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Turkey Embarks Upon Ballistic Missiles: Why and How?

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ABSTRACT

From the late-1980s, and in response to the rapid spread of ballistic missiles in her neighborhood, Turkey has opted to add a symmetrical ingredient to her traditional policy of asymmetrical response, and began developing and deploying her own ballistic missiles. Additionally, thanks to the rapid technological progress during the last 10-15 years, shorter range ballistic missiles have been rendered attractive weapon systems even for countries like Turkey with access to advanced air power assets. Thanks to multi-phased development program, Turkey has recently deployed ballistic missile with a range of up to 300 km, whereas development work has been underway on longer-range derivatives. Paying tribute to geostrategic, technological, cost, and foreign policy considerations, the optimum range bracket for Turkey's ballistic missiles appears to be around 800 kilometers. Recent calls for ballistic missiles of much longer ranges (e.g. 2,500 km) do not correspond to Turkey's geostrategic and security circumstances. Rather than being the products of careful cost-benefit analyses, those calls appear to be the outcomes of unarticulated competitive reasoning and instincts. Combined with controversial and puzzling statements coming from the individuals close to Turkey's top decision-making circles, they are seen and treated as further signs of Turkey's latent nuclear weapon aspirations.

Keywords: Ballistic Missiles, Weapons of Mass Destruction, Deterrence (Strategy), Turkish Defense Policy, Missile Defense.

Türkiye Niçin ve Nasıl Balistik Füzelere Yöneldi?

ÖZET

1980'li yıllardan itibaren yakın coğrafyasında balistik füzelerin hızla yaygınlaşması ve bunlardan bazılarının çatışmalarda kullanılmasına yanıt olarak Türkiye, asimetrik karşılığın yanısıra simetrik karşılık seçeneğine yönelmiş ve kendi balistik füzelerini geliştirme yoluna gitmiştir. İlaveten, son 10-15 yılda kaydedilen teknolojik gelişmeler, görece kısa menzilli balistik füzeleri Türkiye gibi hava gücü imkânları gelişmiş ülkeler açısından bile cazip silah sistemleri haline getirmektedir. Türkiye, 1990'larda başlattığı çok aşamalı füze geliştirme programı sayesinde, 300 km menzilli balistik füzeler konuşlandırmıştır. Daha uzun menzilli türevlerin geliştirilmesine devam edilmektedir. Diğer taraftan; jeostratejik, teknolojik, maliyet ve dış ilişkiler gibi kistasların kesişme noktasında, Türkiye'nin konuşlandıracağı balistik füzeler için en uygun menzil aralığı olarak takribi 800 kilometre rakamı belirginleşmektedir. Son dönemde gündeme gelen çok daha uzun menzilli (örneğin 2,500km) balistik füzeler edinilmesine yönelik çağrılarsa, Türkiye'nin jeostratejik şartları ve güvenlik hedefleriyle tam manasıyla örtüşmemektedir. Kapsamlı maliyet-yarar analizlerinden ziyade basit rekabet refleksine dayandığı izlenimi yaratan bu çağrılar, uluslararası camiada Türkiye'nin nükleer silah emelleri beslemeye başladığına dair şüpheleri ciddileştirmektedir.

Anahtar Kelimeler: Balistik Füzelere, Kitle İmha Silahları, Caydırıcılık (Strateji), Türk Savunma Politikası, Füze Savunması.

Prologue

In early 2012, and immediately after attending a meeting headed by the then Prime Minister Recep Tayyip Erdoğan, the chief of Turkey's state R&D organization, The Scientific and Technological Research Council of Turkey (*Türkiye Bilimsel ve Teknolojik Araştırma Kurumu-TÜBİTAK*) announced that developing missiles with a range of 2,500 km was put in front of them as a realistic target. This was followed in September 2012 by Turkey's Minister of Industry and Technology informing the press that developing long-range "ballistic" missiles was among Turkey's goals. Shortly afterwards, Undersecretary for Defense Industries (*Savunma Sanayii Müsteşarı-SSM*) who happens to be Turkey's top authority for defense industry planning and defense procurement, confirmed the existence of efforts to develop long-range ballistic missiles, and said details would be shared with the public as the work progressed. The Undersecretary has also underlined the technological benefits for ballistic missile development of his organization's recently-inaugurated satellite launch vehicle (SLV) program.¹

