Open Skies in Europe, North America and East of the Urals and Hints for Missile Verification

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Berlin, 23 June 2008

Presentation at the Third Meeting of the Multilateral Study Group on the Establishment of a Missile Free Zone in the Middle East/Gulf Region
Berlin, 23 June 2008

Outline

Open Skies agreements have served as innovative instruments for supporting military transparency and cooperative security in Europe and between Russia and the US.

1. The pioneering bilateral Open Skies agreement between Hungary and Romania (1991 – 2005)
2. The multilateral Open Skies Treaty (1992 -)
3. Open Skies light in Bosnia-Herzegowina (2000 – 2006)
4. Hints for the Middle East context

1. The pioneers: Hungary and Romania

Hungary and Romania became the first states to negotiate and implement a bilateral Open Skies agreement covering their full territory.

The initial situation in 1990/91

- Regime collapse and transformation in Central Eastern Europe
- Collapse of Warsaw Treaty
- Large Hungarian minority in Romania in territories which Hungary lost in 1923
- Danger of renationalization of defence policies
- Negotiations on multilateral Open Skies Treaty stalled since May 1990

Supportive conditions

- Hungary was a supporter of the Open Skies idea and hosted a multilateral OS conference in May 1990.
  → *Openness to approach*

- Both governments were interested in cooperative security and avoidance of nationalistic clashes.
  → *Political will*

- The military leaders of both countries knew each other well from the Moscow Military Academy.
  → *Familiarity between top military advisors and implementers*

- France provided free dual cameras for film duplication.
  → *Outside assistance*

The negotiations

- Initial proposal by Romania in June 1990
- Negotiations Febr/March 1991, total 6 days
- Signature: 11 May 1991

Principles/Rules

- Technically simple: No resolution limit → No lengthy check of resolution
- Short notice: 24 hours announcement. Submission of flight plan 6 hours after arrival. Review and approval of flight plan „as soon as possible“.
- 4 cooperative flights in each country per year
- Unrestricted territorial access
- Sharing of images by duplication

Implementation

- Use of existing observation aircraft
- Low operation cost: ca. Euro 5000 per flight

Outcome and evaluation

- 60 flights in total in 14 years
- Positive impact on political relations
- Positve public impact by symbolic gesture of opening the full air space
- Positive effect on multilateral Open Skies negotiations

Termination

- In 2005 after both states joined NATO

The Hungarian Open Skies aircraft Antonov 26

has space for crew and about 20 inspectors/observers

Foto R. Wiemker 1996

2. The multilateral Open Skies Treaty

Initial situation 1989

- 20 years of experience in negotiation of bilateral and multilateral arms control and CSBM agreements (with some successes)
- Perestroika gave push to talks on reduction of conventional forces in Europe.
- Pres. Bush sr. tried to regain intiative from Gen. Sec.Gorbartchov in arms control.

  → **Proposal of a multilateral OS Treaty with unlimited territorial access (24 May 1989)**

Supporting conditions

- Informal positive input from Canada. → Canada hosts first Open Skies conference in Feb. 1990.
- Positive reaction from Moscow
- Dec. 1989: NATO states agreed on „Basic elements of an OS Regime“.

