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Cono Giardullo/Walter Dorn/Danielle Stodilka

Technological Innovation in the OSCE: The Special Monitoring Mission in Ukraine

> *The OSCE Special Monitoring Mission (SMM) is the only organization on the ground in eastern Ukraine that provides impartial facts about a confusing conflict that has been going on since 2014.*[1]
>
> *Even by United Nations or European Union standards, the SMM was becoming a cutting-edge peace operation.*[2]

Introduction

The Organization for Security and Co-operation in Europe (OSCE) deployed the Special Monitoring Mission to Ukraine (SMM) in March 2014, shortly after protests turned violent in the Luhansk and Donetsk regions of eastern Ukraine. The SMM mandate is similar to those of traditional UN peacekeeping missions: to establish facts by observing and reporting impartially on the situation; to facilitate dialogue among parties to the conflict; and, later, to help oversee peace accords (Minsk agreements).[3] The SMM deployed unarmed civilians, not military personnel,[4] on the ground in ten different monitoring teams across Ukraine, mostly to the two eastern regions.

Like traditional UN peacekeepers, the SMM observers initially had a limited view beyond their own line of sight, at night, and in dangerous areas. The Mission soon realized that it needed technology to assist with monitoring.[5] So,

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Note: The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the OSCE, its SMM or Canada's Department of National Defence.

1 Stephanie Liechtenstein, "OSCE, Keep Going!" *Security and Human Rights Monitor*, 27 April 2017, at: https://www.shrmonitor.org/osce-keep-going.

2 Walter Kemp, Civilians in a War Zone: The OSCE in Eastern Ukraine, in: Institute for Peace Research and Security Policy at the University of Hamburg/IFSH (ed.), *OSCE Yearbook 2017*, Baden-Baden 2018, pp 113-123, here: p. 117, at: https://ifsh.de/file/publication/OSCE_Yearbook_en/2017/Kemp-en.pdf.

3 The mandate tasks the SMM, *inter alia*, to gather information and report on the security situation in the area of operation and establish and report facts in response to specific incidents. Cf. Organization for Security and Co-operation in Europe, Permanent Council, Decision No. 1117, Deployment of an OSCE Special Monitoring Mission to Ukraine, PC.DEC/1117, 21 March 2014, available at: http://www.osce.org/pc/116747.

4 "[T]he civilian nature of the OSCE Mission is an asset, making it easier for all parties to accept its deployment", Liechtenstein, cited above (Note 1). However, it should be noted that many of the SMM monitors are former military.

5 Point 7 of the Minsk Memorandum, 19 September 2014, and paragraph 3 of the Package of measures for the Implementation of the Minsk agreements, 12 February 2015, explicitly authorize the use of technologies to help verify the agreements. These texts are available at: https://peacemaker.un.org/sites/peacemaker.un.org/files/UA_140919_MemoImplementati

it started to use Unmanned/Unpersonned Aerial Vehicles (UAVs), satellite images, and remote (on-site) cameras. Although the SMM is a relatively new peace operation, its innovative deployment of modern technologies can offer useful lessons for future SMM and OSCE activities, and for other international organizations, including the United Nations, which only adopted its first UAVs in a peace operation in 2013.[6]

The SMM began operating UAVs in October 2014, impressively soon (six months) after the Mission was created.[7] The aerial devices immediately proved their worth. However, they were also attacked both physically and electronically, being shot at (and shot down) and jammed, at a rate of almost twice a week.[8] At least one mini-UAV was seized at gunpoint in 2017 by Russian-speaking forces.[9] In addition, there was some concern that the parties were surreptitiously monitoring the video feeds.[10] These problems, as well as "extended contract negotiations",[11] caused a hiatus of more than 18 months,[12] before the long-range UAV programme was re-started in March 2018.[13] But the UAVs were immediately under attack again by the conflicting parties. A video released by the Mission of surface-to-air missiles fired at a long-range UAV shows one such attack in June 2018.[14] The Mission started losing many long-range UAVs: Three were either shot down or jammed between 27 October 2018 and 18 April 2019,[15] resulting in a loss of operational capabilities for the

onPeacePlan_en.pdf and https://peacemaker.un.org/sites/peacemaker.un.org/files/UA_150212_MinskAgreement_en.pdf.

6 Publications on the use of technology in UN peace operations can be found at: https://www.walterdorn.net/pub#tech.

7 Two months after the SMM was created, a concept note on UAVs was circulated internally and the following month the decision was made to use UAVs. Showing great speed and flexibility in procurement, the first flight occurred three months later on 23 October 2014. Cf, Claus Neukirch, The Special Monitoring Mission to Ukraine: Operational Challenges and New Horizons, in: Institute for Peace Research and Security Policy at the University of Hamburg/IFSH (ed.), *OSCE Yearbook 2014*, Baden-Baden 2015, pp. 183-197, here: p. 196.

8 Cf. Digital Forensic Research Lab, Blinding the Eye in the Sky, *Medium*, 10 August 2016, at: https://medium.com/dfrlab/jamming-the-eyes-in-the-sky-over-ukraines-east-5dc10f136cc5.

9 Cf. OSCE, Spot Report by the Special Monitoring Mission to Ukraine: Armed men open fire close to SMM in Yasynuvata and Pikuzy, Kyiv, 25 February 2017, at: https://www.osce.org/ukraine-smm/301821.

10 Information provided to Walter Dorn by a Ukrainian officer, 2017.

11 Marcel Peško, The OSCE's Engagement in Response to the Crisis in Ukraine: Meeting New Challenges with New Solutions, in: Institute for Peace Research and Security Policy at the University of Hamburg/IFSH (ed.), *OSCE Yearbook 2016*, Baden-Baden 2017, pp. 23-32, here: p. 30.

12 Cf. John Hudson, International Monitor Quietly Drops Drone Surveillance of Ukraine War,, *Foreign Policy*, 28 October 2016, at: http://foreignpolicy.com/2016/10/28/international-monitor-quietly-drops-drone-surveillance-of-ukraine-war/.

13 Cf. OSCE, OSCE SMM long-range unmanned aerial vehicles resume monitoring of security situation in eastern Ukraine,Kyiv, 28 March 2018, at: https://www.osce.org/special-monitoring-mission-to-ukraine/376456.

14 Cf. OSCE Special Monitoring Mission to Ukraine, OSCE SMM UAV targeted near Betmanove, 15 June 2018, at: https://www.youtube.com/watch?v=sirVhEQ9b8c.