Probably, the clearest confirmation of Turkish leadership's determination to add long-range missiles in Turkey's inventory came in November 2015, when President Recep Tayyip Erdoğan went in record with his following remarks during an interview broadcast live on Turkish televisions:

Currently, we manufacture missiles, but we are not at the desired level with respect to the range, which must be much longer. Are we going to do long-range defense or offense? This is the crux of the matter. What we ... want is indigenous, long-range and offensive (missiles). ... If we build offensive (missiles), we would be addressing the defense as well. While getting reserve officer training at Tuzla [first lieutenant school], they told us 'the best defense is offense'. This is what we should aim at: offensive and long range. The moment we produce those (missiles), we would be solving the issue of defense as well.²

Comments and acknowledgements coming from its leaders and top technocrats leave no doubt about Turkey's resolve to develop and deploy what could be termed as medium-range ballistic missiles (MRBMs) – a classification that covers missiles with ranges between 1,000 and 3,000 km. More intriguing has been the amount of reporting and speculation that Turkey's ambitions went well beyond MRBMs, and extended into the domain of intercontinental ballistic missiles (ICBMs), implying missiles that could fly more than 5,500 km.³ Ever since 2011, certain media outlets have been awash with stories linking every possible defense and aerospace contract to the presupposed goal of gaining access to ICBM technologies. Leading among those have been the SLV program, as well as the T-LORAMIDS competition to acquire air/missile defense systems, whose add-on technology

1 "TÜBİTAK: Hedefimiz 2 bin 500 kilometre menzilli füze yapmak", *Hürriyet*, 14 January 2012, <http://www.hurriyet.com.tr/tubitak-hedefimiz-2-bin-500-kilometre-menzilli-fuze-yapmak-19680119> (Accessed on 22 April 2017); "TRT Anadolu Kartalı", *TRT television*, 12 March, 2014, www.youtube.com/watch?v=6DCSBhK1YT4 (Accessed on 15 March 2014); "Bakan'dan uyarı: Cesaretli olun!", *Hürriyet*, 14 September 2012, <http://www.hurriyet.com.tr/bakandan-uyari-cesaretli-olun-21464717> (Accessed on 22 September 2012); "BMC'ye Kirpi Uyarısı", *Milliyet*, 27 September 2012, <http://www.milliyet.com.tr/bmc-ye-kirpi-uyarisi-ekonomi-1603169/> (Accessed on 12 October 2012).

2 "Cumhurbaşkanı Erdoğan Canlı Yayında", 19 November 2015, <http://www.memleket.com.tr/cumhurbaskani-erdogan-canli-yayinda-760431h.htm> (Accessed on 3 July 2016).

3 "Türkiye, kıtalararası füze üretecek", *Zaman*, 24 July 2012, p.1; Yiftah Shapir and Gallia Lindenstrauss, "Plotting Trajectory of Turkey's Ballistic Missile Program", 4 November 2012, http://wmdjunction.com/121102_turkey_ballistic_missiles.htm (Accessed on 7 November 2012).

transfer requirements were frequently speculated to include know-how to enable ICBM development.⁴ Nonetheless, when reporting based on inference and/or wild speculation is eliminated, the notion of a Turkish ICBM is not supported by Turkish officials' statements and acknowledgements, nor is there tangible or reliable public domain evidence to substantiate such a program or activity in Turkey at the moment.

Meanwhile, a nuclear non-weapon state and a long-time NATO ally like Turkey developing an interest in MRBM capability constitutes enough of an anomaly, for which a good strategic explanation has so far been lagging. In this respect, strict adherence to all regional and global nonproliferation initiatives and arrangements continues to be a mainstay of Turkey's foreign and security policies. For over six decades, Turkey has distanced itself from weapons of mass destruction (WMD) and their delivery means out of her conviction that such capabilities resulted in more competition and insecurity than being conducive to peace and stability.⁵ Without a doubt, the US and NATO's extended deterrence guarantees – to include nuclear warheads deployed on Turkish soil– encouraged and greatly facilitated Turkey's spotless commitment to such noble cause. Among the full set of nonproliferation and export control arrangements that Ankara is a party are the Missile Technology Control Regime (MTCR) and the Hague Code of Conduct (HCOG), both of which aim specifically at restraining the spread and/or use of ballistic missiles.