  → *formative basis for structure and content of Treaty.*

Negotiations

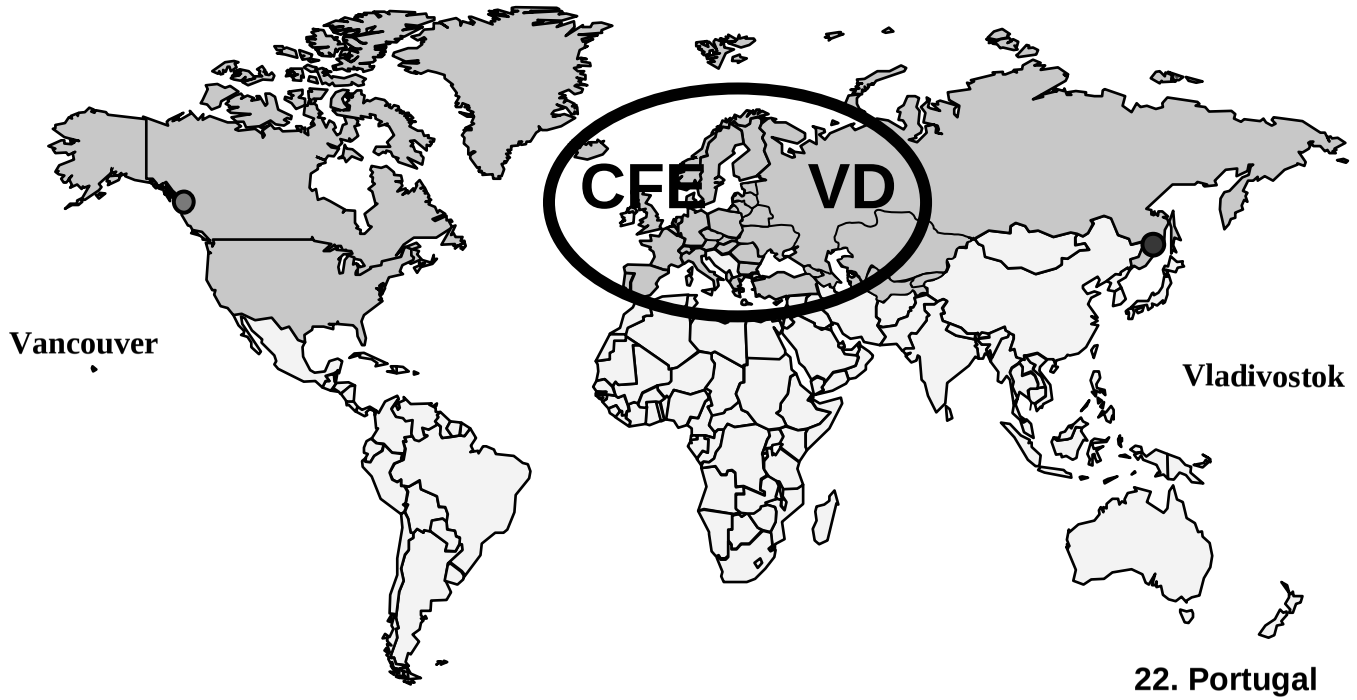
- 2 conferences in Feb. and May 1990 without final success
- Continuous session in Fall 1991 and Winter 1991/92 in Vienna
- Signature: 24 March 1992 in Helsinki at CSCE Summit

→ **Result: A treaty between states with rights and obligations of each party (No bloc commitments)**

Actors/States Parties

- Initially 26 States Parties: All NATO members (then 16), plus former Warsaw treaty members: Bulgaria, Chechoslovakia, Hungary, Poland, Romania, Russia+Belarus, Ukraine
- Today: 34 states incuding formerly neutral states Finland, Sweden, 3 Baltic states, Bosnia, Croatia, Slovenia

Treaty Area



1. Canada
2. United States
3. Belgium
4. Netherlands
5. Luxembourg
6. Bosnia-Herzegovina
7. Germany
8. Bulgaria
9. Denmark
10. Spain
11. Finland
12. France
13. Georgia
14. Great Britain
15. Greece
16. Hungary
17. Italy
18. Latvia
19. Norway
20. Poland
21. Lithuania
22. Portugal
23. Romania
24. Russia
25. Belarus
26. Slovak Rep.
27. Slovenia
28. Sweden
29. Czech Rep
30. Turkey
31. Ukraine
32. Croatia
33. Estonia
34. Iceland

Idea

- *Cooperative aerial observation in order to improve military transparency and openness and to support verification*

Rules/Principles

- **Unlimited** territorial access
- Use of unarmed fixed wing observation aircraft
- System of passive and active **flight quota** depending on size of country

e.g. US, Russia with Belarus	**max. 42**	per year
France, Germany, Italy, Turkey, UK	**max. 12**	
Poland, Romania	**max. 6**	
Georgia, Greece	**max. 4**	

- Limited **surprise element**: Time span between announcement of flight and begin of flight typically **24 -30 hours**
  → *Sufficient time for hiding very sensitive equipment*
- **Image data are shared** between observed and observing state. All others can acquire copies.
  → *This puts all parties on equal footing*
- Open Skies **Consultative Commission** settles disputes, upgrades rules and allocates annual quota.