15 Cf. RFE/RL, OSCE Mission's Drone Shot Down After Spotting Russian Missile System In Eastern Ukraine, *RadioFreeEurope/RadioLiberty*, 1 November 2018, at: https://www.rferl.org/a/russia-ukraine-osce-drone-germany-france-suspect-separatists/29577799.html;

Mission and serious financial losses for the contractor. While long-range UAVs accounted for almost 17 per cent of the Mission's budget in 2016 (last data available), it was the contractor providing the service who assumed liability for UAV loss.[16]

Despite the setbacks, there were compelling reasons for the Mission to further improve its technological monitoring. First, the SMM received a volley of criticism and pressure to expand its monitoring beyond daylight hours.[17] Second, the Mission has had its monitoring and freedom of movement increasingly restricted, mostly due to security hazards and threats, which included risks posed by mines, and unexploded ordnance (UXO). For example, the Mission suffered a fatal incident on 23 April 2017, when one SMM patrol member died and two were injured after a vehicle hit a possible mine.[18] Earlier, SMM monitors had been subject to abduction at gunpoint and SMM vehicles had been vandalized.[19] Moreover, they have frequently been harassed and prevented from entering areas, even though they have the right to freedom of movement under the Mission's mandate and under the Package of Measures for the Implementation of the Minsk agreements.[20] Thus, it became imperative to find additional ways of gathering information, both for situational awareness, and to carry out the monitoring of the Minsk agreements.

In the first few years, the SMM showed great reluctance to share information about its technologies. But in May 2019, it finally published a video on "OSCE SMM technical monitoring".[21] This video informed the world about technologies the Mission uses to: first, help observe at night; second, monitor the situation in areas not accessible by regular patrols; third, observe the impact

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OSCE, Spot Report by OSCE Special Monitoring Mission to Ukraine (SMM): SMM loses long-range unmanned aerial vehicle near Berdianka, Kyiv, 18 February 2019, at: https://www.osce.org/special-monitoring-mission-to-ukraine/411776; OSCE, Spot Report by OSCE Special Monitoring Mission to Ukraine (SMM), SMM long-range unmanned aerial vehicle crashes near contact line in Donetsk region, Kyiv, 19 April 2019, at: https://www.osce.org/special-monitoring-mission-to-ukraine/417773.

16 Cf. Peško, cited above (Note 11), p. 30-31. In 2018, for instance, the general costs related to contracts awarded to external companies for providing the Mission with UAVs related expenses amounted to 26,314,000 euros over a two-year period, at: https://procurement.osce.org/resources/document/contract-awards-2018-0.

17 Cf. Andrew E. Kramer, Keeping Bankers' Hours, European Observers Miss Most of Ukraine War, *New York Times*, 27 July 2016, at: https://www.nytimes.com/2016/07/28/world/europe/ukraine-war-osce-observers.html.

18 Cf. OSCE, Spot Report: One SMM patrol member dead, two taken to hospital after vehicle hits possible mine near Pryshyb, Kyiv, 23 April 2017, at: https://www.osce.org/special-monitoring-mission-to-ukraine/312971.

19 Cf. OSCE, Latest news from the OSCE Special Monitoring Mission to Ukraine (SMM) based on information received until 18:00 hrs, 28 May (Kyiv time), Kyiv, 29 May 2014, at: https://www.osce.org/ukraine-smm/119299; Interfax-Ukraine, OSCE SMM calls for inquiry into spray paint incident involving SMM vehicles, *Kyiv Post*, 23 July 2015, at: https://www.kyivpost.com/article/content/war-against-ukraine/osce-smm-calls-for-inquiry-into-spray-paint-incident-involving-smm-vehicles-394138.html.

20 Cf. OSCE, OSCE Special Monitoring Mission to Ukraine (SMM) Daily Report 301/2019, issued on 20 December 2019, Kyiv, 20 December 2019, p. 6, at: https://www.osce.org/special-monitoring-mission-to-ukraine/442867.

21 Cf. OSCE, OSCE SMM technical monitoring, 15 May 2019, at: https://www.osce.org/special-monitoring-mission-to-ukraine/419582.

of the conflict on civilian population and infrastructure; and fourth, portray the current security situation with 20 camera systems, especially along the 500 km contact line. It included impressive footage from its most flexible monitoring technology: the UAV.

UAVs: Eyes in the Sky

The SMM is the first OSCE mission to deploy UAVs to complement monitoring and reporting by ground personnel. The Mission started flying UAVs within half a year of its creation. An early offer of military UAVs was declined, and instead, the Mission elected to use commercial, civilian UAVs under the direct control of the civilian mission.[22] The SMM UAVs are explicitly permitted in the no-fly zone established by the Minsk Memorandum: along the whole line of contact in a security zone that is at least 30 km wide, i.e., 15 km wide on each side of the line of contact. SMM UAVs have also been deployed up to the internationally recognized border with the Russian Federation, which stretches well beyond the distance of 15 km from the contact line.[23] The SMM deploys more than 50 short and mid-range UAVs. In addition, the mission has several long-range UAVs, though more than one was shot down.[24]

In June 2019, the Mission published its first 3D rendering from UAVs, called "Damage to civilian housing in eastern Ukraine".[25] It was made from two separate flights of mid-range UAVs, whose images were orthorectified using the software Pix4d.[26] The imagery and digital evidence showed that both sides had positioned military hardware and heavy weapons close to civilian housing. The video showed two villages, one on each side of the line of contact, i.e., one under Ukrainian control, and one under the control of the separatist armed forces. The video quickly became one of SMM's most popular videos; it was viewed almost 300,000 times on the Mission's Facebook page in the half year after it was uploaded. Unfortunately, despite the many daily flights of SMM UAVs, no other similar high-resolution and telling video has been released, while this practice should become, in our view, a regular one. At the same time, the long time necessary to orthorectify hundreds of images and build a 3D model cannot be the priority in a mission, which is essentially about reporting on ceasefire adherence on a daily basis.

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22 The offer was made by Germany, France, Italy, and the Russian Federation on 17 October 2014 in Milan. Cf. Neukirch, cited above (Note 7), p. 196.

23 See point 7 of the Minsk Memorandum, cited above (Note 5); cf. also Cono Giardullo/Ertuğrul Apakan, UAVs for the benefit of people: The use of unmanned aerial vehicles within the OSCE Special Monitoring Mission, *Human Rights Quarterly* (forthcoming).