It is against this background that Turkey's recent declaratory recourse toward MRBM capability becomes more remarkable and puzzling. Long-range ballistic missiles are commonly associated with WMD and especially nuclear weapons, because they are deemed to single out as the ideal delivery means for such weapons. Historical evidence in this regards is conclusive: every state to have acquired nuclear weapons has also sought MRBMs. And with an exception or two, all countries pursuing MRBM-class missiles had their eyes set on nuclear weapons, too.⁶ Would Turkey become an exception to the rule by confining its MRBM capability to conventional warheads? Or as claimed by several others, is the nascent MRBM effort the harbinger of nuclear weapon ambitions held by Turkey's increasingly authoritarian and isolated political leadership?⁷

Those are highly controversial and contentious questions without an immediate or easy answer. In the absence of sufficient public domain information and straightforward answers, it may be possible to gain deeper insight and devise more plausible explanations by focusing on Turkey's specific circumstances and the consequent motivations and justification for the ballistic missile program(s). More recently, several attempts have been made to scrutinize and decode Turkey's bid for ballistic missiles. A first group of such studies, mostly in Turkish language, has adopted a technical

4 "Erdoğan kıtalararası füze istedi", *Milliyet*, 24 July 2012, <http://www.milliyet.com.tr/erdogan-kitalararasi-fuze-istedi-siyaset-1571175/> (Accessed on 26 February 2017); "Kıtalararası yerli füze için kritik pazarlık", 22 December 2014, <http://ekonomi.haber7.com/sectorler/haber/1253738-kitalararasi-yerli-fuze-icin-kritik-pazarlik> (Accessed on 29 March 2015); İbrahim Sünnetçi, "CPMIEC ve EuroSam'ın gözünden T-LORAMIDS", *Savunma ve Havacılık*, No.188, 2014, p.43.

5 "Arms Control and Disarmament", <http://www.mfa.gov.tr/arms-control-and-disarmament.en.mfa> (Accessed on 18 March 2017).

6 Doug Richardson, "Strategic Strike: Ballistic Missile Ambitions and Development", *Jane's International Defense Review*, March 2008, p.49-54; Sıtkı Egeli, *Taktik Balistik Füzeler ve Türkiye*, Ankara, Savunma Sanayii Müsteşarlığı, 1993, p.15-21, 44-49.

7 Hans Rühle, "Is Turkey secretly working on nuclear weapons?", 22 September 2015, <http://nationalinterest.org/feature/turkey-secretly-working-nuclear-weapons-13898> (Accessed on 17 December 2016); Ami Rojkes Dombe, "Turkey's Nuclear Ambitions", 29 April 2015, <http://www.israeldefense.co.il/en/content/turkeys-nuclear-aspirations> (Accessed on 30 June 2017).

prism to reveal the evolution of Turkish industry's ballistic missile activity.⁸ Yet, scant or no attention has been paid to the regional security setting, nor motivations or alternative courses of action available to Turkish decision makers. Conversely, a second group of studies has jump-started to the presumed objective of Turkey's bid for ballistic missile, which has almost unanimously been identified as the Turkish leaders' underlying and secluded aspirations to acquire nuclear weapons. Yet, in reaching such conclusion, they appear to have side-stepped Turkey's decades-old efforts to develop ballistic missiles. Nor did they pay tribute to other possible justification, including the advent of technologies enabling the use of ballistic missiles in conventional settings as well.⁹

Bearing in mind the complexities of the topic, this paper will aim at developing a more comprehensive and multi-faceted approach, along with which not only the nature of the threat and the historical roots and evolution of Turkey's ballistic missile program would be described, but also the range of options available to Turkish planners and decision makers, thereof the probable justifications for their recourse toward ballistic missile capability would be identified. In fact, it is hoped that the latter would also provide for a blueprint of available options applicable not only to Turkey, but all regional powers faced with the challenges of ballistic missile proliferation.