Entry into force

1 Jan 2002 after 9 years delay in Russian ratification

→ *Difficulties in overcoming resistance of establishment (fear of espionnage/ old thinking)*

→ Russia now sees advantages in OS flights: cheaper and more flexible than satellite monitoring.

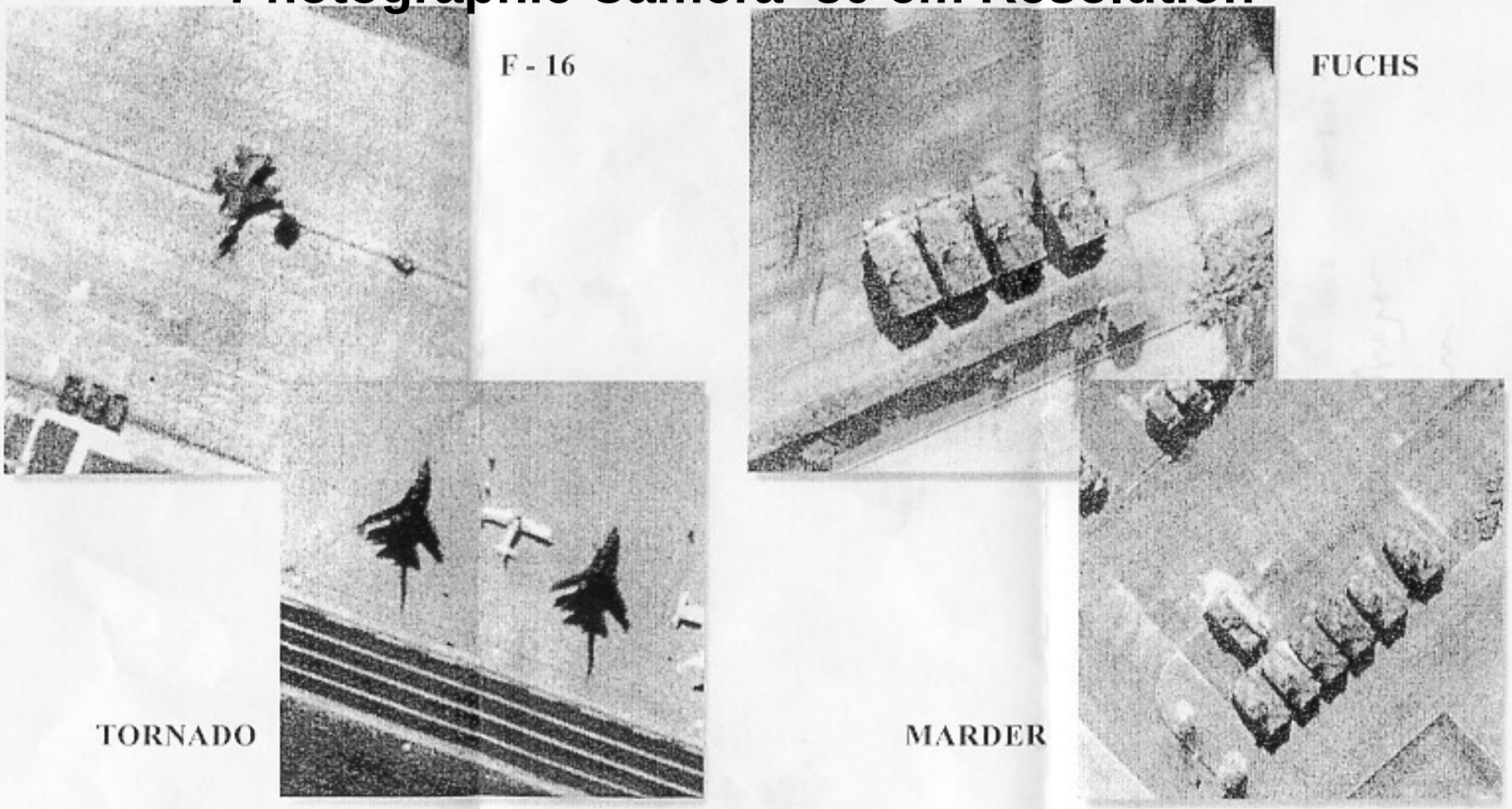
Sensors and resolution

- **Photographic** framing and panoramic cameras at **30 cm** resolution GSD (Ground Sampled Distance)
- **Video** cameras at **30 cm** resolution
- **Thermal infrared imaging** devices at **50 cm** resolution
- **Imaging radar** (SAR) at **3 m** resolution (not yet deployed)
- **Digital** large and medium format **cameras** at **30 cm** resolution (under discussion)

