NATO´s Ballistic Missile Defense Plans – a game changer?
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<www.ifsh.de and www.armscontrol.de>

1. Lisbon Summit´s Decisions
2. Current Capabilities and Technical Reliability
3. Cooperation with Russia
The Research Project

**Missile Defense in Europe** – A cooperative study by the **Academy of Sciences in Hamburg** and the **IFSH**

Chapter 1: Technology and Proliferation of Ballistic Missiles

Chapter 2: Missile Defense Technologies, Missile Defense Programs outside Europe

Chapter 3: Ballistic Missile Defense (BMD) in Europa, Evaluation of the future Capabilities of the US Systems

Chapter 4: Possible impact of BMD on Disarmament, Arms Control and International Relations

Conclusions and Recommendations
Modelling of Missile Flights

Mod5, a physical model for the simulation of ballistic missile trajectories has been developed.

Model Input:
- missile data
- launch site
- flight direction
- gravity turn

Trajectory Calculation:
- gravity of the Earth
- inertia forces
- drag force
- missile thrust

Model Output:
- missile range
- place of impact
- duration of flight
- apogee
- burn-out velocity

Assumptions and Approximations

Allows to answer the question, if and where an attacking missile can be reached.
NATO’s New Strategic Concept, November 20 2011:

• Proliferation of ballistic missiles (BM), which poses a real and growing threat to the Euro-Atlantic area [#2]
• NATO develops “the capability to defend our populations and territories against BM attack as a core element of our collective defence” [#19]
• NATO “will actively seek cooperation on MD with Russia” [#19]

NATO’s Summit Declaration, November 2011:

• Essential elements of the (comprehensive) review would include the range of NATO’s strategic capabilities required, including NATO’s nuclear posture, and MD [#30]
• The aim of a NATO MD capability is to provide full coverage and protection for all NATO European populations, territory and forces against the increasing threats posed by the proliferation of BMs, taking into account the level of threat, affordability and technical feasibility [#36]
NATO Experiences

- NATO has **no** joint BMD experiences
- "**Action Plan**" developed for June 2011
- “to explore opportunities **for cooperation with Russia**”
- Most programmes are **national**: Patriot, Meads, Thaad
- First candidate is the US Aegis-BMD- system (ship/land)
- US- EPAA is “welcomed as a valuable national contribution to the NATO MD architecture” [Lisbon Dec #37]
- ALTBMD-Program is a **tactical** Command and Control Project to net sensors and systems against MRBM.
- **Costs**: 800 mio. € (14 years), + 200 mio. € 😊
- Poland, Czek Republic, Romania, Bulgaria are ready for deployment of Aegis-BMD-Components, Turkey???
Obama’s „Phased Adaptive Approach“: Aegis-BMD-System

- Build-up of a regional BMD-system in Europe against MRBM’s
- Six (three) ships equipped with SM-3 Block I (II) can cover Europe
- SM-3 is **not tested** under realistic conditions; countermeasure problem is not solved, therefore BMD is „shaky defense“
- Next generation of interceptors SM-3 Block IIA/B (2018) has Anti-ICBM capability and can affect Russian deterrent
- Number of interceptors are not limited, performance of interceptors will be improved and ships can be deployed everywhere which is a legitimate concern by Russia and esp. China
- Cooperation with Russia is offered, but unlikely
- Cost and arms control consequences are underestimated
# European Phased Adaptive Approach

<table>
<thead>
<tr>
<th>Phase</th>
<th>Intro</th>
<th>BMD-System</th>
<th>Deployment area</th>
<th>Directed to</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>2011</td>
<td>PATRIOT; THAAD; FBX, AEGIS SM-3 Block IA;</td>
<td>Mediterranean, Baltics, Black Sea</td>
<td>S/MRBM</td>
</tr>
<tr>
<td>II</td>
<td>2015</td>
<td>+ Aegis SM-3 IB</td>
<td>+ Land-based Romania</td>
<td>S/MRBM</td>
</tr>
<tr>
<td>III</td>
<td>2018</td>
<td>+ Aegis SM-3 IIA</td>
<td>+ 3-4 sites + Poland</td>
<td>SRBM/MRBM/IRBM(ICBM)</td>
</tr>
<tr>
<td>IV</td>
<td>2020</td>
<td>+ Aegis SM-3 IIB</td>
<td>Possible only 2 land-based sites</td>
<td>IRBM, ICBM</td>
</tr>
</tbody>
</table>
Proliferation of Ballistic Missiles

- Only the five NPT **Nuclear Weapon States** own Ballistic Missiles (BM) with sophisticated technology and ranges $> 3,000$ km

- **North Korea** and **Iran** are developing MRBM and – like **Israel, India, Pakistan and Saudi Arabia** - possess missiles with ranges of more than $1,000$ km