Missile Threat to Turkey

By virtue of its common frontier with the USSR, Turkey has lived under the threat of ballistic missiles right from the opening phases of the Cold War. It would be naïve to expect that a key NATO ally hosting high-value US military assets on its territory would be exempted from the target list of Soviet tactical and strategic missiles, especially when those US assets once included nuclear-tipped Jupiter MRBMs – which were to become bargaining chips during 1962's Cuban Missile Crisis.¹⁰ From late-1960s onwards, other countries in Turkey's immediate vicinity began also deploying ballistic missiles capable of reaching Turkish territory – first Bulgaria and Syria, then Israel and Iraq, and eventually Iran and Saudi Arabia followed the suit. As detailed in Table 1, currently Turkey comes within the range of ballistic missiles owned by eight regional states. Not included in this list is the multiplicity of non-state actors and proxies in the Middle East to have recently captured such missiles from their enemies and/or acquired them from their patron states.¹¹

8 See İbrahim Sünnetçi, "Özgün Silah ve Mühimmat Geliştirme Çalışmalarında Son Duruma Bir Bakış", *Savunma ve Havacılık*, No.169, 2015, p.115-121; Arda Mevlütoğlu, "Turkish Surface-to-Surface Rocket and Missile Systems-III", *ACIG.org*, modified 28 July 2008, http://www.acig.info/CMS/index.php?option=com_content&task=view&id=192&Itemid=47 (Accessed on 5 August 2008); Aaron Stein, "Turkey's Missile Programs: A Work in Progress", *EDAM Non-Proliferation Briefs*, 2013, <http://edam.org.tr/disarmament/EN/documents/Turkey%20Missile%20Programs.pdf> (Accessed on 20 May 2014).

9 See Yiftah Shapir and Gali Lindenstrauss, "Plotting the Trajectory of Turkey's Ballistic Missile Program", 2012, http://wmdjunction.com/121102_turkey_ballistic_missiles.htm (Accessed on 30 December 2012); Rühle, "Turkey nuclear weapons"; Dombe, "Nuclear Ambitions".

10 "SM-78 Jupiter", <https://missilethreat.csis.org/missile/jupiter/> (Accessed on 30 March 2017).

11 Jeremy Binnie, "IDF corroborates Hizbullah 'Scud-D' claims", *IHS Jane's Defence Weekly*, 2 March 2015, <http://www.janes.com/article/49668/idf-corroborates-hizbullah-scut-d-claims> (Accessed on 10 March 2015); "Jaish al Islam launching 'Islam 5' missile", 4 February 2016, https://www.youtube.com/watch?v=NNIJ_3kr48c (Accessed on 10 February 2016).

Table 1 Regional States with Ballistic Missiles Capable of Reaching Turkey¹²

	Range (km)	Type	Origin
Greece	128	ATACMS	US
Azerbaijan	80/120, 300	Tochka, Scud-B	USSR
Armenia	80/120, 280, 300	Tochka, Iskander-E, Scud-B	USSR, RF
Syria ¹³	80/120, 300, 500,700	Tochka, M600, Scud-B, Scud-C, Scud-D	USSR/RF, Iran, PRNK
Iran ¹⁴	250, 300, 500, 700, 1,000, 1,600, 2,200*	Fateh-110, Shahab-1, Shahab-2, Fateh-313, Zulfiqar, Shahab-3, Gadr/Emad, <i>Sejil</i> *	PRNK, Iran
Saudi Arabia ¹⁵	2,150, 2,700	DF-21, DF-3	PRC
Israel	1,500, 4,800	Jericho-2, Jericho-3	Israel
Russian Federation (RF)	120, 500, 6,500, 8,300, 9,000, 10,500	Tochka, Iskander-M, R-29, R-36M, R-39, RS-12M, RS-18, RS-12, RS-24, RSM-56	RF

(*) Under development.

It goes without saying that not all those ballistic missiles and their respective possessors would be perceived and treated at the same level of urgency and priority by Turkish military planners and political decision-makers. Yet, there are at least some regional states in Turkey’s immediate vicinity with ongoing or potential quarrels with Ankara, and their respective ballistic missile inventories would surely cause more concern.

Probably the first and foremost among those is *Iran*, a country to have invested heavily in its large and varied inventory of short- and medium-range ballistic missiles. Since the Iran-Iraq War of 1980s, ballistic missiles have been central to Iran’s “way of war”, and they have also constituted the backbone of its strategic deterrent.¹⁶ More recently, it came as no surprise that ballistic missiles stood as Iran’s weapons of choice for striking Islamic State (IS) targets inside Syria –a mode of employment further validating the preeminent status of ballistic missiles in Tehran’s security posturing.¹⁷ In this sense and over the years, Iran has skillfully manipulated *Scud*-derivative ballistic missiles and associated technical know-how received from North Korea to develop its domestic missile development and production capabilities. At the outset, Tehran concentrated on developing longer range derivatives

12 Unless cited otherwise, data contained in the table drawn from: “Ballistic Missiles”, <http://missilethreat.com/missiles-of-the-world/> (Accessed on 25 January 25 2013); *The Military Balance 2014*, London, IISS, 2014.