Price of resolution limit: need sophisticated certification procedures for ensuring that the resolution limit is observed.

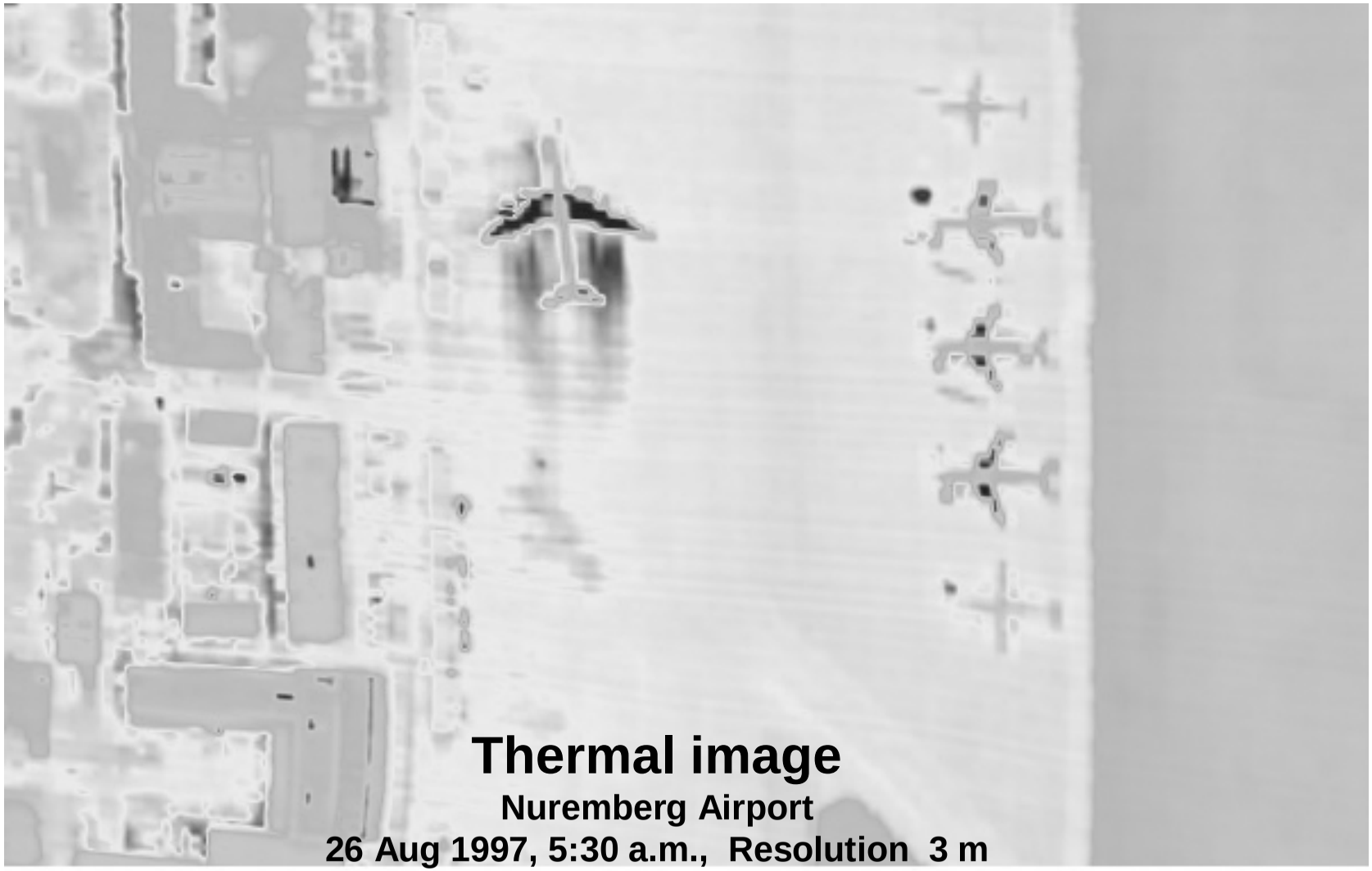
Open Skies

Photographic Camera 30 cm Resolution



Aircraft and armoured personnel carriers in Germany

Source: German Verification Center, Geilenkirchen



Thermal image

Nuremberg Airport

26 Aug 1997, 5:30 a.m., Resolution 3 m

Source: H.Spitzer; Univ. Hamburg, CENSIS, courtesy DLR Wessling

Implementation

- 1992 -2001 before entry into force: Over 400 test flights under Treaty-like conditions
- 2002 – 2007: 380 flights
- Only few states exploit their full active quota entitlements: *Russia and Ukraine*.
- Basic asymmetry: NATO states do not overfly each other. 27 NATO states concentrate their flights on Russia (42), the Ukraine (12) and a few smaller non-aligned states.

Contribution to verification and transparency by monitoring of

- Major conventional weapons parked in the open (Russia ca. 40 %, Germany ca. 20 % of all holdings) **CFE Treaty**
- New construction on military sites
- Naval forces **Global Exchange of Military Information**
- Nuclear facilities
- Missile sites **START Treaty**
- Industry and infrastructure

→ ***typically 50 sites observed per mission***

→ ***Cost effective / superior to satellite monitoring (commercial sats)***

Intrusiveness

- Full territorial access **High**
- Resolution 30 cm GSD **Medium**
  → *acceptable compromise between legal verification requirements and illegal espionnage*
- Frequency of flights **Medium/Low**
- Surprise element **Medium/Low**

Level of confidence in compliance

High level of compliance thanks to
- Detailed (technically complex) implementation rules
- Structural elements which support cooperation (joint flights)
- Political will and mutual interest

Domestic acceptability

- No issue any more
- Open Skies has become a routine affair handled by desk officers, not noticed by the general public, not covered by newspapers.

