
Preface

In connection with the implementation of the Additional Protocol complementing the nuclear safeguards agreements between states and the International Atomic Energy Agency (IAEA), commercial satellite imagery has steadily gained importance for the effective and efficient performance of IAEA Safeguards. The IAEA's obligation has been extended to include the detection of undeclared nuclear materials and activities in states. Especially the view from space offers a powerful tool to detect clandestine activities. In addition, space technology and commercial satellite imagery have a potential to support inspectors during their missions. The verification of site declarations with 3-D modelling of satellite imagery is an important example where safeguards efficiency can be dramatically improved.

Two early developments and positive experiences influenced the implementation of satellite imagery in international safeguards. On the one hand, the verification of disarmament treaties based on satellite imagery was very stimulating, and, on the other hand, concepts for verifying greenhouse gas reduction strategies suggested several hints and incentives as to how to apply and implement satellite imagery on a technically and institutionally sound basis.

In the early 1990s, two research groups, one at King's College London (B. Jasani) and the other at the Juelich Research Centre together with the University of Bonn (D. Klaus), started programmes and projects towards introducing commercial satellite imagery to the international safeguards procedures. Subsequently, joint projects under the auspices of the IAEA and in the frame of IAEA Member States Support Programmes involving research groups in Canada and the US finally led to the establishment of the IAEA's Satellite Imagery Analysis Laboratory.

Furthermore, the implementation and establishment of commercial satellite imagery obtained support from the European Safeguards Research and Development Association (ESARDA). Its Working Group on Verification Technologies and Methodologies offered international experts an excellent forum for in-depth discussions and exchanges of views resulting in many pro-

posals for new projects and programmes. The European Commission based its research initiatives related to the Global Monitoring for Security and Stability (GMOSS) also on ideas emerging from this working group.

Research topics and programmes involving commercial satellite imagery and international safeguards have a strong interdisciplinary character and structure. Scientists from different fields such as mathematics, statistics, geography, physics, and mineralogy had to build up networks, in order to achieve successful results. Again, the ESARDA working group is an example of having such a structure with broad experience of its members, since the group is not only dealing with nuclear verification issues but also with those arising from the Biological and Chemical Weapons Conventions and from climate change.

The Additional Protocol has introduced a new dimension in both international safeguards and research. The IAEA has to cope with future challenges in connection with the detection of undeclared materials and activities. These challenges are complex and need appropriate responses that will be based on research, e.g., on commercial satellite imagery as a powerful tool. ESARDA and its different working groups are available and offer their support for the further strengthening of international safeguards and commercial satellite imagery as one special aspect.

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