13 Markus Schiller and Robert H. Schmucker, “Flashback to the Past: North Korea’s ‘New’ Extended-Range Scud”, 8 November 2016, <http://38north.org/2016/11/scuder110816/> (Accessed on 13 December 2016); Alon Ben-David, “Shielding Civilians”, *Aviation Week & Space Technology*, 9 September 2013, p.28-29.

14 Michael Elleman, “Part-I: Are Iran’s Missiles a Threat?”, 25 April 2016, <http://iranprimer.usip.org/blog/2016/may/23/part-i-are-iran%E2%80%99s-missiles-threat> (Accessed on 12 October 2016); “Iran claims Zolfaghar missile has 700km range”, *Jane’s Defence Weekly*, 28 September 2016, <http://www.janes.com/article/64149/iran-claims-zolfaghar-missile-has-700-km-range> (Accessed on 9 October 2016).

15 Jeff Stein, “CIA Helped Saudis in Secret Chinese Missile Deal”, 30 January 2014, <http://europe.newsweek.com/exclusive-cia-helped-saudis-secret-chinese-missile-deal-227283?rm=eu> (Accessed on 3 February 2014).

16 Micheal Eisenstadt, “Missiles and the nuclear negotiations with Iran”, 6 July 2015, <http://www.washingtoninstitute.org/policy-analysis/view/missiles-and-the-nuclear-negotiations-with-iran> (Accessed on 30 July 2015).

17 Artemis Moshtaghian, “Iran launches missiles into eastern Syria, targets ISIS”, 19 June 2017, http://edition.cnn.com/2017/06/18/middleeast/iran-launches-missiles-into-syria/index.html?utm_source=Sailthru&utm_medium=email&utm_campaign=EBB%2006.20.2017&utm_term=Editorial%20-%20Early%20Bird%20Brief (Accessed on 20 June 2017).

of the liquid-fuelled, *Scud*-based *Shahab* family of missiles. More recently, though, Tehran's focus has shifted towards solid-fuelled, thereof more reliable, survivable and accurate *Fateh* family. Iran's parallel effort has been to augment its missiles with new technologies to improve their accuracy, and new aids and techniques, such as detachable/maneuvering warheads and submunitions, to overcome targeted country's missile defenses.¹⁸

Perhaps even more importantly, a link could convincingly be established between Iran's persistent ballistic missile efforts on the one hand, and its nuclear weapon ambitions on the other, whereby ballistic missiles have been rendered a key element of Iran's nascent doctrine of nuclear ambiguity: "nuclear intimidation without the bomb".¹⁹ Turkey being a next door neighbor and a customary strategic rival of Iran, it would be unrealistic to assume that Ankara's perceptions and vision of Iran has not been impacted by such concerns. Indeed, in a rare public expression of the Turkish military's perspective on the subject, Turkish Chief of General Staff went into record describing "Iran (...) as a risk element in the region, due its ballistic missile capabilities and its nuclear program."²⁰ Nor did Turkey's top political leadership hide their discomfort with Iran's ballistic missile arsenal. In President Erdoğan's words, "Iran has built missiles with ranges of 2,000-2,200 kilometers. (...) This is utterly unacceptable."²¹ From this perspective, Turkey agreeing in 2011 to host the forward-deployed detection/tracking element of NATO's European Phased Adaptive Approach (EPAA) missile defense umbrella finds a major part of its explanation in Ankara's unease with Iranian ballistic missile and nuclear ambitions. Tehran's reaction to Ankara's decision took the form of publicly threatening to hit targets inside Turkish territory with ballistic missiles in the event of 'any' military hostility toward Iran – not exactly the kind of posturing to ease Ankara's worries and concerns.²²

