AEGIS BALLISTIC MISSILE DEFENSE

Aegis BMD Overview
for the
Military Affairs Council

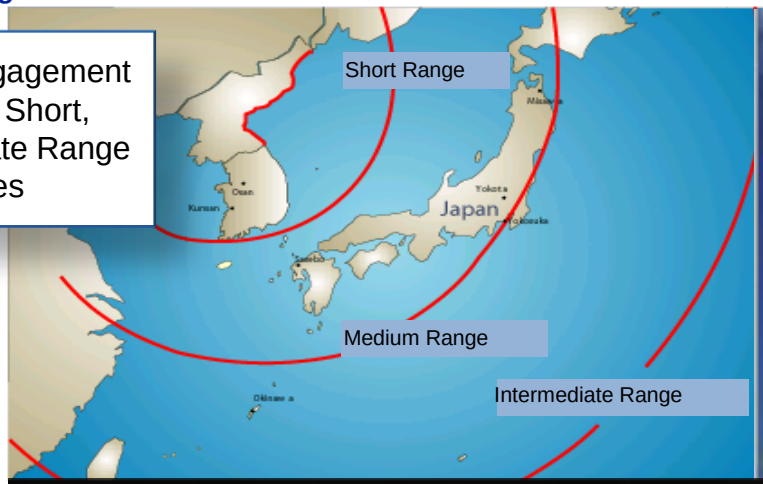
CAPT Brian Shipman, USN
Chief of Staff, Aegis BMD

23 January 2012

Aegis BMD's Role in the BMDS

Aegis BMD

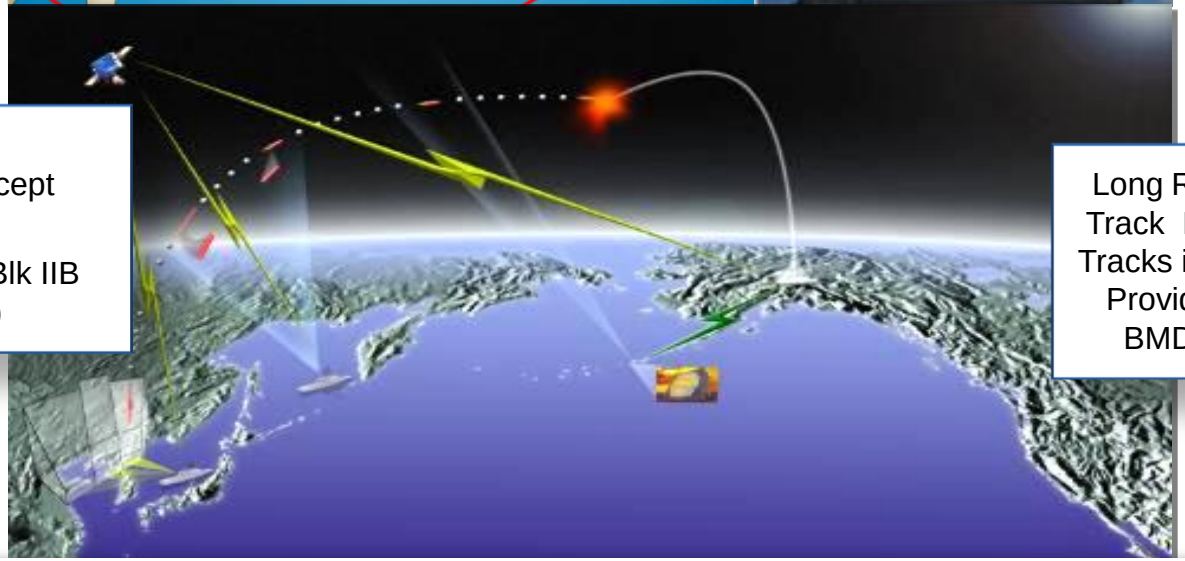
Ascent/Midcourse Engagement Capability Defeats Short, Medium & Intermediate Range Ballistic Missiles



Terminal Defense Capability Defeats Shorter Range Ballistic Missiles

<u>Future</u>
Adding Early Intercept Capability

Anti-ICBM w/SM-3 Blk IIB (Aegis Ashore)



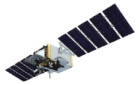
Long Range Surveillance & Track Function Detects and Tracks in Early Ascent Phase Providing Forward Based BMDS Sensor Support

Proven Against Single Salvo, Dual Salvo & Separating Targets

Aegis BMD Program

Aegis BMD

Autonomous (2004)
Launch on Remote (Ship to Ship) 2006
Launch on Remote (BMD Sensors) 2008
Engage on Remote



Aegis Ballistic Missile Defense Signal Processor (BSP) Upgrade 2012

SM-3

Blk I / IA / IB 2004/2006/2013 ✓ ✓
Blk IIA 2018
Blk IIB 2020

AN/SPY-1D(V) (4 Array Faces)

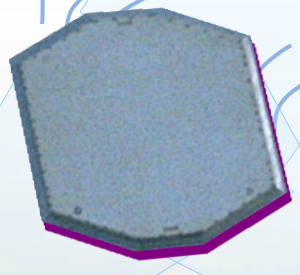
Aegis Ashore Deckhouse

Aegis Weapon System

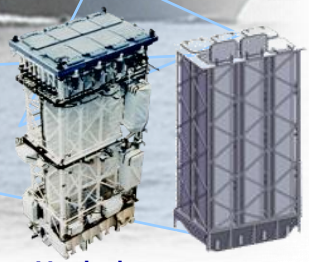
VLS 3 modules; 8 cells each

Aegis Ashore 2015
Hawaii Test Site 2013

Open Architecture 2012



Radar System AN/SPY-1



Vertical Launching System Mark 41

SM-3 Blk IIB VLS Concept

Sea-Based Terminal

SM-2 Blk IV 2008 Near Term ✓
SM-6 Missile 2015 Incr 1
SM-6 Missile 2018 Incr 2

Approved for Public Release: 12-MDA-6517 (11 January 12)