24 Definitions used in this paper regarding the range of SMM drones – long-range, mid-range, and short-range – are essentially SMM terms, which do not necessarily match general technical terminology. In order to compare the tasks, strengths, and flaws of each platform, we kept the Mission's terminology.

25 Cf. OSCE, Damage to civilian housing in eastern Ukraine, 3 June 2019, at: https://www.osce.org/special-monitoring-mission-to-ukraine/421529.

26 This is evident from the logo in the bottom right of the video published (see Note 25).

In November 2019, the Mission published UAV imagery of co-operation and confidence building to highlight and encourage the reconstruction of the Stanytsia Luhanska bridge at the only crossing point between the sides in the Luhansk region. The before and after images of the bridge were shown through image comparisons from short-range UAVs.

Long-range UAVs, Schiebel Camcopter S-100, allow for assessment of more distant and larger areas. An example is shown in Figure 1. This model allows for vertical take-off and landing (VTOL) and has a range of 160 km. These are the only SMM UAVs with infrared imaging sensors, and they are piloted and maintained by external contractors, while the operational activities (flight planning and camera control) rest with the mission.[27] Given the safety and access restrictions preventing SMM ground monitors from operating during the night and on unpaved roads, the long-range UAVs are valuable monitoring tools, together with the fixed cameras and acoustic sensors, that can help overcome the limitations. The long-range UAVs have been hotly debated within the mission, given the difficult experience and ongoing risks of losing expensive technological hardware. This led to risk-sharing agreements with the supplier, which had been selected through a tender procedure. OSCE participating States agreed to pay voluntary contributions to partially fund the cost of expensive long-range UAVs.[28]

The mid-range UAVs, mostly Delair-Tech DT 18,[29] have been in operation since November 2015, and have ranges varying between 15-30 km. Short-range, mini-UAVs – DJI Phantom and Inspire quadcopters with ranges of 3-5 km – have also been used frequently. All of the SMM UAVs are equipped with high definition photo or video cameras. The two categories of UAVs (mid- and short-range) are currently operated by SMM field monitoring officers who are specially trained for this.[30] The UAVs are the principal reconnaissance tool used for observations related to human rights and humanitarian incidents. They also facilitate the observation of disengagement zones (weapons free areas), minefields, and damaged or destroyed infrastructure.

27 The UAV contractor provides both the pilots and the payload (camera) operators. But during an UAV mission, an SMM monitor usually works alongside the payload operator to provide direction. Cf. Beth Stevenson, Schiebel Camcopter UAV to deploy over Ukraine, *FlightGlobal*, 15 September 2014, at: https://www.flightglobal.com/civil-uavs/schiebel-camcopter-uav-to-deploy-over-ukraine/114474.article.

28 The SMM's first long-range UAVs (contracted from an Austrian company) "could not be flown in certain types of weather (including fog and freezing temperatures), and several were shot down, causing the supplier to terminate the contract due to excessive risk." Kemp, cited above (Note 2), p. 116.

29 Représentation permanente de la France auprès de l'OSCE, Une entreprise française va fournir des drones à la Mission d'observation en Ukraine [French company to supply drones to the Special Monitoring Mission in Ukraine], 7 October 2016, at: https:// osce.delegfrance.org/Une-entreprise-francaise-va-fournir-des-drones-a-la-Mission-speciale-d.

30 Cf. Giardullo/Apakan, cited above (Note 23).

Figure 1. (A) The long-range UAV used by the SMM, both an electro-optical (visible light) and an infrared (thermal) camera in the pod (undercarriage ball).[31]

31 Sources: (A) OSCE Special Monitoring Mission to Ukraine, 28 March 2018 (OSCE/Evgeniy Maloletka), at: https://www.flickr.com/photos/osce_smmu/41325822072; (B) OSCE SMM Ukraine, *Twitter,* 28 September 2017, at: https://twitter.com/osce_smm/status/913309485158031360; (C) screencapture from online video by OSCE SMM, Damage to civilian housing in eastern Ukraine, cited above (Note 25).