Syria is another country to have developed heavy reliance on ballistic missiles as an affordable and guaranteed substitute to its moribund air power and conventional military capabilities. In this sense, ballistic missiles coupled to chemical warheads have provided for the much-needed strategic deterrent against Syria's militarily superior neighbors. At the tactical and operational levels, too, Damascus has seen and treated ballistic missiles as any other weapon system for actual war-fighting – a precept validated first in 1973 against Israel, and more recently against opposition targets in Syria's ongoing civil strife.²³ Prior to the outbreak of the civil war, Syria was believed to possess roughly 500 *Scud* derivatives, supplemented by a vast stockpile of shorter range, solid-fuelled *M600* missiles (locally built clones of the Iranian *Fateh* family), and possibly tens of thousands of (up to 150km-range) artillery rockets – most of them capable of carrying chemical warheads.²⁴

18 Elleman, "Iran's Missiles"; Jeremy Binnie, "Iran announces new missile tests", *Jane's Defence Weekly*, 13 February 2014, p.23; Greg Thielman, "Iran's Nuclear Ballistic Missile Threat Not on the Horizon", *Defense News*, 14 September 2015, <http://www.defensenews.com/story/defense/commentary/2015/09/14/irans-nuclear-ballistic-missile-threat-not-horizon/72254428/> (Accessed on 23 October 2015); "Iran Zolfaghar missile".

19 Eisenstadt, "Negotiations with Iran".

20 "Org. Özel Savunma ve Havacılık Dergisi'ne konuştu", *Hürriyet*, 25 March 2015, <http://www.hurriyet.com.tr/org-ozel-savunma-ve-havacilik-dergisi-ne-konustu-28549591> (Accessed on 27 July 2017).

21 Bülent Aydemir, "Türk Füzesi: Hedef Menzil 2500 km", *Habertürk*, 29 December 2011, <http://www.haberturk.com/gundem/haber/701120-turk-fuzesi-hedef-menzil-2500-km> (Accessed on 31 December 2011).

22 "İran'ın ilk hedefi Malatya", *Cumhuriyet*, 27 November 2011, p.13; "Tehran threatens Ankara with new missile system", *Hürriyet*, 3 July 2012, <http://www.hurriyetdailynews.com/tehran-threatens-ankara-with-new-missile-system.aspx?pageID=238&nID=24589&NewsCatID=352> (Accessed on 4 July 2012).

23 "Syria Missile Development 1997", <http://www.wisconsinproject.org/countries/syria/missiles.html> (Accessed on 18 March 2017); "Syria's 'Scud' attacks not seen as international threat", *Jane's Defence Weekly*, 19 December 2012, p.6.

24 Ben-David, "Shielding Civilians", p.28-29; Schiller and Schmucker, "Flashback to the Past".

From Turkey's perspective, Syrian missile threat has been neither paranoia, nor farfetched contingency. In two occasions, Syria threatened to use ballistic missiles in order to deter or coerce Ankara –first one in 1998 during the row over the ousting of the PKK leader from Syria, and for a second time in 2011 over Turkish support to Syria's armed opposition.²⁵ It is true that Syria's civil war has taken a heavy toll on Syria's ballistic missile stockpile –by one estimate, over 90 percent was captured or used up against rebels.²⁶ Yet, despite reduced stocks, ballistic missiles continue to be launched at will inside Syria, and some of them fly across the border and land inside Turkish territory.²⁷ More concerning has been Assad regime's apparent evasion of its international obligations by retaining or re-constituting its chemical weapons stocks, thence the re-emergence of the threat posed by chemically-tipped Syrian ballistic missiles.²⁸ To make the matters worse, ballistic missiles are controlled and fired inside Syria not only by government forces, but also by non-state actors and proxy groups, rendering thereof the task of deterring or preventing their use even more challenging.²⁹

For Turkey, the most recent addition to the already shaky and complex missile picture in Syria has been the appearance there of the much more modern and capable *Iskander* ballistic missiles alongside Russian troops. In fact, some *Iskanders* may have already been fired against rebel targets adjacent to Turkish border.³⁰ Together with reports of fresh supplies of Russian *Tochka* short-range ballistic missiles arriving in Syria, this could not be a welcome development for Turkish planners, because it implies ballistic missiles being used alongside air and naval power in Russia's strategy of overseas force projection using Syrian territory.³¹

Looking southward from Ankara, Saudi Arabia and Israel are the two other regional states deploying ballistic missiles capable of reaching Turkish territory. Originally, *Saudi Arabia's* Chinese-origin MRBMs were acquired more than two decades ago, as a deterrent response to the exchange of ballistic missile salvos between Iran and Iraq, neither of which were in friendly terms with the Saudis.³² In 2007, Saudi arsenal has been augmented with more modern and accurate, yet still conventionally-tipped MRBMs from China, possibly as a countermove to Iran's rapidly growing and diversifying missile inventory. All the while, whether Saudi Arabia's latent nuclear weapon ambitions play a role

25 "Yılmaz'dan füze uyarısı", *Yeni Yüzyıl*, 11 September 1998, p.1; "Suriye, füzelerini Türkiye'ye çevirdi", *Türkiye Gazetesi*, 26 November 2011, p.1.