U.S. Phased Adaptive Approach Contributes To NATO Missile Defense

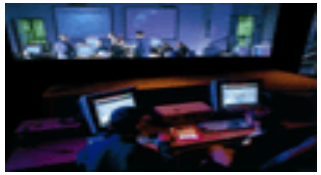
Aegis BMD

Phase 1 (By 2011)

Initial capability against SRBMs, MRBMs, and IRBMs, enhanced homeland defense

Aegis BMD 3.6.1 with SM-3 IA

AN/TPY-2 (FBM)

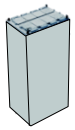


C2BMC AOC Ramstein

ALTBMD Interim Capability

Phase 2 (By 2015)

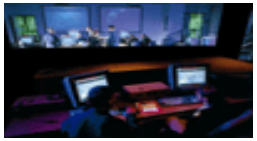
Robust capability against SRBMs and MRBMs



Aegis Ashore 5.0 with SM-3 IB (one site)

Aegis BMD 4.0.1/5.0 with SM-3 IB

AN/TPY-2 (FBM)



C2BMC Updates

ALTBMD Lower Tier

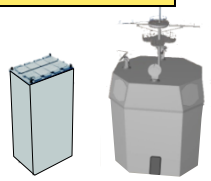
Potential EPAA Enhancements

THAAD

Phase 3 (By 2018)

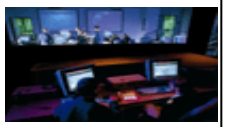
Robust capability against IRBMs

Aegis BMD 5.1 with SM-3 IIA



Aegis Ashore 5.1 with SM-3 IB/IIA (two sites)

AN/TPY-2 (FBM)

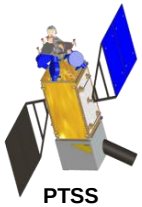


C2BMC Updates

ALTBMD Upper Tier

Potential EPAA Enhancements

THAAD



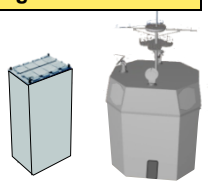
PTSS

ABIR

Phase 4 (By 2020)

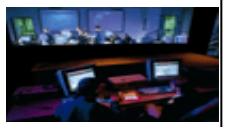
Early intercept capability against MRBMs and IRBMs; and ICBMs from today's regional threats

Aegis BMD 5.1 with SM-3 IIA



Aegis Ashore 5.1 with SM-3 IIB (two sites)

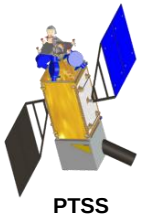
AN/TPY-2 (FBM)



Enhanced C2BMC

Potential EPAA Enhancements

THAAD



PTSS

ABIR

Aegis BMD Fleet Today
(January 2012)

Aegis BMD

SM-3 Blk I Deliveries

CY04	FM-7 FM-8 PB 08	CY05	

SM-3 Blk IA Deliveries

CY06	FTM-10
CY07	FTM-11 FTM-11a FTM-12 FTM-13 (2) Burnt Frost
CY08	
CY09	FTM-17
CY10	Key: Delivered / Procured
CY11	FTM-15

SM-3 Blk IB Deliveries

CY11	FTM-16 E2 (Pathfinder Round)

SM-2 Blk IV Deliveries (75)

FTM-14 (2)
Stellar Daggers

Norfolk BMD Ships

- VELLA GULF
- MONTEREY
- RAMAGE
- STOUT
- COLE
- *LABOON
- *BARRY (FY11)
- MAHAN (FY12)
- ROSS (FY12)
- ARLEIGH BURKE (FY12)
- DONALD COOK (FY12)

SDGO BMD Ships

- DECATUR
- BENFOLD
- MILIUS
- HIGGINS
- JOHN PAUL JONES

Mayport Based BMD Ship

- THE SULLIVANS
- CARNEY (FY12)

Japan Maritime Self Defense Force

- KONGO
- CHOKAI
- MYOKO
- KIRISHIMA

YOKO BMD Ships

- SHILOH
- STETHEM
- CURTIS WILBUR
- JOHN S. MCCAIN
- FITZGERALD

PHBR BMD Ships

- LAKE ERIE (4.0.1 EDM)
- PORT ROYAL
- RUSSELL
- O'KANE
- PAUL HAMILTON
- HOPPER

AB201109CC003

** Not Yet Certified*

Aegis BMD Firing Operations

Aegis BMD

Foreign Military Sales

17 Dec 07 — JFTM 1

- First Firing from Japanese Destroyer

19 Nov 08 — JFTM 2

- First Japanese No-Notice Launch
- Separating Target

27 Oct 09 — JFTM 3

- Engage Separating Warhead with SM-3 Blk IA

28 Oct 2010 — JFTM 4

- Final JFTM engagement of a separating warhead with SM-3 Blk IA

Terminal Defense

5 June 08 — FTM 14

- Engage SRBM w/ SM-2 Blk IV

26 Mar 09 — Stellar Daggers

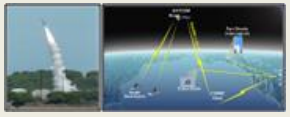
- Simultaneous BMD/ AAW Engagement

Homeland Defense

GT-180 Glory Boost

IFT-9/10

PAC EX I, II, III, & IV

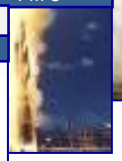


First ICBM Tracking: 19 Sep 02

25 Jan 02 — FM-2

- First Intercept

13 Jun 02 — FM-3



21 Nov 02 — FM-4

- Ascent Phase Intercept

17 Jun 03 — FM-5

- Aim Point Adjust

11 Dec 03 — FM-6

- No Notice Firing

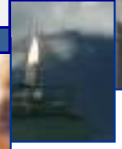
24 Feb 05 — FTM 04-1(FM-7)