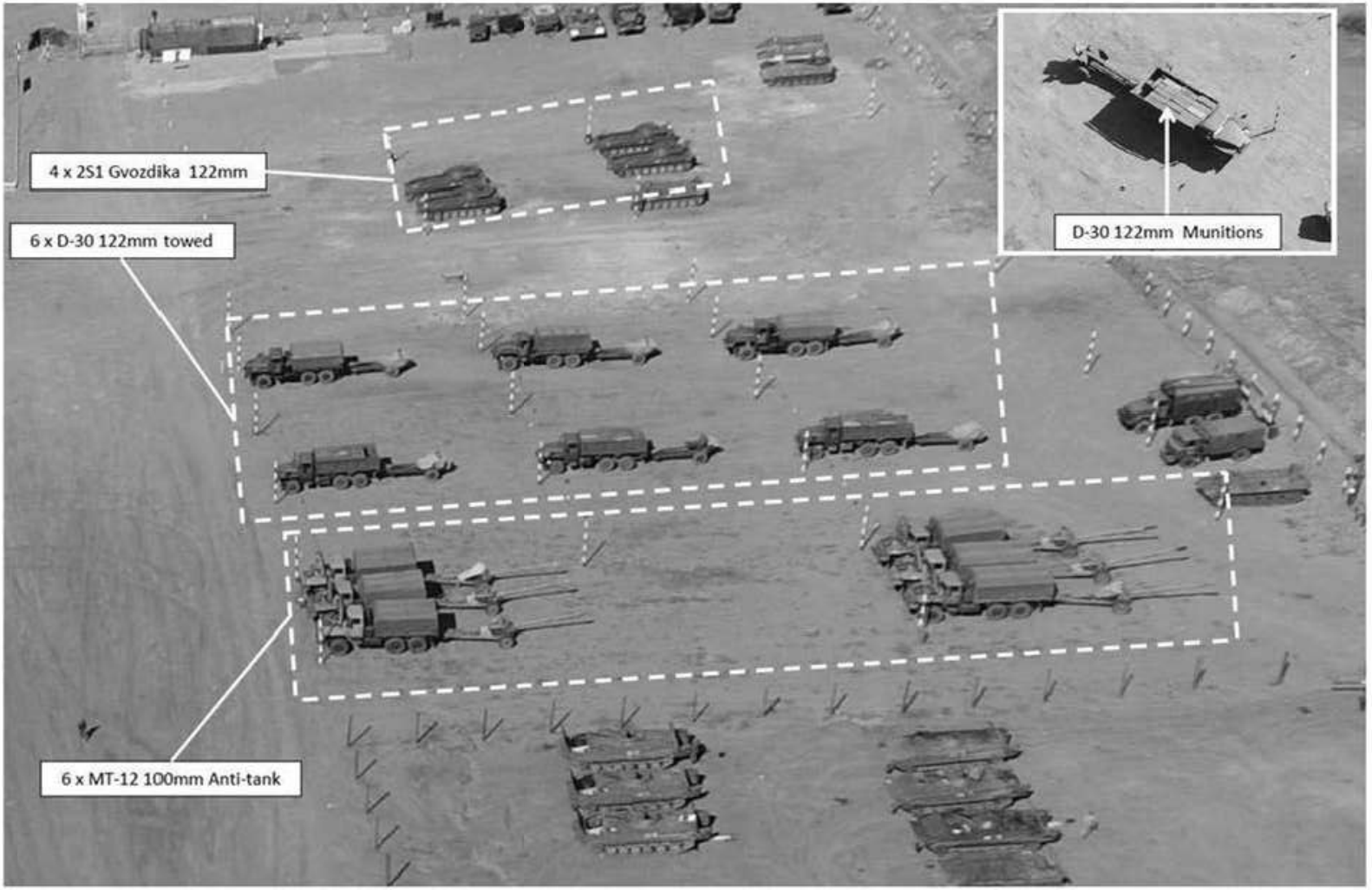

Figure 1. (B) Image taken by mid-range UAVs showing artillery equipment in Myrne, a village located in a non-government-controlled area.

Figure 1. (C) Images converted to 3D rendering of war-damaged dwellings.

The imagery enables comparison pre- and post-shelling, and identification of civilian buildings occupied by armed forces. In the course of this monitoring work, the UAVs have been often subject to shooting and jamming.[32] Electronic counter-measures, including state-of-the-art Russian systems for jamming, are increasingly observed in the conflict zone, suggesting that the current conflict in eastern Ukraine is a training camp and laboratory for some of Russia's electronic warfare equipment and techniques.[33] The SMM's short-range UAVs have been used to try to locate larger drones that have crashed, with mixed outcomes.[34]

Compared to the long-range UAVs, the short- and mid-range models are more limited by inclement weather conditions, fly at lower altitudes, and have lower endurance, all of which increase the exposure to jamming and shooting. The goal of assigning one mini-UAV to each patrol group is close to full realization.

Other Sensors

The deployment of 24 ground-based camera systems to monitor hotspots, checkpoints, and disengagement zones was another effective technological development by the Mission. Cameras were deployed to the hotspot of Shyrokyne village in January 2016, and near Donetsk airport a few months later, as well as in the disengagement areas. Major challenges in their use, in addition to those already mentioned, include obtaining security guarantees from the conflicting parties, ensuring data integrity, and preventing data tampering.[35] The daylight and thermal imaging cameras also monitor crossing points along the line of contact, the three disengagement zones of Petrivske, Stanytsia Luhanska and Zolote, and certain dangerous hotspots. Ground cameras are operated remotely on mounts around six metres tall. A few of them are mobile, mounted on vehicle trailers. The recorded data from ground cameras is transmitted via an encrypted satellite communication system to the Technical Monitoring Centre (TMC) at the SMM head office. Data received from the cameras is frequently mentioned in the daily reports of the mission.[36] Some of the thermal-only cameras, manufactured by *Infratec*, were provided as an

32 Cf. OSCE Special Monitoring Mission to Ukraine, SMM long-range UAV comes under fire, 5 April 2019, at: https://www.youtube.com/watch?v=T-0HNhIu_Gs.

33 See DFR Lab, #MinskMonitor: New Russian Electronic Warfare Systems in Eastern Ukraine, *Medium*, 23 August 2018, at: https://medium.com/dfrlab/minskmonitor-new-russian-electronic-warfare-systems-in-eastern-ukraine-5b913afbb455; DFR Lab, Russian GPS-Jamming Systems Return to Ukraine, *Medium*, 23 May 2019, https://medium.com/dfrlab/russian-gps-jamming-systems-return-to-ukraine-8c4ff7d8dcb8.

34 Cf. OSCE, Spot Report by OSCE Special Monitoring Mission to Ukraine (SMM), cited above (Note 15).

35 Cf. Peško, cited above (Note 11).

36 Cf. OSCE, Latest from the OSCE Special Monitoring Mission to Ukraine (SMM), based on information received as of 19:30, 20 August 2018, Kyiv, 21 August 2018, at: https://www.osce.org/special-monitoring-mission-to-ukraine/391211.

in-kind contribution from Germany.[37] One of the major downsides of fixed-site cameras is the need for an electricity feed, which can only be guaranteed in some areas by the use of generators. Also, SMM camera systems can be "blinded" using spot lights and aimed lasers, as was attributed to the Lugansk People's Republic.[38]

Acoustic sensors are also used by the Mission, so far without clear success. Little is known about the sensors, though some difficulties in installing the two of them were reported.[39] However, in the words of a former deputy chief observer of the Mission, such sensors can allow the Mission "to detect ceasefire violations, identify the direction from where they originate and under certain circumstances, pinpoint the origin of fire".[40] But too little information has been publicly shared, notably in the Mission's public reports, to allow a proper evaluation of such sensors. Live feeds from the acoustic sensors, as well as from the cameras, are transmitted to the TMC. They help create a "real time situation awareness and a common operating picture for the Mission".[41]

The SMM also adopted satellite imagery early on (June 2015) to help with monitoring.[42] Presently, this support is provided, *inter alia*, by the European External Action Service (EEAS) and amounts to almost six million euros,[43] helping especially with in-depth monitoring of the security situation in areas where no SMM monitors can be deployed. Imagery and analysis are provided by three agencies, among them DigitalGlobe and the EU Satellite Centre (SatCen), with funding provided by the Instrument contributing to Stability and Peace (IcSP), which is the EU's main mechanism to support "stabilisation initiatives and peace-building activities".[44] For instance, IcSP-

37 Cf. InfraTec., Monitoring compliance with security measures in Ukraine, 27 June 2017, at: https://www.infratec.eu/press/press-releases/details/2017-06-27-monitoring-compliance-with-security-measures-in-ukraine/

38 Cf. OSCE SMM Ukraine,"LPR" use laser to "blind" #OSCE SMM camera at Stanytsia Luhanska, *Twitter,* 6 October 2017, at: https://twitter.com/osce_smm/status/ 916241741606420480.

