SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

On-Site Inspections (OSIs) in challenging environments with focus on young volcanic centres

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INTRODUCTION AND MAIN RESULTS

This poster aims to build on the discussions held during the On-Site Inspection Workshop 24 in 2018 (OSI-WS-24) whose objectives were, among others, to consider OSIs in different and potentially “challenging” environments. Environmental factors considered during OSI-WS-24 were mainly of climatic nature and include Low/high temperatures, high precipitation, Low/high wind speeds/direction, and day time hours. Actual environments for the conduct of OSIs may range from tropical rain forests, mountainous terrains, deserts and the high seas. The poster focus on possible conduct of OSIs in young volcanic centres, challenges on the conduct of OSI e.g. mobility, adverse effects on IT, H&S, topography and the limitations on OSI techniques.

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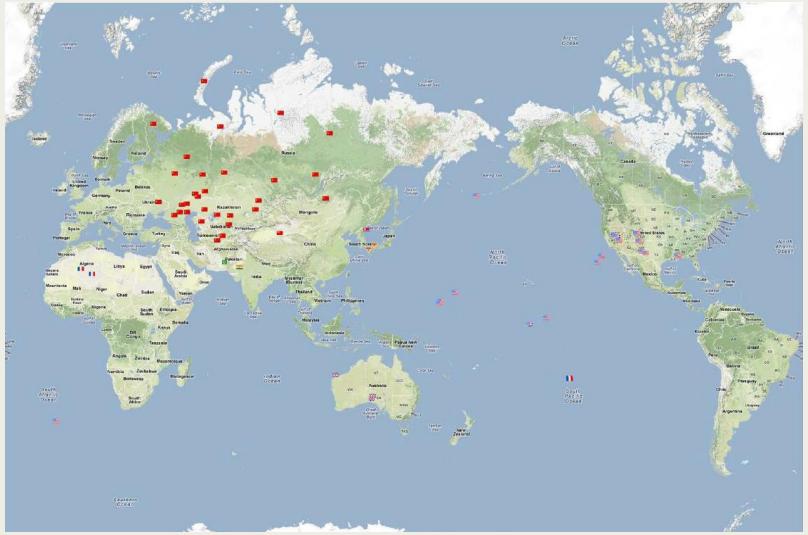
Introduction

The Comprehensive Nuclear Test-Ban Treaty (CTBT) prohibits all nuclear weapon test explosions or any other nuclear explosion in any *environment*. A number of environments are outlined in CTBT/WS/OSI-24/1. However, young volcanic centres are not included among the different environments. The term "challenging" with respect to OSI environments implies location of IA, time, adverse effects on people and methods, climate, topography, infrastructure, or observables and signatures. Other challenges include IT training and skills sets required for the conduct of OSIs in such challenging environments.(CTBT/WS/OSI-24/1). With respect to young volcanic centres, the foreseen challenges include time, adverse effects on people, topography, observables and signatures, and IT training. This presentation will focus on possible challenges due to the conduct OSI in young volcanic terrains such as Olkaria and Menengai geothermal fields in the Central Kenya rift valley. In this environment, underground tests (both vertical and horizontal emplacements) are feasible.

Past Nuclear Test Sites

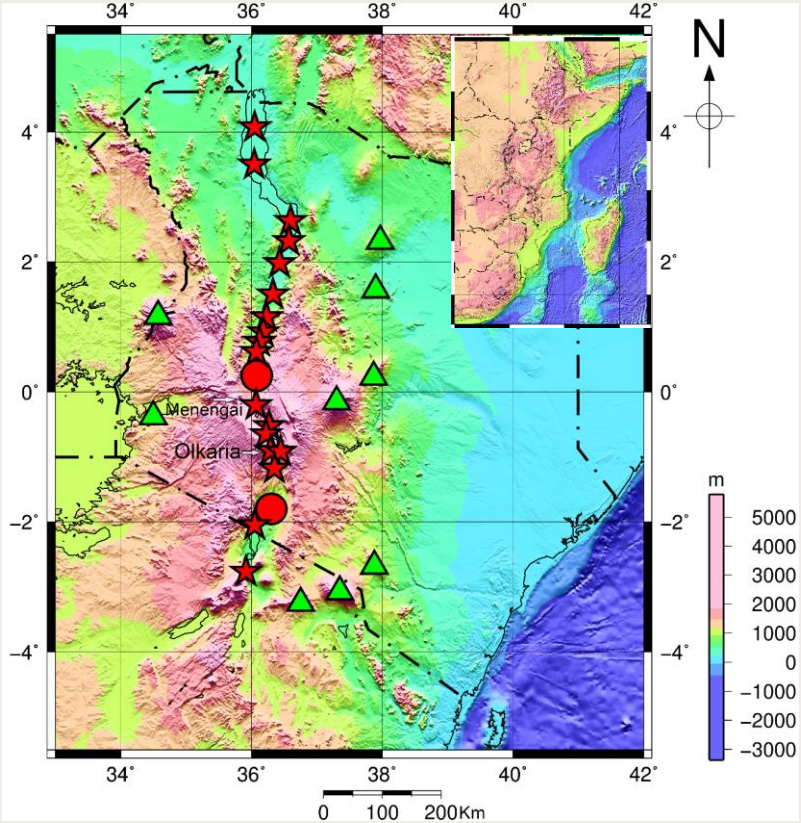
- One potentially conducted along Aleutian Trench, a convergent plate margin where Pacific Plate subducts beneath North American Plate. The trench is associated with highly active Aleutian Arc.

Subduction process gives rise to formation of numerous volcanoes e.g. the Aleutian Islands.



The Kenya Volcanic Centres/Fields

Olkaria volcanic/geothermal field consists of a series of lava domes/flows and volcanic ashes. The youngest of the lava domes (Ololbutot) was dated at 180 ± 50 years BP (Clarke et al., 1990). The volcanic field is also characterized by high heat flow on the surface. Lava domes and volcanic ashes are attributed to rhyolitic volcanism, which commenced about 400,000 years ago. **Menengai Volcano** is one among late Quaternary caldera volcanoes formed in the inner-trough of Kenya rift valley. It is associated with a high thermal gradient resulting from shallow magmatic intrusion(s).



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OSI challenges in Young Volcanic Centres

Topography

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OSI challenges in Young Volcanic Centres

Time constraint and performance of IT (Reduced Mobility)

Challenges conducting OSI techniques

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OSI challenges in Young Volcanic Centres

Time constraint (Reduced Mobility)

Health and Safety (Possible injuries)

Health and Safety (Injuries and ENV)

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OSI challenges in Young Volcanic Centres

Health and Safety (Wildlife attacks)

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Summary of OSI challenges in Young Volcanic Centres

- Slowing down the conduct of most ground based initial inspection period (IIP) techniques (e.g. VOB, POS, GRM, ENV, ERAL/H) and the performance of inspectors
- Adverse effects on the Inspection Team (IT) especially in regards to health and safety (H$S)
- Sub-soil gas sampling in areas of elevated temperatures
- Tough terrain/topography will result in deployment challenges of equipment and their maintenance (i.e. battery charging, cables, memory cards etc) e.g. PSM, ACT, ECM etc.
- Long operation periods of instruments due to difficult access of Search Zones (SZs),
- Noisy/no data acquisition for PSM, and most ground based GPY techniques e.g. ACT, ECM, GPR, RES etc
- Challenges carrying the CG-6 gravimeter in such challenging terrain while still on/powered (c.f. equipment familiarization activity, 26-30 May 2025).