NATO OTAN

Science & Technology Organization
Monthly Newsletter

S&T organization

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Fall S&T Board Meeting in Vilnius

In this issue

EDITORIAL BY THE CHIEF SCIENTIST

Dear STB members,

It was a real pleasure meeting you in Vilnius for our Fall STB meeting. As the decision sheet clearly displays, we have a lot of things on our plate. I remain committed to work with all of you, for the STO to deliver up to expectations.

S&T is increasingly important and relevant, and we have succeeded in making it increasingly present on many agendas, both of the Nations and of NATO bodies.

We, the STO, have a crucial role to play. In our complex world of today S&T should both explore, research the unknown, innovate without a predefined concrete materiel objective in mind and build the S&T evidence base to find solutions for well defined issues.

As a Belgian physicist I was particularly proud of Professor Englert, being awarded the physics Nobel prize, together with Professor Higgs, for the discovery of the Higgs boson. I'd like to quote Professor Englert: "We should not evade complexity, we must enter in a confrontation with it, understanding the necessity of doing so and understanding the need to master that complexity".

Yours,

MGen Albert Husniaux,
NATO Chief Scientist

Making Progress

23 July: STO official birthday

One year after the decision taken by the Nations in July 2012 to reorganise NATO S&T, the new STO was formally approved by the NATO Council.

16-20 September: Fall STB Symposium and Board meetings

From 16 to 20 Sep 2013 the 2013 Fall STB meeting was organised in Vilnius (Lithuania). During the session with partners the focus was on the S&T programs and activities creating a clear view on NATO S&T. During the Executive NATO only session, the board members focussed on S&T governance and the ongoing S&T transition.

16-17 September: NATO Agencies Days

The STO took the opportunity to participate to the NATO Agencies Days held at the NATO HQ in Brussels. This was the first organisation of a yearly event where all agencies and organisations can promote their activities to NATO's most senior leadership.

18 September: 2013 NATO STO Von Karman Medal Recipient

The NATO Chief Scientist, MGen Albert Husniaux, BEAF, on behalf of the Science and Technology Board (STB) presented a Von Kármán Medal to Professor Dr Maurus TACKE (DEU), who is one of the German Board Members as well as a former RTO SET Panel Chairman, for exemplary service and significant contribution to the enhancement of progress in research and technological cooperation among NATO and the NATO nations.


MGen Albert Husniaux presenting the Von Kármán Medal to Dr Maurus Tacke

NATO S&T Strategy Implementation

Following the discussions and decisions during the STB meeting regarding the implementation of the NATO S&T Strategy, the individual stakeholders have been asked to develop their Action Plans for 2014.

The NATO Military Authorities (NMAs, i.e. the Strategic Commands ACT and ACO, and the Military Committee supported by the International Military Staff) are preparing one consolidated NMA Action Plan. The plan will be discussed during the MC S&T Focus Session on 18 November 2013. A further approval by the MC should be sought later on this year."

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MGen Albert Husniaux, NATO Chief Scientist, and
Col. Eugenijus Vosylius, Commandant of the Lithuanian Military Academy

News out of the NATO HQ (Brussels)

10-11 July – Framework for Future Alliance Operations

The S&T Coordination & Outreach Section Head attended the fifth of "ACT's Future workshops", held at the NATO School, Oberammergau, which was the first step in the path of defining the Framework for Future Alliance Operations. This document will deliver a future organizing framework, informed by a set of broad strategic insights and military implications through an assessment of required mission types.

15 July - CNAD in Permanent Session.

The S&T Coordination & Outreach Section Head gave a briefing to the CNAD in Permanent Session (attended by the NADREPs), presenting STO's business with a focus on the relation to Smart Defence and to the Connected Forces Initiative. This highlighted in particular the STO Programme of Work (POW) building, management and delivery, providing an overview of NATO S&T, and a proposal to inform the NADREPs on the STO POW adopting a more dynamic approach.

25 July: OCS Staff recruitment successfully ended

Between 15 and 25 July, the recruitment of the new OCS staff was organised. Candidates for one A-5 and three A-4 positions were selected. The new staff members will take up their duties starting in November.

28-30 August: Chief Scientist visit to the UK MOD and DSTL

The Chief Scientist visited the UK MOD and DSTL in London where he met Mr. Tom McKane Director General Security Policy, Mrs Alison Stevenson, Head of NATO and European Policy and Prof Vernon Gibson, the Chief Scientific Adviser.

3 September: NATO Defence Planning Process

On the 3rd of September a meeting of the NDPP '17 Focus Group was held at NATO HQ. The purpose of the Focus Group is to start the preparations for the next 4-year cycle of the NATO Defence Planning Process, in particular regarding Step 2 (defining requirements). This work is tightly connected to the "enhanced NDPP" initiative which promotes a stronger focus on the long term horizon and therefore on S&T contributions. The Office of the Chief Scientist is actively contributing to this initiative.