39 Cf. Ministry of Foreign Affairs of Ukraine, Statement on "Russia's ongoing aggression against Ukraine and illegal occupation of Crimea", 24 November 2017, at: https://mfa.gov.ua/en/news/61363-statement-on-russias-ongoing-aggression-against-ukraine-and-illegal-occupation-of-crimea.

40 OSCE SMM: The number of ceasefire violations recorded in Donbas this year exceeds 325,000, *Ukraine Crisis media center*, Kyiv, 3 November 2017, at: http://uacrisis.org/61968-osce-71.

41 OSCE, Technical Monitoring Officer/Camera Operator, at: https://jobs.osce.org/vacancies/technical-monitoring-officercamera-operator-vnsmus00606.

42 "The 12 February package of measures also refers to the possible use of satellite imagery", Stephanie Liechtenstein, Interview with Alexander Hug: Political will has to be translated into operational instructions on the ground, *Security and Human Rights Monitor*, 24 February 2015, at: https://www.shrmonitor.org/interview-alexander-hug-deputy-chief-monitor-political-will-translated-operational-instructions-ground/.

43 Cf. European Union External Action, Further support in the area of satellite imagery to the OSCE Special Monitoring Mission in Ukraine, *EEAS*, 11 June 2019, https://eeas.europa.eu/topics/sanctions-policy/63915/further-support-area-satellite-imagery-osce-special-monitoring-mission-ukraine_en.

44 European Commission, The Instrument contributing to Stability and Peace responds rapidly to crises, builds peace and prevents conflict around the world, at: https://ec.europa.eu/fpi/

supported assistance from the SatCen in 2017 delivered 510 products that contributed to SMM's monitoring efforts. These products covered: identification and description of military activity and equipment; change detection; monitoring of the contact line; training areas and rail stations; and battle damage assessment.[45] There is no evidence that the Mission has purchased sensors for radiation or chemical weapons. But because of the hazard from industrial and explosive gas exposure by either the SMM personnel or the local population, the SMM is procuring chemical detectors for a wide range of hazardous gases, from carbon monoxide to chlorine to hydrogen cyanide. Gas detectors can be installed in fixed locations or carried by monitors.[46] Given years of unverified environmental assessments in the conflict region, the SMM needs to develop a capability for rapid environmental (chemical) assessment.

The monitors currently carry cameras and binoculars, as well as cellular phones that can record still images and videos. Other standard patrol-related equipment includes radios, satellite phones, flak jackets, and helmets. A few camera systems are mounted on vehicle trailers but advanced reconnaissance vehicles (with radars) are not used. Neither are body or helmet-mounted cameras. Furthermore, too often monitors face difficulties in gaining quick access to satellite imagery and making use of aerospace (satellite and UAV) imagery to conduct their tasks. This appears to be due to both a lack of technical knowledge about remote sensing possibilities in conflict zones, and to the centralized tasking structure, which is based at the headquarters Operations Unit.

Data Handling

On a normal day, the SMM collects around 50-60 patrol reports, imagery from satellites, acoustic sensors, static and patrol cameras, and dozens of flights from short-, mid-, and long-range UAVs. To handle the volume of digital reporting, in 2015/16 the Mission established an Information Management Cell, whose status was later elevated to a Centre (IMC), which is staffed with image analysts, geographic information experts, and information, database, and operations data managers.[47]

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what-we-do/instrument-contributing-stability-and-peace-preventing-conflict-around-world_en.

45 Cf. Interim Responses Programme on Ukraine – Further support to the OSCE Special Monitoring Mission in Ukraine, p. 2, at: https://ec.europa.eu/transparency/regdoc/rep/3/2018/EN/C-2018-3108-F1-EN-ANNEX-1-PART-1.PDF.

46 Cf. OSCE, on behalf of the OSCE Special Monitoring Mission to Ukraine, Supply of gas detectors for the OSCE Special Monitoring Mission to Ukraine, OSCE Procurement reference RFQ/SMM/112/2019 (with Clarification Notes No, 1 and No. 2), 17 December 2019, at: https://procurement.osce.org/tenders/supply-gas-detectors-osce-special-monitoring-mission-ukraine.

47 Cf. Peško, cited above (Note 11), p. 31; see also: OSCE, Senior Information Management Officer, at: https://jobs.osce.org/vacancies/senior-information-management-officer-vnsmus00340.

In 2018, the SMM greatly expanded its technical monitoring capabilities, even converting some positions from field monitoring officers (MOs) to technical monitoring officers (TMOs). It created a Technical Monitoring Centre (TMC), located in Kyiv, where live feeds are received 24/7, including feeds from fixed cameras and acoustic sensors in the field. Under the supervision of the SMM Operations Unit, the TMC co-ordinates with the eastern monitoring teams (MTs) and helps the MTs with their data access and contributions to the mission common operational picture (MCOP).[48] The camera/UAV operators, some operating remotely in the TMC, extract ceasefire violation clips from video feeds – sometimes hundreds per day. Geographic Information System (GIS) specialists analyse the geospatial data to help understand both the capabilities and limitations of the monitoring systems.

Both satellite and UAV imagery should be progressively integrated within a recently developed Enterprise Geographic Information System (EGIS), "using state-of-the art reporting and mapping tools […] to improve the flow of information between the SMM's field teams and its headquarters".[49] While the EGIS was being instituted in 2019, the Permanent Representative of Ukraine to the International Organizations in Vienna predicted it would "enhance the SMM's awareness of the current situation on the ground and provide the Mission with the capacity to inform on the distance to the contact line while reporting on specific locations and damage to residential areas and military positions".[50]

To rationalize all these processes, a new position was created in 2019. The Senior Technical Project Officer is responsible for the planning, development, and management of activities, and delivery of the project to enhance and maintain the technical monitoring capacity of the mission.[51]

Within the OSCE SMM, there are no levels of information security (e.g., secret or top secret) for personnel, as there are within EU and NATO missions, while UN missions have a highest classification grade of "strictly confidential". Inside the SMM, the most sensitive information is shared on a *need to know* basis, by granting individual mission members electronic access to specific mission folders and briefing notes.

To limit external release, there is only one designation, *OSCE+*, meaning the release of documents is possible only to OSCE participating States, OSCE executive structures and Asian/Mediterranean Partners for Co-operation.

48 Cf. OSCE, Chief of TMC (Technical Monitoring Centre), at: https://jobs.osce.org/vacancies/chief-tmc-technical-monitoring-centre-vnsmus00836.

