Next Generation Instruments for Environmental Space Remote Sensing

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NOAA Emerging
Technologies Workshop

NSOSA Instrument Catalog

Emerging Technologies

- Capability Name: Instrument Catalog for NOAA Space Observation System Architecture Study

- Capability Developer (NOAA funding organization): NOAA NESDIS, Satellite and Information Service
- Partnerships in Development: JPL, GSFC, APL, MIT-LL, Aerospace Corporation and Industry
- Capability Brief Description/Status: Generated instrument concepts for the 2030-2050 timeframe, ranging from projected extensions of legacy instruments to major departures, and from high-end concepts compatible with today's aggregated systems to strongly disaggregated platforms

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RFI

August 2015

NOAA Future Environmental Remote Sensing Capabilities

Environmental Data Records Value Models (EVM)

NOAA Space Platform Req. Working Group (SPRWG)

Measurement parameters for three levels: Study Threshold (ST), Expected (E), Maximum Effective (ME)

Legacy

Inputs from JPL, GSFC, APL, MIT/LL, Aerospace Corp., and industry

JPL-Led Team of Subject Matter Experts

Evolve representative candidates by subsuming characteristics of individual concepts

JPL PRODUCT

Performance and SWAP-C (Size, Weight, and Power – Cost) estimates for each instrument concept in the catalogs

Imagers/Sounders, etc

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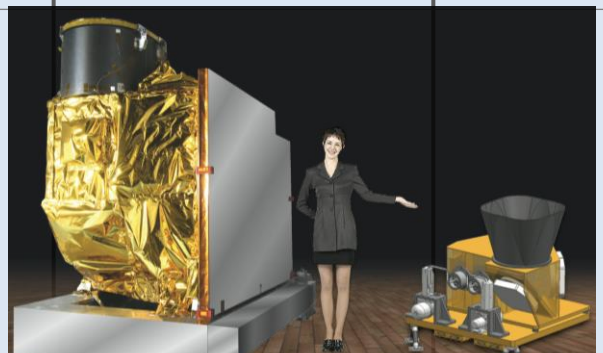
Vis/IR GEO Imager Concepts

	Study Threshold	Expected	Maximum Effective
Resolution	2-4km (IR), 1 km (Vis), 0.5km (Pan)	2 km (IR), 1 km (Vis), 0.5 km (Pan)	1 km (IR), 0.3 km (Vis), 0.3 km (Pan), 0.75 (DNB)
CONUS Update Rate	1 min	5 min	2.5 min
Radiometric Accuracy	0.1 K	0.1 K	0.05 K
Wavelengths	0.47-13.6 microns	0.47-13.6 microns	0.40 to 13.7 microns, day/night band
Size [m]	1.3 x 1.1 x 1.0	1.6x1.5x1.4	1.9x1.8x1.7
Mass [kg]	170	275	477
Power [W]	350	450	630
Data Rate [Mbps]	2/30	30	4700
Reference Instrument			



Space Weather Instruments

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	Coronagraph Concept		
	Study Threshold	**Expected**	**Maximum Effective**
Field of View	2.5-20 Rs	2-32 Rs	1.1-32 Rs
Resolution	20 arcsec	23 arcsec (2-6 Rs) 50 arcsec (6-32 Rs)	5.6 arcsec (1-3 Rs) 23 arcsec (3-6 Rs) 50 arcsec (6-32 Rs)
Sampling Rate	30 minutes	12 minutes	5 minutes
Size [m]	0.1x0.1x0.2	0.2x0.2x1.36	0.34x0.34x1.36
Mass [kg]	3	14	21
Power [W]	3.5	12	18
Data Rate [kbps]	5	5	50
Cost ($FY16) **(NICM + SME)**	$7.3M	$15M	$21M
Reference Instrument	MiniCOR (CubeSat)	SOHO LASCO C2+C3	SOHO LASCO C1+C2+C3

Reference instruments guided the estimation of the performance and SWAP-C

Extrapolations and combination of various instruments in *suites* were required in most cases

NSOSA Instrument Catalog

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- Anticipated impacts of capability:
  - NOAA Space Segment environmental monitoring program of the 2030-2050 would achieve desirable performance at lower cost than the POR
  - Technological improvements in nearly all major instrument types would be incorporated
  - Industry could work with National labs to accelerate tech maturation and infusion
  - Society will benefit