		$1062.7 M	**$789.1 M** **IDL: $294M * 2 = $588M**			$34.5 M (KIOST)

* Critical specifications needed by GEO-CAPE Oceans SWG; CBE – Current Best Estimate; # Faure et al. 2008 (Proc. ICSO) ; ^ from Hu et al. 2012 (AO)