49 Ambassador Stefano Toscano, Interviews with HMA Directors: Ambassador Stefano Toscano, The Journal of Conventional Weapons Destruction, Issue 1, Article 4, April 2019, p. 2, at: https://commons.lib.jmu.edu/cisr-journal/vol23/iss1/4.

50 OSCE, Statement by the Delegation of Ukraine in response to the update by Ambassador Martin Sajdik and to the report by Ambassador Yaşar Halit Çevik, 4 July 2019, p. 4, available at: https://www.osce.org/permanent-council/425564.

51 Cf. OSCE, Senior Technical Project Officer, at: https://jobs.osce.org/vacancies/senior-technical-project-officer-vnsmus00973.

Data Dissemination

In 2019, the SMM took much more pride in publicizing its use of drone monitoring than it did in earlier years. While footage is not released frequently, the Mission is remarkably public about its findings from all sources, releasing the findings on a daily basis and making "all of its relevant observations public on the OSCE web site".[52] What the Mission considers "relevant" are violations of the Minsk agreements – mainly ceasefire violations and any presence of military hardware within the agreed withdrawal lines.

While the earliest (2014) mission reports were relatively sparse, the Mission now publishes detailed daily reports of ten or more pages with standard types of information on the observed ceasefire violations. For instance, the daily report of 10 December 2019, noted that mini-UAVs helped spot: first, an excavator in a non-government controlled area, probably used to cover a nearby trench with dirt; second, Ukrainian Armed Force personnel digging; third, anti-tank mines in both government- and non-government-controlled areas; and fourth, a military presence in the security zone more than a dozen times. That daily report extensively tabulated cases where the fixed cameras recorded dozens of ceasefire violations, in addition to tabulated instances where SMM monitors "heard" over a hundred violations (specified as either fire from small arms, cannons, heavy machine guns, or "not known").[53]

As another case in point, a thematic report on the OSCE SMM website shows casualties caused by an anti-tank mine activated near a checkpoint. It also showed the contamination of agricultural fields with explosive objects.[54] Extensive crater analysis – or impact site assessment[55] – is also carried out to show the direction of past mortar or other artillery fire, and UAV images are sometimes used to locate the craters, identify damage to walls, roofs, and fences, and improve the assessments made by field monitors.

Some six years since the beginning of the armed conflict, it is fair to say that UAV images have "democratized" access to the conflict zone, causing a kind of "CNN effect 3.0" – i.e., using shocking images of humanitarian crises that compel influential policymakers to pay attention in situations that would otherwise be forgotten.[56] Greater transparency also served the Mission's purpose to better and more realistically portray the risks and living conditions of

52 OSCE, OSCE SMM technical monitoring, cited above (Note 21), at 1:01.

53 Cf. OSCE, Daily Report 292/2019, 10 December 2019, available at: https://www.osce.org/special-monitoring-mission-to-ukraine/441790.

54 Cf. OSCE, Special Monitoring Mission to Ukraine, Thematic Report, The Impact of mines, unexploded ordnance and other explosive objects on civilians in the Donetsk and Luhansk regions of eastern Ukraine: January 2018-October 2019, SEC.FR/838/19, 4 December 2019, pp. 16-17, available at: https://www.osce.org/special-monitoring-mission-to-ukraine/441170.

55 Cf. OSCE, Latest from OSCE Special Monitoring Mission (SMM) to Ukraine, based on information received as of 19:30, 2 September 2016, Kyiv, 3 September 2016, at: https://www.osce.org/special-monitoring-mission-to-ukraine/262386.

56 This revised CNN effect 2.0 uses means and coverage by an international organization, given the quasi-complete absence of media companies along the line of contact. The CNN

residents in eastern Ukraine. Multiple times, UAV images showed military-purposed trenches, roadblocks, and mines creating divisions between close villages,[57] and public and private infrastructure burned and destroyed.[58]

Some of the findings remain extremely sensitive from a political standpoint. This was the case in August and October 2018, when the Mission decided to report that:

> An SMM long-range unmanned aerial vehicle again spotted vehicles, including a truck carrying an armoured personnel carrier, entering and exiting Ukraine via an unpaved road in a non-government-controlled area of Donetsk region near the border with the Russian Federation where there are no border crossing facilities.[59]

Given the exceptional circumstances, the SMM management even released the long-range UAV footage, which was viewed over 350,000 times on YouTube.[60]

Video footage from the fixed cameras has rarely been released, but exceptions include imagery from the thermal camera observations of Shyrokyne in August 2016,[61] and video portraying the fire of howitzers near Svitlodarsk in January 2017.[62]

The decision to publicly release digitally acquired observations rests entirely with the SMM Chief Monitor, the Head of the Mission who "owns" the information obtained by the Mission. Observations are released more frequently, and on the basis of specific advice provided to the Chief Monitor by

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effect 3.0 covers the role of emerging global media players, or of social media, in this process. Cf. Piers Robinson, The CNN effect: can the news media drive foreign policy?, Review of International Studies 2/1999, pp. 301-309; The Media and 9/11, CNN Effect 2.0, Public Diplomacy and Global Communication 2014d, London Metropolitan University blog, 14 May 2015, at: https://pdgc2014d.wordpress.com/2015/05/14/the-media-and-911-cnn-effect-2-0/.

57 Cf. OSCE SMM Ukraine, *Twitter,* 18 October 2018, at: https://twitter.com/OSCE_SMM/status/1052886051440775169; OSCE SMM Ukraine, *Twitter,* 7 May 2019, at: https://twitter.com/OSCE_SMM/status/1125715872130174977; OSCE SMM Ukraine, *Twitter,* 9 July 2019, at: https://twitter.com/OSCE_SMM/status/1148496428102234112.

58 Cf. OSCE SMM Ukraine, *Twitter,* 12 October 2018, at: https://twitter.com/OSCE_SMM/status/1050710283231084544.

59 OSCE, Latest from the OSCE Special Monitoring Mission to Ukraine (SMM), based on information received as of 19:30, 12 October 2018, Kyiv, 13 October 2018, at: https://www.osce.org/special-monitoring-mission-to-ukraine/399674; cf. OSCE, Latest from the OSCE Special Monitoring Mission to Ukraine (SMM), based on information received as of 19:30, 8 August 2018, Kyiv, 9 August 2018, at: https://www.osce.org/special-monitoring-mission-to-ukraine/390179.

60 Cf. OSCE Special Monitoring Mission to Ukraine, OSCE SMM spotted convoys of trucks entering and exiting Ukraine in Donetsk region, 10 August 2018, at: https://www.youtube.com/watch?v=Ani2YWDLXl0.