- Their BM-technology is based on older Russian/Chinese technology

- Future path of the Iranian and North Korean missile program is unknown, but ambitious (Iran) not sucessfull (North Korea)

- The development of ICBMs is much more difficult than claimed by government authorities

- Dozen of countries have (old) missiles with shorter ranges
Interceptor Deployment and hypothetical trajectories form Russia and Iran

Different scenarios with various model missiles, launch sites, targets, interceptors, interceptor deployments and trajectories.
Defense with SM-3 Block I
Defense with SM-3 Block II
Reachability of ICBMs

<table>
<thead>
<tr>
<th>Interzeptordaten \ Trajektorie</th>
<th>Kavoshgar - W. DC</th>
<th>Tatischchevo - W. DC</th>
<th>Plessezk-W. DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startverzögerung</td>
<td>160 s</td>
<td>85 s</td>
<td>75 s</td>
</tr>
<tr>
<td>Maximalgeschwindigkeit ((v_{EO}))</td>
<td>5.0 km/s</td>
<td>4.8 km/s</td>
<td>4.7 km/s</td>
</tr>
<tr>
<td>Aufprallgeschwindigkeit ((v_{IMP}))</td>
<td>2.1 km/s</td>
<td>4.0 km/s</td>
<td>4.3 km/s</td>
</tr>
<tr>
<td>Abfanghöhe ((h_{IMP}))</td>
<td>1421 km</td>
<td>480 km</td>
<td>271 km</td>
</tr>
<tr>
<td>Flugdauer (t_{IC})</td>
<td>430 s</td>
<td>197 s</td>
<td>141 s</td>
</tr>
</tbody>
</table>

Nach Washington DC
Unsolved „Countermeasures“ Problem

- Stealth Warhead
- Aluminium Strips
- Elektronical Sender
- Debris of the upper stage
- Submunition

2002-2009 MDA: 8 of 10 successful „target destroyed“

Lewis/Postol:
2 hits out of 10
1. The HTK technology has not been tested under realistic conditions

2. **Location:** The Aegis BMD system can, in principle, to defend Europe against Iranian IRBM

3. Unclear **costs/effectiveness** require accurate budget and mission review

4. An introduction of **faster interceptors** (phase III/IV) could have an effect with respect to Russian ICBMs in West Russia.

5. A potential adversary has **many options to bypass** the existing BMD systems (CMs or intensified rocket production = arms race).

6. The **reliability** of a EU-BMD-system can only be seen in combat

7. NATO´s future BMD system is due to it´s inherent unreliability an **additional component to deterrence** not a substitute

8. The BMD debate **masks the real problem:** nuclear proliferation and nuclear security, esp. it denies other likely delivery system (CM, UAVs)

9. BMD has an inherent ASAT capability and there are no international rules prohibiting the destruction of satellites (OST 1967)
3. Russia’s Concern, Future Cooperation and Arms Control/Disarmament

• Joint cooperation on tactical MD can be the first real security cooperation with Russia and a litmus test for both sides political will. At best it could be a game changer for the European security architecture

• If there is political will and if Iran/ Middle East is the problem Joint TMD can be organized

• There are many obstacles which could derail European Security and arms control in Europe:
  - CFE-Treaty and the debate of the withdrawal of TNWs
  - Iranian problem
  - N-START Implementation and N-START-Follow-on
  - Domestic stakeholders: Radar in Georgia
  - Aim, architecture etc. unclear: one or two systems
Russia’s Concern

• **N-START Follow-On:** Less than 1,000 warheads?
  - Prompt Global Strike?
  - US and RUS might argue to give up: First strike capability, Triade, counterforce doctrine, no-first use
  - Including tactical nuclear weapons
  - Weaponization of space and BMD
  
  ➢ **Missile defense and strategic stability?**

• Taking into account that „strategic offensive arms of one Party do not undermine the viability and effectiveness of the strategic arms of the other Party“ [Federal Law of RF on N-START, 2011]
Cooperation with Russia

President Medwedev: „full equality or compensation of an emerging imbalance“? But which imbalance: nuclear deterrent? Conventional?

**Joint Tactical BMD System**: „possible“
1. Joint Data **exchange**, BMD **exercises** and observers („transparency“)
2. Integration of Sensors (Radar/Space) in a tactical BMD system and common BMD HQ for coordination and data exchange („Partnership“)
3. Joint tactical BMD-system: C², sensors, interceptors („hardware“) veto?
4. Problem: demarcation between TMD and strategic BMD (agreement)

**Joint Strategic BMD System**:
1. JDEC in Moscow, BMD exercises and observers („transparency“)
2. Limitation of strategic deployments (Arctic?) and interceptors („Arms Control“)
3. Treaty on Prohibition of Acts against attacks of objects in space („OST“)
Possible Deployment sites for Joint BMD assets