Large-scale explosion sources at Sayarim, Israel, for Infrasound Calibration of the International Monitoring System

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OBJECTIVES

- Provide fully controlled infrasound sources (the strongest since the establishment of the IMS network), monitored by extensive observations for calibration of IMS infrasound stations in Europe, Middle East and Asia;
- Contribute to the understanding of infrasound propagation and its seasonal variation;
- Calibrate the detection capability of the IMS infrasound network in the eastern Mediterranean region.

2010 EXPERIMENT - Winter weather (wind) pattern

In January 2010 two large-scale explosions were successfully conducted by Gil at the same SMR site, in different times of the day. View and design of Gil charge. Strong booster of nitrates (10%) provided a proper upward detonation (10% charge) triggering the SMR explosion. Two explosions at the same site on 26.01.11.

- Reliable records of air-shock overpressure records for all shots. The Yield estimation is based on maximal Impulse and free-field peak overpressure measured at gauges G2-G6, using the same DDESB BECV4
- The Yield was estimated, based on Positive Phase Impulse (an integral of positive envelopes). See Chart for comparison of yield estimates for all 6 shots and gauges.
- The Yield of the two explosions is estimated for both shots, with all shots at similar altitude and distance. The Yield of the two explosions is estimated for both shots, with all shots at similar altitude and distance.
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2009 EXPERIMENT - Summer weather (wind) pattern

Shot of ~82 tons HE cast explosives in barrels, was conducted by Gil at Sayarim Military Range, 26 Aug. 2009 (supported by the US Army SMDX). Origin (Detonation) Time: 06:31:54.0 GMT

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Local observations: Radiosonde data

- Obtained local radiosonde data providing preliminary assessments of specific features of the tower atmosphere in Sayarim and Sayarim Heights. The new station is operational and the data are being processed for scientific purposes.
- New stations are planned to be established in the near future in Sayarim Heights and the surrounding area.
- The joint effort of the various teams and institutions involved is expected to provide valuable insights into the propagation of infrasound and the effects of various atmospheric conditions on the detection of infrasound signals.

CONCLUSIONS

Two shots of about 100 tons of explosives each one, assembled as special design pyramid/hemisphere on the soft sediment surface, were successfully conducted by Gil at Summer 2009 and Winter 2010. Developed charge design is similar to enhanced explosion and infrasound emissions for both charge scaling and infrasound propagation features affected by various atmospheric (wind) conditions.

The obtained abundant databases will provide important contributions to the modeling of infrasound propagation, non-detection analysis at different stations, and detectability issues of small nuclear reactor tests.

Acknowledgments

Many organizations and persons participated in the preparations of the Winter Millennium explosion, measurements and data processing. In particular, the Executive Office of the International Monitoring System (IMS) at Vienna and the Israel Defense Force (IDF) Headquarter, the Israel Meteo-Service (IsMS) at the Israel Meteorological Authority. The assistance of the CTBTO and its member states, particularly those that supplied an excellent seismic and infrasound records for all shots.

The authors acknowledge the contributions of the following institutions: Army Research Lab/Univ. of Alaska, US Army Corps of Engineer, ARCTIC, Amgar Yaris, GEOS Company, MRTF-CTBTO office in Vienna. Express thanks to Dr. E. Stempler, Y. Hamashidyan of the Experiment Division of the Israel Defense Forces (EIDF) for providing appropriate territory, logistics and near-source support to both US teams.

The joint effort of the various teams and institutions involved is expected to provide valuable insights into the propagation of infrasound and the effects of various atmospheric conditions on the detection of infrasound signals.