- Separating Warhead

17 Nov 05 — FTM 04-2(FM-8)

- SM-3 BLK IA
- Aegis 3.6
- First Coalition Test

22 Jun 06 — FTM 10



7 Dec 06 — FTM 11

26 Apr 07 — FTM 11 Event 4

- Simultaneous BMD/AAW Engagements
- Auto-BMD
- Pulse DACS

22 Jun 07 — FTM 12

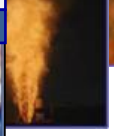
- Engage Dual SRBMs

6 Nov 07 — FTM 13

20 Feb 08 — Satellite Intercept

- First Launch on Remote Operation

1 Nov 08 — PACBLITZ 08



- First Fleet SM-3 Firing

30 Jul 09 — FTM 17

15 Apr 11 — FTM 15

- First IRBM Intercept

1 Sept 11 — FTM 16

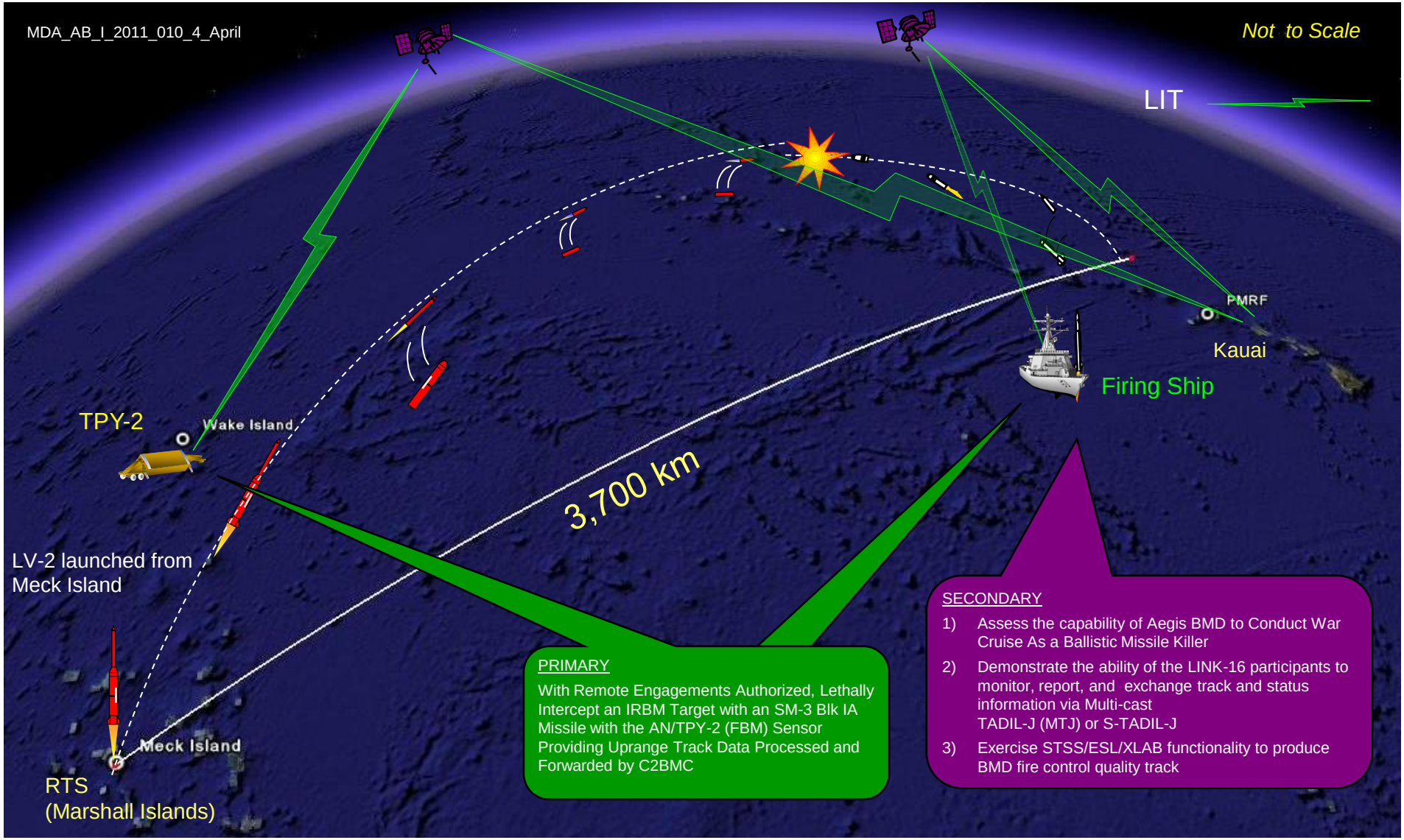
- SM-3 BLK IB
- Aegis 4.0.1

COMOPTEVFOR Final Report:
"The Aegis BMD System is Operationally Effective and Operationally Suitable"

Aegis BMD Firings Successes
19 for 23 SM-3 3 for 3 SM-2

FTM-15 Mission Scenario and Objectives

Aegis BMD



Aegis BMD 3.6.1, SM-2 Block IV & SM-3 Block IA

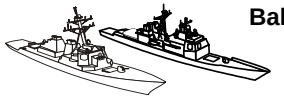
Currently Fielded Weapon System

Aegis BMD

Aegis BMD 3.6.1 Computer Program and Equipment System:

Approach: Modify Existing Ship Systems

Threats: Short to Intermediate Range Ballistic Missiles



Initial Launch on Remote

Operational:
- Retain Multi Mission Capability
- Near Term Sea Based Terminal

Quantity: 23 *(as of 2 January 2012)*

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

SM-2 Block IV Missile:

Approach: Modify Existing SM-2 Block IV Missiles

Battle Space: In the Atmosphere

Threats: Short Range Ballistic Missiles

Quantity: 72 *(as of 2 January 2012)*

Provider: Raytheon, Arizona & Navy Field Activities/Labs

SM-3 Block IA Missile:

