



How Can Meteorological Modelling Support CTBT Verification - A Policy Perspective -

Dr. Mona Dreicer

Director, Office of Nuclear Affairs

US Department of State

Not necessarily the view of the US Government

Compliance Process



■ Elements of Compliance

- Verification information & analysis
- Compliance analysis & judgement
- Action

Tools for Verification & Compliance

■ Technology

- Monitoring data
- Open source information increasingly important for compliance

■ Diplomacy

- Minimize political obstacles to transparency
- Reinforce compliance regimes

CHALLENGES FOR DIPLOMACY

- Harmonize national and international compliance process to reinforce effective treaty regimes
- Promote transparency while protecting national security and commercial interests
- Promote sustainability of arms control treaty implementation by connecting technology and processes with non-arms control requirements

Academic/NGO - analysis Open Source NTM

Analyzed & Screened
National Result

Concerned State Party

- analysis
- screening

CTBTO

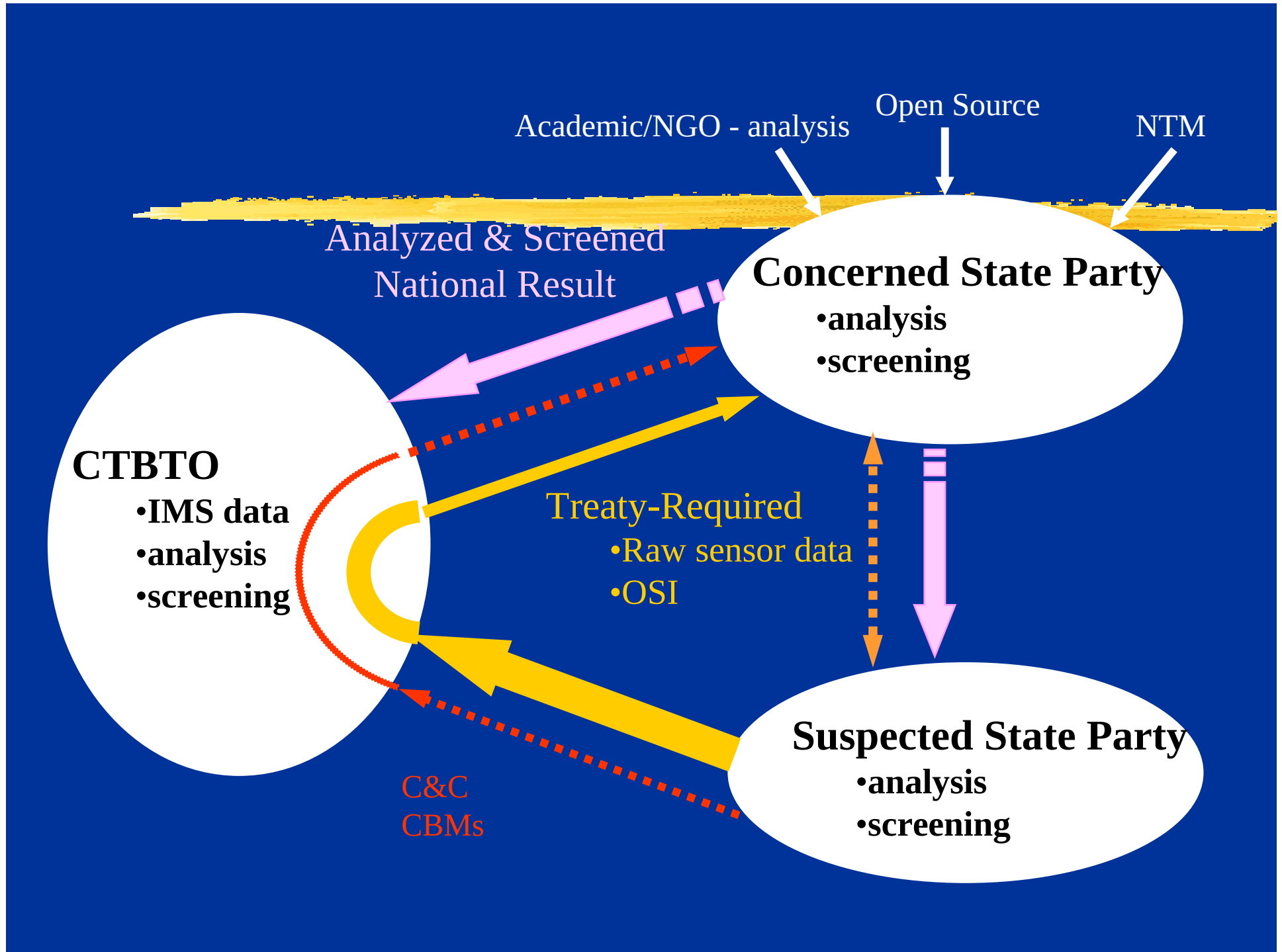
- IMS data
- analysis
- screening

Treaty-Required
•Raw sensor data
•OSI

Suspected State Party

- analysis
- screening

C&C
CBMs



Compliance Judgements

- Non-Compliant -
 - “Beyond a Reasonable Doubt”
 - Admission of guilt
 - Smoking gun
 - Direct, multi-source evidence
- Lack of Confidence in Compliance
 - Indirect/single source
 - Dated information
 - Justifiable dual use activity

CTBT Verification Challenge

- Detection
- Identification
- Location
- Attribution
- Evasion

- 
- CTBT International Data Center (IDC) receives data from 321 seismic, hydroacoustic, infrasound (SHI) and radionuclide sensors (International Monitoring System or IMS)
 - SHI data is received continuously (primary) and as requested (auxiliary)
 - Radionuclide data sent daily

- 
- IDC analyzes data from sensors
 - IDC Products include Event Bulletins
 - Characterize events
 - Screen out events consistent with natural phenomena or non-nuclear, man-made phenomena
 - Field of regard

- 
- Each State Party can request an on-site inspection (OSI) to clarify whether a nuclear explosion has been carried out
 - An OSI requires an affirmative vote of 30 of 51 Members of the Executive Council to proceed

What we need is.....

a way to link the SHI data analysis to radionuclide detection....

by highlighting a region of the world to be considered carefully....

including the degree of uncertainty associated with the result....

using objective internationally accepted methods.

Questions that need answers

- What meteorological modelling capabilities should the IDC routinely exercise?
- What tools should be used at the IDC and how should the results be reported?
- How can additional international expertise be harnessed?

Questions that need answers

- How should a broader international process be initiated? (RSMC's??)
- What is the best way to produce an international consensus result?
- What tools should be used?
- How should the results be reported for use in the international verification process? (event bulletins)

- 
- What capabilities should the IDC routinely exercise?
 - What tools should be used and how should the results be reported - for routine and special cases?
 - HYSPLIT
 - OMEGA
 - others?



■ How can additional international expertise be harnessed?

- Defined process to call for international participation and reporting in a way that is complementary to IDC capabilities
- positive input into addressing international compliance concerns

- How to initiate the additional international process?

- when and how should the international meteorological community be called upon to help?

- Tools to be used?

- consistency

- common understanding

- international expert acceptance

- 
- Can an international consensus result be produced?
 - Previous exercises
 - RSMC process
 - How should the results be reported for use in the international verification process?
 - National products
 - International products (WMO, other)



Can't stress enough how important it is to the verification and compliance process that the uncertainty of the results be clearly displayed.

How can this be accomplished?

Further research needed

Additional analysis methodology is needed for effective use of radionuclide network :

- Characterization of natural and typical anthropogenic radionuclide sources
- Advanced data fusion algorithms for linking SHI and radionuclide results, including atmospheric geolocation techniques