Evaluation

- Major political changes in Europe since 1992
- Most of the problems the Treaty was designed for have been solved.
  → *Some parties stopped active participation but receive flights (Bosnia, Denmark, Estonia, Portugal, UK)*
- BUT: a) Still substantial interest of Russia to overfly virtually all NATO states incl. the US and Canada regularly.
  b) Substantial interest of the US and other NATO states to overfly Russia.
  → *maintain military transparency in the Russia – NATO context*
- The Treaty is unquestioned in contrast to CFE.
- Open Skies flights can partially make up for the suspension of CFE inspections in Russia and by Russia (effective since Dec. 2007).
- Limited potential for conflict mitigation between Baltic states vs. Russia, Georgia vs.Russia, in former Yugoslavia
- **Open Skies operational experience could assist OS initiatives in other regions.**

3. Open Skies light in Bosnia-Herzegowina

Initial conditions

- 1991 – 1995: Wars in former Yugoslavia
- Nov. 1995: Dayton Agreement foresaw CSBMs in Bosnia-Herzegowina

Negotiations/Preparations

- 26 Jan. 1996: Bosnian Croat Federation and Republica Serpska concluded a CSBM agreement.
- May 1996: First ground inspection
- End 1996: Parties signalled their readiness for examinig a regional Open Skies regime.
- 1997 – 2001 Seven demonstration flights in Bosnia-H.
  by external parties from the multilateral OS Treaty

Agreement

April 2000: The three entities in Bosnia-Herzegowina agreed on a regime of cooperative aerial inspections.

Rules/Implementation

- Helicopter flights with inspectors from the three entities
- Sensors: Video cameras without resolution limit
- Few flights per year

Evaluation

- Minimum solution at low cost
- Image quality and coverage lower than in multilateral OS Treaty
- Good potential for detecting training sites of paramilitary groups
- External assistance was crucial.