61 Cf. OSCE Special Monitoring Mission to Ukraine, OSCE SMM thermal camera observations in Shyrokyne, Donetsk region, 23 August 2016, at: https://www.youtube.com/watch?v=SLLvCUUQ19g.

62 OSCE Special Monitoring Mission to Ukraine, OSCE SMM UAV: 5 howitzers firing in direction of Svitlodarsk, 12 January 2016, at: https://www.youtube.com/watch?v=mHQQd6DYwT0.

the two Deputy Chief Monitors, Heads of Units, and political advisors. The release of such observations to mandated partners and participating States is now more flexible and frequent, with a view to advancing peace negotiations, keeping the States informed at all times and justifying the expensive technological tools used.

The SMM publishes its results on its website.[63] The report for the latest quarter (July-September 2019) is informative: The Mission detected over 50,000 ceasefire violations. Twenty per cent of weapons in violation of withdrawal lines were reported in government-controlled areas (GCAs) and eighty per cent in non-government-controlled areas (NGCAs). Ninety-two per cent of restrictions[64] imposed on SMM movement were in NGCAs and eight per cent in GCAs.

The utility of technology to aid mission reporting is also illustrated. The means used to detect the weapons in violation were: long-range UAVs (44 per cent); patrols (34 per cent); mini-UAVs (14 per cent); aerial/satellite imagery (seven per cent); and mid-range UAVs (0.4 per cent). Thus, the majority of violations were observed with technological means. In addition, some 60 per cent of all ceasefire violations were recorded during the night, mostly using technology. This kind of extensive data from human and technologically-aided observations enables trend analysis to be conducted, mainly by an international Trend Analysis Adviser[65] and one or two National Trend Analysis Officers[66] who are embedded in the Reporting and Political Analysis Unit. The Trend Analysis Advisers and Officers are in close contact with the Operations Unit in order to "help ensure Monitoring Teams receive feedback and guidance on report and other aspects of the implementation of the Mission's mandate".[67] However, the Mission is careful that its analysis does not exceed its political authorization.

Issues: Attribution and Beyond

The SMM is severely constrained by its mandate: It cannot attribute ceasefire violations to a violator, even if one is identified,[68] meaning that the Mission is

63 OSCE, OSCE Special Monitoring Mission to Ukraine, at: https://www.osce.org/special-monitoring-mission-to-ukraine.

64 Including impediments to the use of monitoring technologies: UAVs, cameras, and acoustic sensors.

65 Cf. OSCE, Trend Analysis Adviser, at: https://jobs.osce.org/vacancies/trend-analysis-adviser-vnsmus00611.

66 Cf. OSCE, National Trend Analysis Officer, at: https://jobs.osce.org/vacancies/national-trend-analysis-officer-vnsmun00804.

67 OSCE, Trend Analysis Adviser, cited above (Note 65).

68 This mandate limits the Mission to "establish and report facts […]". OSCE, Permanent Council, Decision No. 1117, cited above (Note 3), p. 1.

in the awkward position of showing the evidence of such violations, but it cannot disclose who committed them.[69] In many cases, the perpetrator can be easily deduced using information provided by the Mission on the location of the violation or the direction of fire recorded. In the course of almost six years of activity, a stauncher, more direct approach was frequently requested, notably by Ukrainian civil society and media. But the political actors who guide the Mission have not changed the mandate. So, the Mission replies, as summarized by former Deputy Chief Monitor Alexander Hug, that the role of deciding on questions of guilt and responsibility is "not for the media and not for the OSCE SMM to assume".[70]

The SMM also prefers not to attribute blame more generally, even when one of its own members is killed or injured by the action of one of the parties. When OSCE Chairperson-in-Office, Sebastian Kurz, called for a thorough investigation into the death of the SMM patrol member in 2017,[71] the OSCE Secretariat turned to the International Humanitarian Fact-Finding Commission (IHFFC), based in Switzerland, to carry out the investigation, since the OSCE Secretariat lacked expertise of its own.[72] But the IHFFC was also constrained by a mandate to "establish the facts of the incident [… rather than] establish criminal responsibility or accountability for the incident".[73]

While the practice is sometimes criticized, persons from the conflicting parties are part of the SMM staff, who are all civilians or police personnel (though many are former military). Currently, out of over 1,300 SMM staff members, there are 766 monitoring officers, of whom 41 are Russian, but none is Ukrainian. The Mission has personnel from 45 of the 57 OSCE participating States. Russians are present, but few in number, among the 125 international staff at the Mission headquarters in Kyiv. Ukrainian staff members, whose nation is a direct participant in the conflict, are employed as local (national) staff in the roles of assistants, advisors, translators, and administrative personnel.[74]

Criticism has been raised about the presence of Russian monitors in the past, particularly following several scandals in which personnel allegedly from

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69 This is the case for monitoring the adherence to the ceasefire, but not for monitoring the disengagement process and withdrawal of weapons, when the SMM, by naming the village where military hardware or members of armed forces were spotted, also implies who the violator is.

70 News Agency 112 International, Ending the bloodshed is the task of the sides. International organizations are here to assist and document, – Alexander Hug", *112.ua*, 18 March 2019, at: https://112.international/interview/ending-fighting-is-not-the-task-of-osce-smm-thats-the-task-of-the-sides-alexander-hug-36942.html; see also Amy Mackinnon, Counting the Dead in Europe's Forgotten War, 25 October 2018, at: https://foreignpolicy.com/2018/10/25/counting-the-dead-in-europes-forgotten-war-ukraine-conflict-donbass-osce/.

71 Cf. Liechtenstein, cited above (Note 1).

72 Cf. Kemp, cited above (Note 2), p. 119.

73 International Humanitarian Fact-Finding Commission, OSCE Special Monitoring Mission was not targeted, concludes Independent Forensic Investigation into tragic incident of 23 April 2017, *IHFFC.ORG,* 7 September 2017, at: https://www.ihffc.org/index.asp?mode=shownews&ID=831.