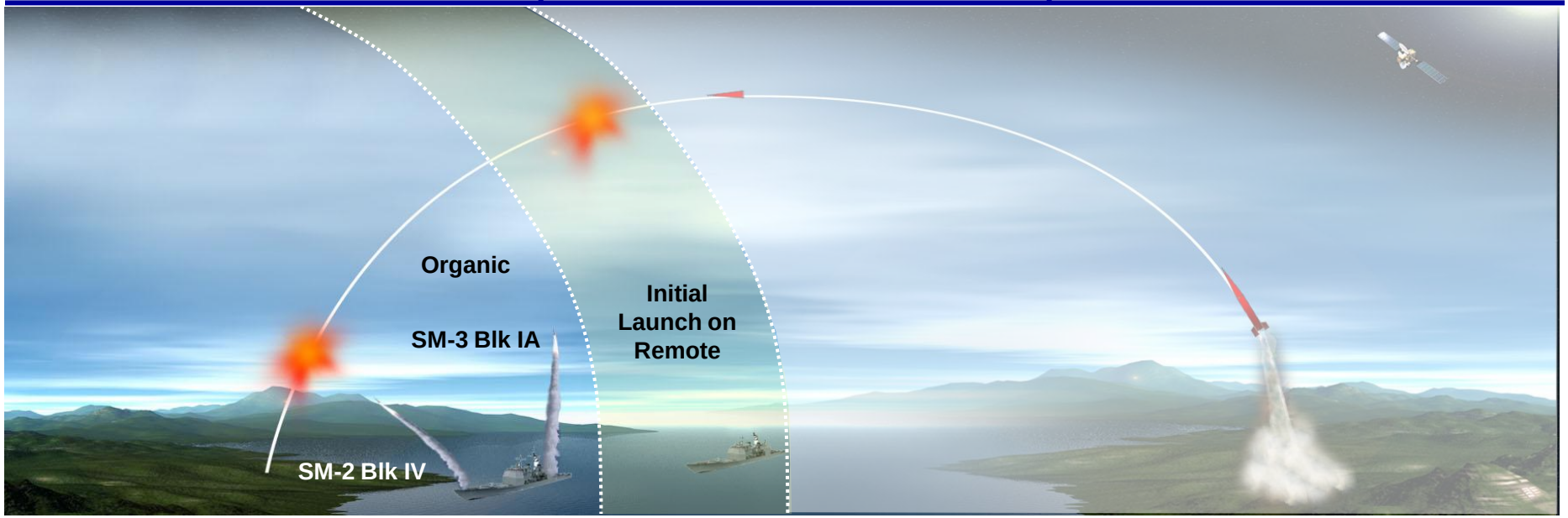
Approach: Add 3rd Stage & Kill Vehicle to Existing SM-2 Blk IV Booster Stack

Battle Space: Above the Atmosphere

Threats: Short to Intermediate Range Ballistic Missiles

Quantity: 81 *(as of 2 January 2012)*

Provider: Raytheon, Arizona & Navy Field Activities/Labs



PAA Deployment
USS MONTEREY Deploys to Mediterranean Sea

Aegis BMD

- **First PAA Phase I Deployment**
  - **Arrived on station 5 April 2011; assigned Ballistic Missile Defense as Primary Mission**
  - **Seven Month Deployment**
  - **Port Visit in Constanta, Romania 06-09 June 2011**
- **MONTEREY has updated and refined PAA related tactics, techniques and procedures**

- **USS MONTEREY has:**
  - **Hosted a Reception and Ship Tours with Teodor Baconschi, Minister of Foreign Affairs; Mircea Geoana, President of the Senate**
  - **Participated in Cultural Exchange and Community Relations Activities in the Constanta Area**

"This is Monterey's Most Important Port Visit on this Deployment"

~ Commanding Officer, USS MONTEREY

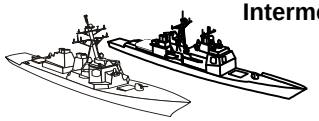
Aegis BMD 4.0.1 & SM-3 Block IB
2nd Generation Weapons System

Aegis BMD

*Aegis BMD 4.0.1 Computer Program and Equipment System:

Approach: Improve Shipboard Signal & Data Processing

Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles



Launch on Remote

Operational: - Increased Raid Density

- Flexible Firing Doctrine

Cost: $45-$55M

Quantity: 1 Test Ship

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

Status: Initial At-Sea Testing Underway, Available Late CY2011

*Can Also Fire SM-3 Blk IA

SM-3 Block IB Missile:

Approach: Improve SM-3 Kill Vehicle Seeker & Engine

Battle Space: Above the Atmosphere

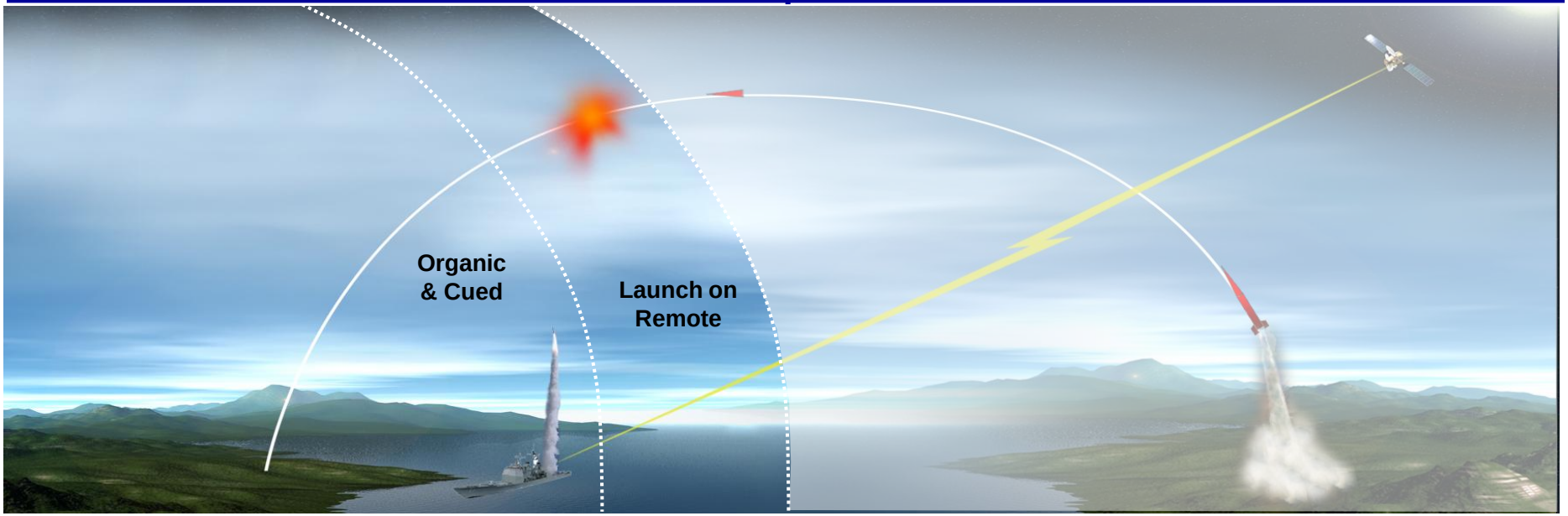
Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles

Cost: $12-$15M (est.)