11 September: SCI-250 Visitors' Day

On 11 September the Chief Scientist participated in the SC-250 Visitor's Day is Ostoya (Norway)

23-24 September - SPSP-ISEG Meeting

A meeting of the Independent Scientific Evaluation Group (ISEG) was held on 23-24 September in Bucharest. The ISEG main task is to provide independent scientific advice on the proposed new projects to be undertaken under the aegis of the Science for Peace and Security Program (SPSP), NATO's main policy tool for enhancing cooperation and dialogue with all Partners, mainly based on civil science. The collaboration between STO and the SPS Programme is constantly increasing, and two STO staff representatives are regular ISEG members.

MGen Albert Husniaux and BGen Erich Roedig

11 September: SCI-250 tests Directed Energy Devices in collaboration with CNAD

Nine NATO nations participating in SCI-250 elected to voluntary share their national experts and resources to test emerging technologies like Directed Energy devices that have several potential applications in NATO's current missions, but also in civilian counter-terrorism scenarios. This trial also demonstrates internal NATO synergies that were developed between the Science & Technology Organization and the Conference of National Armaments Directors, as it is funded in part via the CNAD Voluntary National Contribution Fund on Counter IED. It is a great example of NATO providing a mechanism for a small group of nations and committed individuals to benefit NATO as a whole, fully in line with the Smart Defence concept. This framework permits the leveraging of national research programs to the benefit of the entire Alliance.

18 September: 2013 NATO STO Scientific Achievement Award Recipients

The NATO Chief Scientist, MGen Albert Husniaux, BEAF, on behalf of the Science and Technology Board (STB) presented the following awards on the occasion of the STB week in Vilnius, Lithuania, STO Scientific Achievement Awards to representatives from the following RTO activities for an outstanding contribution to defence science and technology or systems application of technology:

News out of Neuilly-sur-Seine

- HFM-184 on "Safe Ride Standards for Casualty Evacuation Using Unmanned Aerial Vehicles": BGen (Rtd) Erich ROEDIG
- MSG-048 on "Coalition Battle Management Language": Mr Wim HUISKAMP (Acting NMSG Chair) representing Mr Lionel KHIMECHE
- SAS-087 on "Best Practice for Judgment-based Operational Analysis": Dr Diederik WIJNMALEN
- SCI-190 on "Electronic Countermeasures to Radar with High Resolution and Extended Coherent Processing": Mr Dietmar MATTHES.

MGen Albert Husniaux and Mr Wim HUISKAMP (Acting NMSG Chair) representing Mr Lionel KHIMECHE

MGen Albert Husniaux and Dr Diederick Wijnmalen

MGen Albert Husniaux and Mr Dietmar Matthes

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SET-172: An example of a radar image of a tank obtained from turntable measurements.

SAS-087 Research Task Group on "Code of Best Practice for Judgment Based Operational Analysis"

The SAS-087 Task Group recently created three separate state-of-the-art resources – designed specifically for either analysts, clients, or senior executives – to describe the field of judgement-based Operational Analysis (OA) and best practice in its application to the many difficult problems faced by military decision makers, thus tailored for myriad levels of supervision and leadership that can be utilized throughout NATO Nations and Bodies.

These products are available from www.cso.nato.int/abstracts.aspx?RestrictPanel=6.

News out of Neuilly-sur-Seine (ctd)

SET-172 lecture series on "Radar Automatic Target Recognition (ATR) and Non-Cooperative Target Recognition (NCTR)"

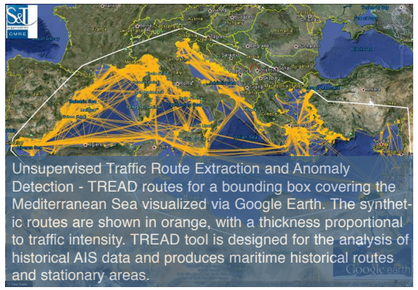
The NATO SET-172 lecture series on "Radar Automatic Target Recognition (ATR) and Non-Cooperative Target Recognition (NCTR)" has been held at a final four venues in 2013 concluding a successful three-year run. The objective of this lecture series has been to provide an overview of the state-of-the-art and continuing challenges of automated radar target recognition. It has covered both the fundamentals of classification techniques applied to data from a variety of radar modes and selected advanced techniques that capture themes currently at the forefront of active research. Over its three year lifespan, the lecture series has been held at eleven wonderful venues (London, UK; Lisbon, Portugal; Hengelo, Netherlands; Dayton, Ohio, US; Gdansk, Poland; Athens, Greece; Oslo, Norway; Brussels, Belgium; Ankara, Turkey; Tallinn, Estonia; Pisa. Italy). This has allowed the educational material to be presented to hundreds of students from across NATO and PfP nations with overwhelmingly positive feedback. The fully revised material from the lecture series has also been captured in a book which has now been published by the IET. (http://www.theiet.org/resources/books/rsna/artr.cfm).