74 Cf. OSCE, Special Monitoring Mission to Ukraine, Status Report, as of 9 December 2019, available at: https://www.osce.org/special-monitoring-mission-to-ukraine/442261.

the Moscow security services were said to have infiltrated the Mission. For such a politically sensitive mission as the SMM, it is important to assure the world and the local population that the Mission does not have spies deployed among its monitors and staff. As a former SMM spokesperson stated, the Mission relies on "the good faith of participating states to second monitors to the OSCE who will work on the basis of impartiality".[75] When joining the Mission, monitors must sign a pledge to abide by the code of conduct and they are required to strictly adhere to this.[76]

The Mission's success has been accompanied by requests for expanded mandates. After the escalation of tensions in the Sea of Azov, including Russia's detainment of Ukrainian sailors, the Mission experienced pressure to monitor the area, but shied away from observing the situation in the Sea of Azov too closely with the new technologies, prompting the OSCE Parliamentary Assembly in July 2019 to call for:

> providing the necessary resources to enhance OSCE SMM capabilities, in particular through the use of technical surveillance equipment, unmanned aerial vehicles and satellite imagery, to monitor the situation in the Sea of Azov and the Kerch Strait [...][77]

Meeting such a request would necessitate a major increase in the technological capability of the Mission. It would vastly increase the coverage area and require a substantial increase in resources, both in devices and image analysts, who would need sea-observation expertise. However, the SMM mandate expansion to this region remains a possibility.

Conclusions

The "Normandy Four" agreement in Paris on 9 December 2019 carries new risks for the SMM monitors, particularly with its calls for 24-hour monitoring. The SMM has always deemed it too dangerous to deploy monitors at night.

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75 Allison Quinn, Russian OSCE monitor in Ukraine fired after "drunkenly saying he was a Moscow spy", *The Telegraph*, 30 October 2015, at: https://www.telegraph.co.uk/news/worldnews/europe/russia/11965191/Russian-OSCE-monitor-in-Ukraine-fired-after-drunkenly-saying-he-was-a-Moscow-spy.html; see also OSCE surprised by Russian intelligence penetrating its Ukraine mission, *Euractiv*, 19 July 2018, at: https://www.euractiv.com/section/global-europe/news/osce-surprised-by-russian-intelligence-penetrating-its-ukraine-mission/.

76 Organization for Security and Co-operation in Europe, OSCE Code of Conduct for Staff/Mission Members, available at: https://www.osce.org/secretariat/31781.

77 Resolution on the Militarization by the Russian Federation of the Temporarily Occupied Autonomous Republic of Crimea and the City of Sevastopol, Ukraine, the Black Sea and the Sea of Azov, in: OSCE PA, Luxembourg Declaration and Resolutions Adopted by the OSCE Parliamentary Assembly at the Twenty-Eighth Annual Session, Luxembourg, 4-8 July 2019, pp. 30-32,, para. 19, at: https://www.oscepa.org/documents/annual-sessions/2019-luxembourg/3882-luxembourg-declaration-eng/file.

Technologies were deployed in the SMM for three main reasons: first, to overcome the limitations of night monitoring, though the SMM already claimed to have a 24-hour presence on the ground;[78] second, to reduce risks in the daytime, particularly after the death of US paramedic Joseph Stone; and third, to broaden the field of view beyond that of ground monitors, who often experience restrictions from ongoing hostilities or deliberate blockage. The renewed call for true 24-hour monitoring, made at the level of heads of state, now becomes an imperative, and the Mission is obliged to adapt. Technologies should again help the SMM to implement the December 2019 proposals of the "Normandy Four" heads of state.[79]

The technologies reviewed above have proven extremely useful to the SMM to fulfil its monitoring mandate. The imagery has shown thousands of clear violations of the Minsk agreements, while making the lives of the monitors on the ground safer and more effective. In addition, the local population is better informed about risks and developments. Although not a panacea, the technology has enabled the Mission to achieve greater range, flexibility, and duration of observation. Technology permits night-time monitoring that is otherwise extremely dangerous for human observers.[80] It has become an indispensable tool in the OSCE's most expensive mission, which, in 2018, had a budget of around 105 million euros, of which almost 85 million euros came from the OSCE's assessed contributions.[81]

SMM monitoring in Ukraine, whether by personnel or using technological means, has a deterrent effect on belligerents, helping to prevent outright attacks, reducing human rights violations, and being "an integral element ensuring the progress achieved" by the Mission.[82] But it is still insufficient to eliminate the low-level fighting and many violations.

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78 OSCE, Who we are, at: https://www.osce.org/special-monitoring-mission-to-ukraine/who-we-are.

79 Cf. RFE/RL, Ukraine, Russia Agree On Full Cease-Fire, "All-For-All" Prisoner Swap By End of 2019, *RadioFreeEurope/RadioLiberty*, 9 December 2019, at: https://www.rferl.org/a/ukraine-russia-agree-on-full-cease-fire-all-for-all-prisoner-swap-by-end-of-2019/30316624.html; Katya Gorchinskaya, The Normandy Summit Ended With No Breakthroughs. What Has It Achieved? *Forbes*, 10 December 2019, at: https://www.forbes.com/sites/katyagorchinskaya/2019/12/10/the-normandy-summit-ended-what-has-it-achieved; Stephanie Liechtenstein, Normandy Summit discusses expanding mandate of OSCE monitors in Ukraine, *Security and Human Rights Monitor,* 19 December 2019, at: https://www.shrmonitor.org/normandy-summit-discusses-expanding-mandate-of-osce-monitors-in-ukraine/.

80 Cf. Alexander Hug, Principal Deputy Chief Monitor of the OSCE Special Monitoring Mission to Ukraine, *Ukrinform*, 17 October 2018 (answer to question 7: "It is known that OSCE SMM observers were working, mainly, on daylight […]"), at: https://www.ukrinform.net/rubric-defense/2560584-alexander-hug-principal-deputy-chief-monitor-of-the-osce-special-monitoring-mission-to-ukraine.html.

81 Cf. Kemp, cited above (Note 2), p. 116. Also cf. OSCE, Annual Report 2018, p.70, available at: https://www.osce.org/annual-report/2018.

82 OSCE, A full and comprehensive ceasefire crucial for success and implementation of security measures, says OSCE SMM Chief Monitor to OSCE Permanent Council, Kyiv, 13 December 2019, at: https://www.osce.org/special-monitoring-mission-to-ukraine/442150.

It is remarkable that a young mission like the SMM, operating with a relatively small budget compared to most UN peacekeeping operations (though more expensive than some UN observer missions), has so quickly adopted sophisticated technologies, namely UAVs and remotely-monitored ground cameras for hotspots. The deployment of these technologies has faced many challenges, not least that some are targeted by belligerents. Despite the risks and costs, the tools reviewed here have proven of great value in helping to fulfil the monitoring mandate of the Mission.

Not only does the OSCE SMM experience with monitoring technologies lay the foundation for future OSCE progress, the technological successes and challenges of the Mission provide valuable lessons for peace operations more generally.