Quantity: >300 Planned, Test Rounds Being Fabricated

Provider: Raytheon, Arizona & Navy Field Activities/Labs

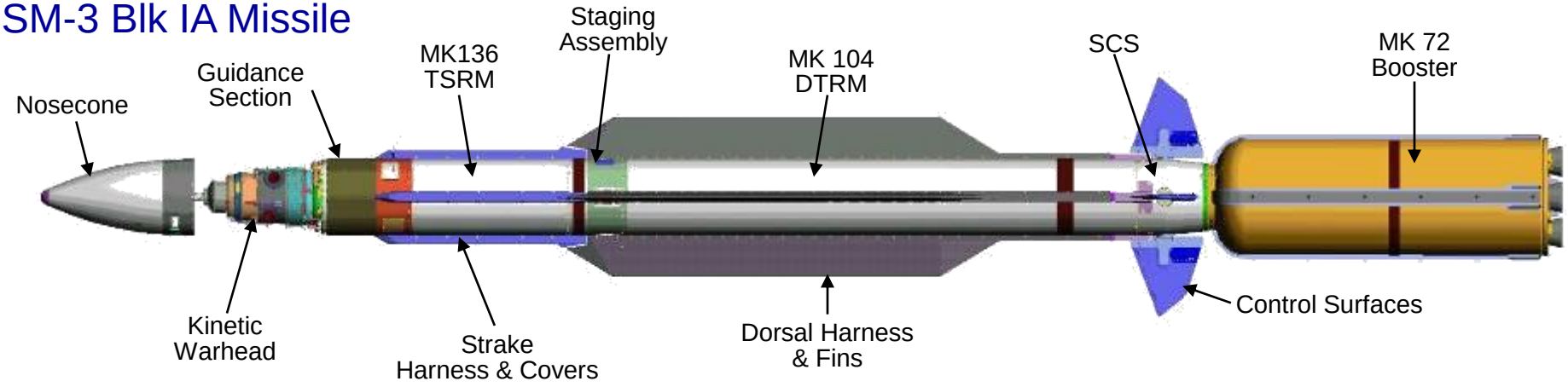
Status: First Flight CY2011
IOC 2013



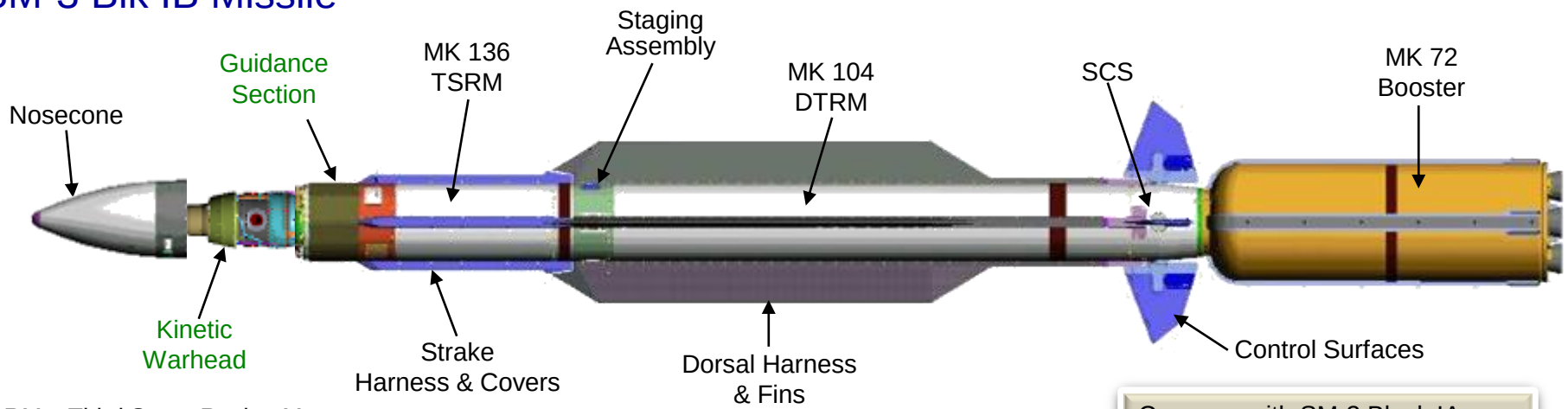
Aegis BMD SM-3 Missile Profile

Aegis BMD

SM-3 Blk IA Missile



SM-3 Blk IB Missile



TSRM – Third Stage Rocket Motor
DTRM – Dual Thrust Rocket Motor
SCS – Steering/Control Section

Common with SM-3 Block IA
Changed for SM-3 Block IB

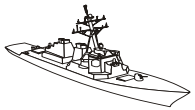
Aegis BMD 5.0 & SM-3 Block IB

Aegis BMD

* † Aegis BMD 5.0 Computer Program and Equipment System:

Approach: Integration of BMD 4.0.1 Capability into Aegis Modernization/Baseline 9

Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles



Launch on Remote

Operational:
- Increased Raid Density
- Flexible Firing Doctrine

Cost: $10M for Ship Integration of BMD 5.0 as part of Baseline 9 (Material; Procurement of ORDALTS; Installation)

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

Status: Under Development as Part of Baseline 9, Available 2014

* Can Also Fire SM-3 Blk IA
† BMD Module in Navy's Baseline 9

SM-3 Block IB Missile:

Approach: Improve SM-3 Kill Vehicle Seeker & Engine

Battle Space: Above the Atmosphere

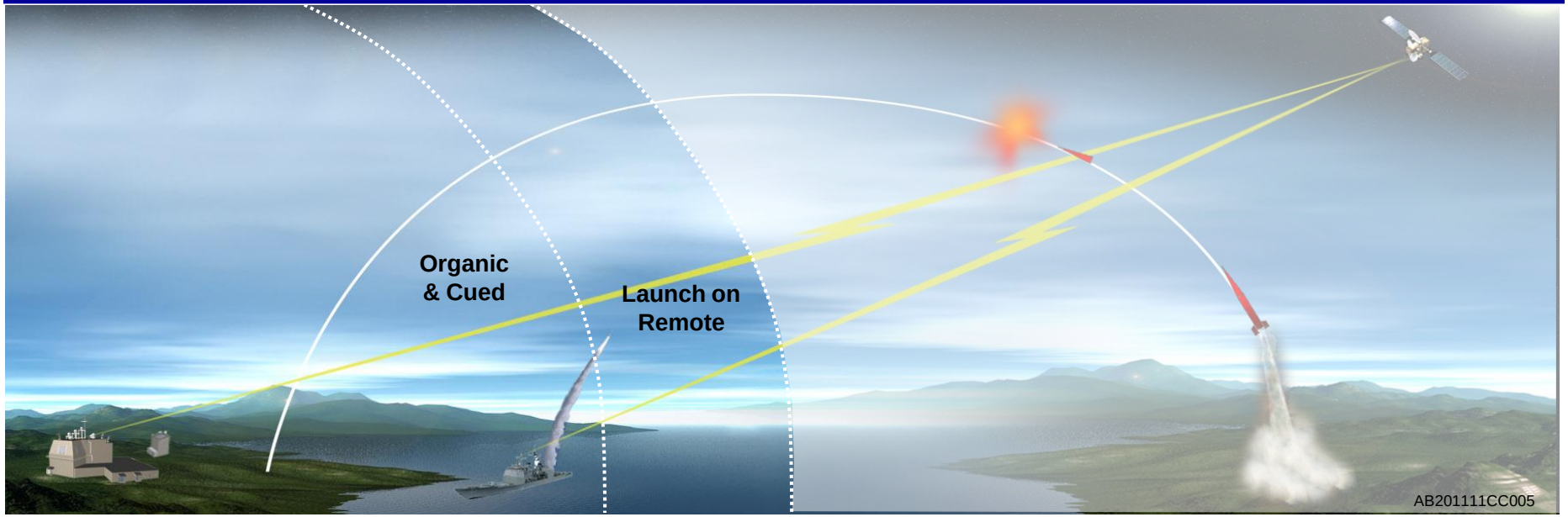
Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles

Cost: $12-$15M (est.)

Quantity: >300 Planned, Test Rounds Being Fabricated

Provider: Raytheon, Arizona & Navy Field Activities/Labs

Status: First Flight CY2011
IOC 2013



Aegis BMD 5.0 CU, SM-3 Block IB & SM-6

Aegis BMD

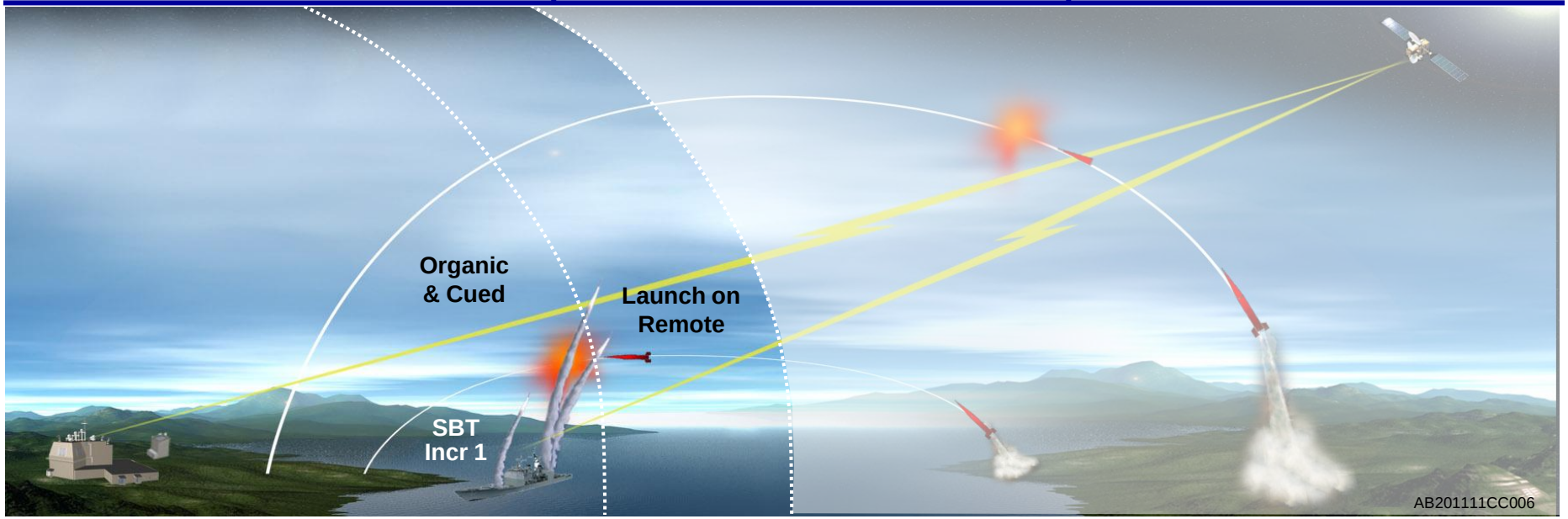
- **Aegis BMD 5.0 CU Development Strategy**
  - Aegis Baseline 9 is foundation for Aegis BMD 5.0 Capability Upgrades
  - Integrates into the Baseline 9 Common Source Library
- **Aegis BMD 5.0 CU Capabilities**
  - Incorporate Endo Organic Engagement
  - Expand/Update Baseline 9 MRBM and IRBM threat set
  - Increase SM-3 engagement capacity and Max SM-3 Missiles in Fight
  - Sea-Based Terminal Increment 1 with SM-2 Block IV and SM-6