Underwater and surface vehicles cooperating in fleet during the MORPH 2013 sea trials off the coast of Toulon (France)

Cooperative Underwater Robots Tested Successfully

In July, the Marine Robotic System of Self-Organising, logically Linked Physical nodes (MORPH) European Commission project tested the latest developments in multiple-vehicle coordination off the coast of Toulon (FRA) at the European Centre of Underwater Technologies, part of the French Institute for Exploitation of the Sea (IFREMER). CMRE demonstrated the software for combined data communication and ranging techniques for underwater acoustic networks. This was instrumental in the success of the test as the coordination algorithms developed by the partners rely on the ability to exchange data and estimate relative positions of the vehicles. With this core capability the Consortium (32 scientists from five countries and eight research organizations) demonstrated coordinated manoeuvres between two underwater and two surface autonomous vehicles. This new robotic concept will map the undersea environment with great accuracy in challenging environments, with rugged terrain or structures with full 3D complexity. Field applications include harbour protection, infrastructure monitoring (e.g. offshore installations or pipelines) and mine countermeasures.

CMRE Scientists "Make Tracks" to Award, Through TREAD



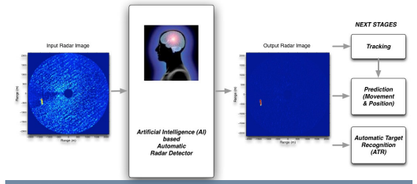
Unsupervised Traffic Route Extraction and Anomaly Detection - TREAD routes for a bounding box covering the Mediterranean Sea visualized via Google Earth. The synthetic routes are shown in orange, with a thickness proportional to traffic intensity. TREAD tool is designed for the analysis of historical AIS data and produces maritime historical routes and stationary areas.

CMRE's Maritime Security programme contributes to NATO's common operating picture through

News out of La Spezia

common design standards, data fusion, and the use of historical data to provide enhanced knowledge of vessel activities. These efforts were recognized with an award at the 16th International Conference on Information Fusion (Istanbul, 9-12 July 2013) for a paper by a CMRE team (Giuliana Pallotta, Michele Vespe and Karna Bryan) which describes CMRE's methodology (Traffic Route Extraction for Anomaly Detection - TREAD) for inferring traffic routes, ports, and stationary areas from raw AIS data and proposes an unsupervised, incremental learning approach to extract historical traffic patterns from Automatic Identification System (AIS) data. AIS provides a rich source of cooperative information on vessel movement via growing networks of shared coastal receivers as well as commercially available AIS records from space. The rapidly increasing amount of data simply cannot be processed by operators. A compact representation synthesizing this vast amount of data gives operational utility to data which would otherwise be ignored.

Best Spanish PhD Thesis on Defence and Security.



Workflow of the automatic vessel detection system based on artificial intelligence: the AI system can clean the input radar image from ocean waves (sea clutter), obtaining a clear output where detection is performed. This will make easier next stages, such as tracking and recognition of vessels, as well as prediction of their positions and movements in the future.

The analysis of sea clutter in work on artificial intelligence for automatic vessel detection helped CMRE to find a new model to estimate winds from radar images. Raúl Vicen's "Automatic Detection of Signals by Using Artificial Intelligence Techniques" has been recognized by the Spanish Royal School of Telecommunication Engineers (COIT) and the Spanish Association of Telecommunication Engineers (AEIT) as the best Spanish PhD thesis on Defence and Security. "I am really proud of it – he says – it's great to see that, when you are strongly committed to do something, you can obtain

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Prototype of the ICARUS survival capsule being deployed from an autonomous surface vehicle during the sea trial held at CMRE in July 2013.

News out of La Spezia (ctd)

really exciting results". The thesis presents a new system based on artificial intelligence (AI) capable of automatically detect vessels of different shapes and sizes at sea under different meteorological and oceanographic (METOC) conditions. Now, Raúl leads the "Decisions in Uncertain Ocean Environments" project at CMRE, working on retrieving wind information from the sea surface clutter observed by marine radars. This work was published in the Journal of Atmospheric and Oceanic Technology.

