AGA 4: The Nuclear Test Ban Treaty and its Verification

Zeit: Donnerstag 16:15–18:15 Raum: S Aula

Hauptvortrag AGA 4.1 Do 16:15 S Aula

Scientific methods to analyse the CTBT International Monitoring System data with emphasis on the area or radionuclide analysis — •Martin Kalinowski — International Data Centre Division, CTBTO

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans nuclear explosions by everyone and everywhere in the atmosphere, underwater and underground. In preparation for entry into force of the Treaty, the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) has been tasked to establish the International Monitoring System (IMS) to monitor the planet for signs of nuclear explosions. The IMS consists of 321 globally distributed monitoring stations that continuously provide in near real-time measurements of seismic, infrasound, hydroacoustic and radioactivity sensors. The five announced nuclear tests of the Democratic People*s Republic of Korea have all been detected and this demonstrates the effectiveness of the monitoring system. The CTBTO maintains close cooperation with the scientific community to constantly refine its methods and ensure that the verification regime operates at the cutting edge of scientific knowledge. This presentation describes the science and technology process and uses the area of radionuclide analysis as an example how processing and interpretation of IMS data is improved by research and methodology developments. Global efforts are undertaken to understand the radioxenon background in the atmosphere that results from civil sources, to characterize the observations at IMS noble gas systems and to screen them for possible indications of signals that may be caused by a nuclear explosion so as to optimize the detectability of nuclear tests.

Slides in English, presentation in German.

AGA 4.2 Do 17:15 S Aula

Stand und geplante Neuerungen der ATTA (Atom Trap Trace Analysis) an der Universität Hamburg — •Friderike Göring[1], Markus Kohler[1], Carsten Sieveke[1], Pablo Woelk[1], Simon Hebel[1], Peter Sahling[1], Gerald Kirchner[1], Christoph Becker[2] und Klaus Sengstock[2] — [1]Carl Friedrich von Weizsäcker Zentrum für Naturwissenschaften und Friedensforschung, Universität Hamburg, Beim Schlump 83, 20144 Hamburg — [2]Institut für Laser-Pyhsik, Universität Hamburg, 22761 Hamburg

Das Kryptonisotop Kr-85 gilt als gut geeigneter atmosphärischer Tracer für die Entdeckung geheimer nuklearer Wiederaufbereitungsaktivitäten. Für einen möglichen Einsatz der Kr-85-Analyse im Rahmen von Maßnahmen zur Verhinderung der Proliferation nuklearer Waffen ist ein hoher Probendurchsatz und damit kurze Analysezeiten auch bei geringen Probengrößen erforderlich.

Die Eignung von Atom Trap Trace Analysis (ATTA) als Nachweismethode für geringe Kr-85-Konzentrationen wurde bereits in mehreren Experimenten verschiedener Forschungseinrichtungen bestätigt. Im ATTA-Aufbau der Universität Hamburg wird metastabiles Krypton auf rein optische Weise erzeugt, wodurch der Probendurchsatz gegenüber bisher existierenden ATTA-Anlagen vervielfacht werden soll.

AGA 4.3 Do 17:45 S Aula

CTBT Verification - Atmospheric Release of Xenon from Civil Nuclear Power Plants — •Matthias Englert and Christoph Pistner — Öko-Institut e.V., Rheinstr. 95, 64295 Darmstadt

Efficient verification is a vital component of the comprehensive test ban treaty (CTBT) that supports global efforts for nonproliferation and disarmament. For verification purposes the comprehensive test ban treaty organization CTBTO will be using the global monitoring system with its technical components to detect nuclear detonations, after entry into force. Acoustic and seismic verification technologies are complemented by detecting radionuclides such as the fission product xenon. Discrimination between civil sources of xenon in nuclear power production from xenon released during a nuclear explosion can be accomplished comparing the differing isotopic vectors of the noble gas. We calculated different isotopic vectors of xenon produced in nuclear power plants with neutronic simulations under typical operating conditions in the plant and compared them with older models. Different production mechanisms in nuclear power reactors will be discussed including a sensitivity analysis of the isotopic vector to fuel element geometry, burnup, fuel composition, reactor type, power level and others. Finally we will present estimates about the release of xenon to the atmosphere from a power plant under different operation conditions such as shut-down, start of operation and accidental releases.