SM-3 Block IB Missile:

Approach:	Improve SM-3 Kill Vehicle Seeker & Engine
Battle Space:	Above the Atmosphere
Threats:	More Sophisticated Short to Intermediate Range Ballistic Missiles
Cost:	$12-$15M (est.)
Quantity:	>300 Planned, Test Rounds Being Fabricated
Provider:	Raytheon, Arizona & Navy Field Activities/Labs
Status:	First Flight CY2011 IOC 2013

SM-6 Missile (Modified):

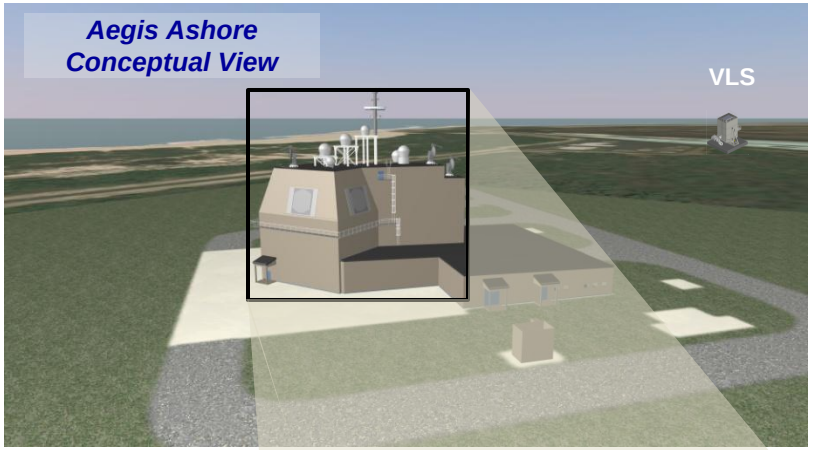
Approach:	Modify Existing SM-6 Missiles
Battle Space:	In the Atmosphere
Threats:	Short and Medium Range Ballistic Missiles
Quantity:	TBD
Provider:	Raytheon, Arizona & Navy Field Activities/Labs
Status:	IOC FY15

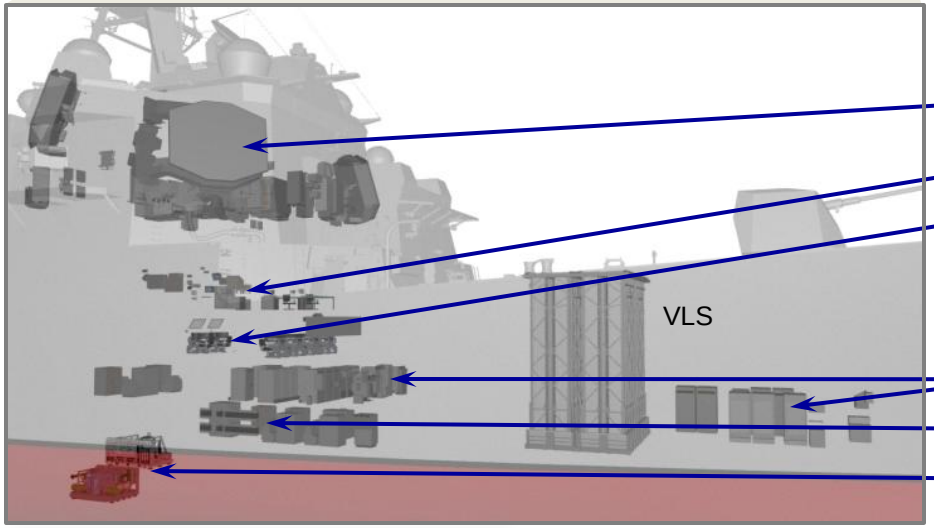


Aegis BMD Transition From Sea To Ashore

Aegis BMD

U.S. Navy Destroyer (DDG 113)





SPY Radar and FCS

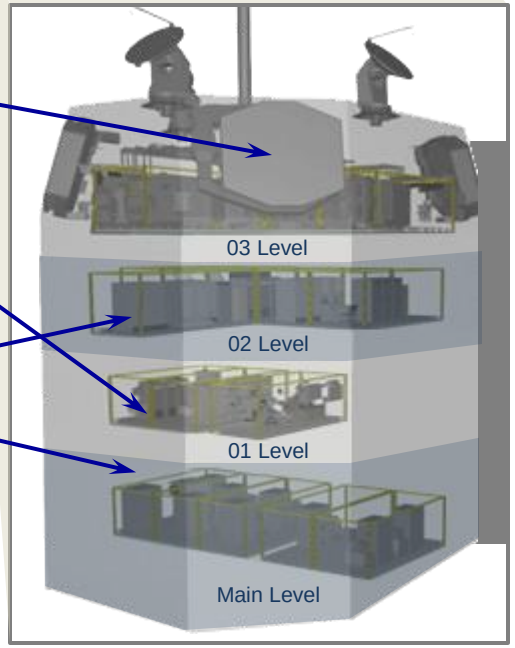
CSMC

CIC

Processors

Power Supplies

Cooling Skids



Acronyms	
FCS	Fire Control System
CSMC	Combat System Maintenance Central
CIC	Combat Information Center
VLS	Vertical Launch System