Unmanned Vehicles to Improved Search and Rescue (SAR)

In July 2013 CMRE hosted the 2013 sea trials of ICARUS, an EC project developing robotic tools to assist with crisis intervention, saving lives and speeding up SAR operations. With 23 partners CMRE is taking technologies developed for military applications and bridging the gap between the research and user communities for detection, location and rescue by developing a toolbox of integrated components for unmanned Search and Rescue. In particular CMRE is involved in the integration of sensors for the detection of the obstacles and the "victims", and on the development of autonomous behaviours that will make use of these sensors. Ultimately, USVs will be first aid devices, including rescue/survival capsules, in case of accidents. Validation and demonstration is planned for two major events in 2015: a simulated earthquake in Belgium and a maritime accident exercise in Portugal.

Sea Trial Recognized Environmental Picture 2013 MED-REP13

The field experiment MED-REP13 was conducted by NATO-STO CMRE and researchers from ITA, ESP and FRA in August 2013, in an area off La Spezia (Italy). Efficient, discreet and secure data collection with an heterogeneous network of robotic platforms was demonstrated in a pre-defined environmentally dynamic denied area. A numerical ocean model produced a physically sounded analysis and forecast of the denied area, assimilating the collected information. The analysis established the hierarchy of near future sampling strategies of the in situ network.


Glider fleet

The experiment concluded testing recent developments on autonomy of underwater gliders and automatic piloting of a glider fleet.

Collaboration on Autonomy

From 17-20 September 2013, STO-CMRE hosted the annual Machine Intelligence for Autonomous Mine Search (MIAMS) Joint Research Project (JRP) meeting and a related Automatic Target Recognition Workshop. Around 20 external representatives from eight nations (BEL, CAN, DEU, FRA, GBR, NLD, NOR, USA) participated in the meetings, which included presentations and discussions on recent research progress related to machine intelligence for autonomous mine search. The participants will continue their collaboration in the future to enable, in a cost-efficient manner, the advancement of mine search capabilities by leveraging resources in a cooperative effort.

Visitors to CMRE

CMRE entertained visits from:

- VAdm Christian Canova FRA(N), Deputy Commander, and RDML Robert Kamensky USA(N), Commander Submarines NATO, to discuss the establishment of a formal business relationship between Allied Maritime Command (MARCOM) and CMRE.
- RADM Michael Devany, Director, Office of Marine and Aviation Operations, US Naval Oceanographic and Aeronautical Administration, to discuss potential collaboration.

Scientific Publications

LIDAR observations of optical and physical properties (LOOPP) conference. / Trees, C. CMRE-FR-2013-009, NATO Unclassified, September 2013.

Impact of underwater glider fleet data assimilation on temperature predictions in the Ligurian Sea. / Mourre, B. CMRE-FR-2013-010, NATO Unclassified, September 2013.

Range dependent index of refraction inversion with the adjoint method using statistics from glider surveys. / Richards, E. CMRE-MR-2013-006, NATO Unclassified, June 2013.

A frequency-domain beamformer for sidescan applications. / Hollett, R.D., CMRE-MR-2013-007, NATO Unclassified, June 2013.

Assessment of the performance of cooperative and coordinated fleets of underwater gliders with Observing Systems Simulation Experiment. / Alvarez, A., Mourre, B., CMRE-MR-2013-008, NATO Unclassified, June 2013.

SPMINEX'13: experimental description and preliminary results. / Couillard, M., Fox, W.L.J. CMRE-MR-2013-009, NATO Restricted, September 2013.

ITMINEX'13: Experimental description and preliminary results. / Couillard, M., Dugelay, S. CMRE-MR-2013-010, NATO Restricted, September 2013.

Spanish and Italian MINEX 2013: Percentage clearance trials report. / Gwatkin, N., Couillard, M. CMRE-MR-2013-011, NATO Restricted, September 2013.

Commercial Technologies and Games for Use in NATO - 10th Workshop - STO-MP-MSG-108, Public release, September 2013

Commercial Technologies and Games for Use in NATO - 12th Workshop - STO-MP-MSG-114, Public release, September 2013

Exploiting Commercial Games and Immersive Technology - STO-MP-MSG-113, Public release, September 2013

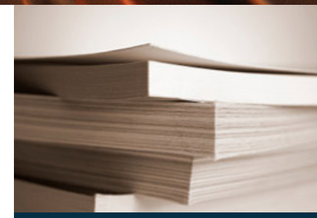
C2 to Simulation Interoperability - STO-MP-MSG-119, Public release, September 2013

Simulation in Support of NATO Operations (ITSEC 2010) - RTO-MP-MSG-101, Public release, September 2013

Human Behaviour Modelling for Military Training Applications - RTO-MP-MSG-107, Public release, September 2013

Simulation in Support of NATO Operations - RTO-MP-MSG-104, Public release, September 2013

Exploiting Commercial Games and Technology for Military Use - 9th Workshop - RTO-MP-MSG-093, Public release, September 2013



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