Termination

By mutual agreement in 2005/ 06

Lessons

- ***Arms control and CSBMs in unstable (post war) environments need to be combined with economic reconstruction assistance and integration into larger networks.***
- ***Media coverage of CSBMs can help to convince the public.***

4. Open Skies agreements in support of missile monitoring

4.1 Multilateral Open Skies Treaty

Regular flights over

- Missile sites e.g. in Russia and the US)
- Missile defence sites (e.g. in Alaska) and air defence sites
- Naval ports with missiles carriers (e.g. Black Sea fleet)

Result

- Detection of changes
- General enhancement of transparency
- Support of START verification

4.2. Middle East Scenario

Objective: Monitoring of missiles and cruise missiles with range > 150 km
Example: Al Safir,Syria surface-to-air-missile site with SA-2 missiles

Source: http://www.globalsecurity.org/wmd/world/syria/images/al-safir-dg-4.jpg

Typical configuration of 6 missiles

Quickbird Resolution ca. 60 cm

Close-up of the SA-2 SAM site at Al Safir

Source: http://www.globalsecurity.org/wmd/world/syria/al-safir.htm

with Guideline missiles on launchers,

Fan Song Radar,

and Control Vans.

Cable are visible

running from the

command van

to the launchers

Dimensions of some missiles in the Middle East

Type	Length	Diameter	Country
SCUD B	11.25 m	0.88 m	Egypt. Iran
SA-2 Air defence	10.6 m	0.7 m	Syria,…
Nodong/ Shahab 3	15.5 m	1.5 m	Syria, Iran
Jericho 1	10 m	?	Israel
Jericho 2	12 m	1.2 m	Israel
Popeye Turbo Cruise Missile	4.9 m	0.53 m	Israel

Which resolution is required?

Reconnaissance Handbook, McDonnel Douglas Co, 1982
defines different image interpretation steps

Analysis step	Recognition example	Required resolution for Missile Sites (GSD)
Detection	recognize object as an vehicle	**1.5 m**
General Identification	recognize vehicle by category, e.g. tank	**0.75 m**
Precise Identification	recognize vehicle by type, e.g.tank T72	**0.3 m**
Description	Recognize details of configuration, like gun of tank	**0.15 m**

Ground Sample Distance corresponds to pixel footprint of a digital imaging sensor

Recommended resolution for Open Skies-type verification of missiles

30 cm GSD

for missiles with ranges > 150 km

Rough guess of detection/identification challenges at 30 cm GSD

Six cases

1) Missiles deployed in the open Challenge **Low**

2) Missiles under cover above ground Challenge **Medium/High**
   → *need time series of construction/transport/deployment or information on type/size of cover*

3) Missiles in underground silos Challenge **Medium/High**
   depends on sophistication of concealment
   → *Indicators: site arrangement, support facilities, double fences*

4) Production facilities, similar to 2) Challenge **Medium/High**

   With agreed gate control Challenge **Low**

5) Test range, similar to 1) Challenge **Low**

6) Export/import monitoring of complete missiles Challenge **High**
   → *Need frequent observation of unloading/transport activities*

   With permanent port monitoring ground inspection Challenge **Low**

Summary

1. Open Skies agreements in Europe, North America and East of the Urals have a proven record of
   - enhancing miltary transparency,
   - supporting verification of arms reductions/ arms bans,
   - building mutual confidence in security matters,
   - giving smaller states access to relevant imagery with resolution of 30 cm superior to commercial satellites (> 40 cm).

2. Monitoring based on Open Skies agreements is a useful complement to national technical means and on-site inspections.

3. Three different approaches have been implemented
   - bilateral (Hungary-Romania)
   - multilateral
   - regional/inner state (Bosnia-Herzegowina)

4. Joint flights have a positive effect on the perceptions and cooperation of the personnel involved, much more so than on-site inspections.

5. Sharing of the images puts all parties on equal footing.

6. Open Skies-like agreements can contribute to the verification of a missile-free or a missile reduction zone.

7. A resolution limit of 30 cm GSD provides for the necessary identification potential without being overly intrusive.

8. The prerequisite is the political will.

Literature: P. Dunay et al., Open Skies, UNIDIR 2004, 311 pp.