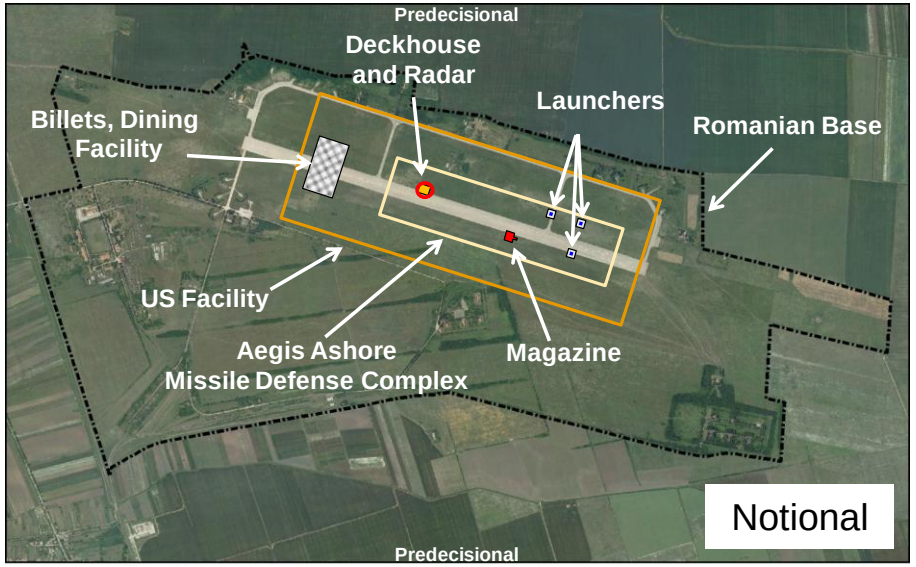
AB201110CC009

Aegis Ashore Missile Defense Site

Aegis BMD

Aegis Ashore Conceptual Drawing

Aegis Ashore Proposed Laydown at Romanian Site



Aegis BMD 5.1, SM-3 Block IIA & SM-6

3rd Generation Weapons System

Aegis BMD

Aegis BMD 5.1 Computer Program and Equipment System:

Approach: Modify Existing Systems to Fly SM-3 Blk IIA & Use Off Board Sensors for Engagement

Threats: More Sophisticated Short to Intermediate Range Ballistic Missiles

Engage on Remote

Operational: Flexible Firing Doctrine

Cost: $23M

Quantity: TBD

Provider: Lockheed Martin, NJ & Navy Field Activities/Labs

Status: Development, IOC 2018

SM-3 Block IIA Missile:

Approach: Increased Reach & Velocity Biggest Missile Compatible w/Mk41 VLS

Battle Space: Above the Atmosphere

Threats: More Sophisticated Short to Some Intermediate Range Ballistic Missiles

Cost: ~$20M-$24M

Quantity: TBD

Provider: Joint U.S. & Japan

Status: Development, 1st Flight Late 2016

SM-6 Missile (Modified):

Approach: Modify Existing SM-6 Missiles

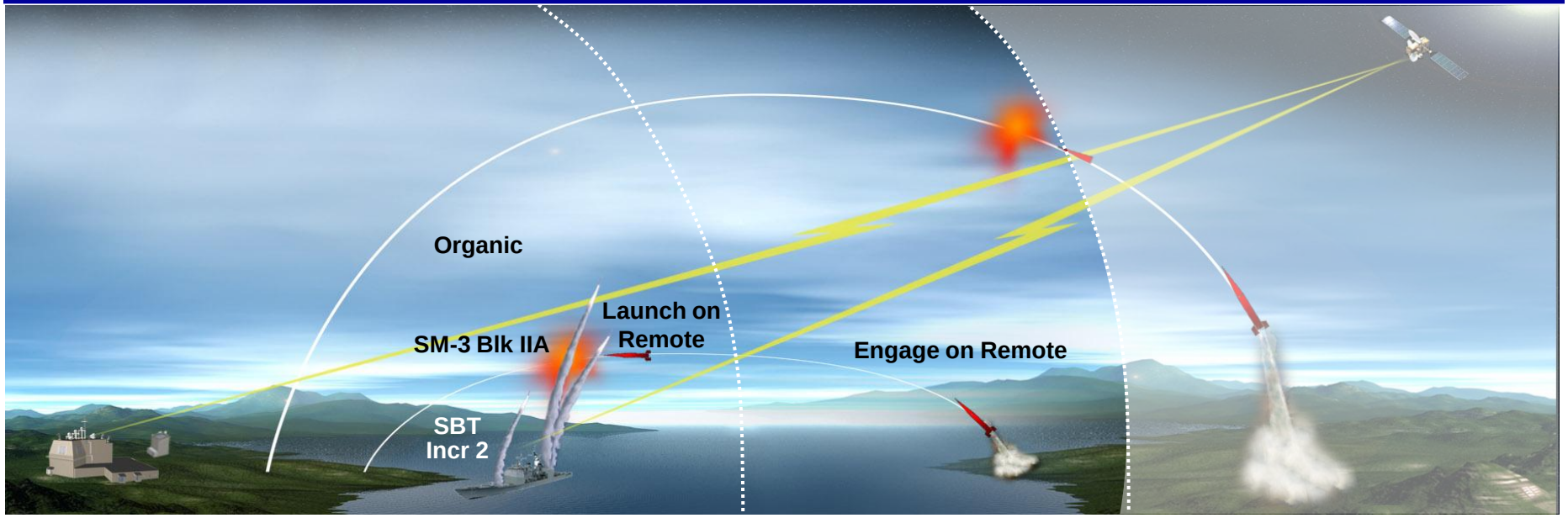
Battle Space: In the Atmosphere

Threats: Short and Medium Range Ballistic Missiles

Quantity: TBD

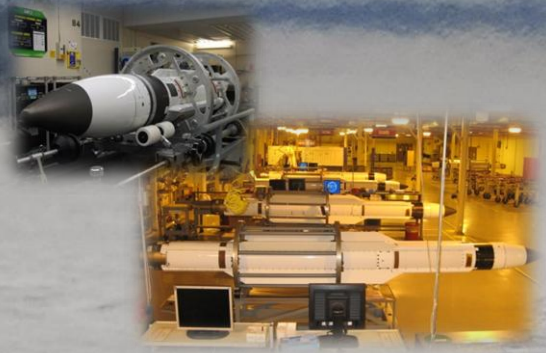
Provider: Raytheon, Arizona & Navy Field Activities/Labs

Status: IOC FY18



Aegis BMD . . . We Deliver

Computer Program Development



Missile Development

Ground Testing

Installation

Firing

Enabling Capabilities, Providing Options for U.S. and Allies


MISSILE DEFENSE AGENCY
CUSTOS CUSTODUM IPSORUM
AEGIS BALLISTIC MISSILE DEFENSE