26 "Israel says 90 pct of Syria's ballistic missiles used up on rebels", 18 November 2015, <http://www.reuters.com/article/mideast-crisis-syria-missiles-idUSL8N13D4M220151118> (Accessed on 15 March 2017).

27 "185 km'den Reyhanlı'ya isabet etti", *Milliyet*, 26 March 2015, p.1.

28 "Sarin used in Syria 5 days before Khan Sheikun: OPCW", 4 October 2017, <http://www.france24.com/en/20171004-sarin-used-syria-5-days-before-khan-sheikhun-opcw-0> (Accessed on 5 October 2017).

29 "Islam 5 missile"; Binnie, "Scud-D claims".

30 "Israeli Satellite Imagery Shows Russian Nuclear-Capable Missiles in Syria", *Defense News*, 6 January 2017, http://www.defensenews.com/articles/israeli-satellite-imagery-shows-russian-nuclear-capable-missiles-in-syria?utm_source=Sailthru&utm_medium=email&utm_campaign=DFN%20DNR%201/6/17&utm_term=Editorial%20-%20Daily%20News%20Roundup (Accessed on 7 January 2017); "Russia sends Syria its largest missile delivery to date, US officials say", 8 February 2017, <http://www.foxnews.com/world/2017/02/08/russia-sends-syria-its-largest-missile-delivery-to-date-us-officials-say.html> (Accessed on 8 February 2017).

31 Dmitry Gorenburg, "Russia's Syria operation reveals significant improvement in military capability", *The National Interest*, 13 November 2015, <http://www.lowyinterpreter.org/post/2015/11/13/Russias-Syria-operation-reveals-significant-improvement-in-military-capability.aspx> (Accessed on 8 February 2016); Dmitri Trenin, "The Revival of the Russian Military—How Moscow Reloaded", *Foreign Affairs*, 18 April 2016, <https://www.foreignaffairs.com/articles/russia/su/20160418/revivalrussianmilitary> (Accessed on 22 April 2016).

32 Gordon Jacobs and Tim McCharty, "China's Missile Sales—Few Changes for the Future", *Jane's Intelligence Review*, December 1992, p.559-560.

in its missile buildup has been the subject of much controversy.³³ From Turkey's perspective, Saudi MRBM capability fits in a very specific context. In parallel to the mutually-accommodating mood that has come to characterize Riyadh-Ankara relations over the decades, Saudi ballistic missiles appear to have registered little in Turkey's threat perceptions and security calculations.

Until a decade ago, *Israel's* potent nuclear-tipped ballistic missile arsenal comprising MRBMs and intermediate-range ballistic missiles (IRBM)³⁴ could have been classified in the same way with respect to Turkey's threat perceptions. However, dramatic turn of events from 2009-onwards and the astonishingly swift deterioration in Israeli-Turkish relations appear to have transformed Turkish political leaders' treatment of Israel's nuclear weapons, and alongside with them, Israeli ballistic missiles intended to deliver nuclear warheads. Over the years, Israel's implicit contention has been that its nuclear arsenal is geared toward deterrence, not war-fighting, whereby nuclear warheads (thereof long-range ballistic missiles carrying them) are spared for the "last resort" circumstances where Israel's existence is threatened.³⁵ This is a posture most likely to have factored in Turkish military and defense planners' calculations over the years. Yet, increased tensions and mutual suspicions are likely to have transformed the perception and treatment of Israel's nuclear weapons, and together with them its ballistic missile arsenal. Some of the statements coming from the top echelons of Turkish state are indicative of the unease felt with weapons that could be used to annihilate any rival.³⁶ Meanwhile, two important facts complementing the picture should be noted here: first, given its far superior air power, electronic and cyber warfare capabilities, Israeli recourse to its "last resort" weapons is rather unlikely against its regional rivals. And second, over the years Israel has built an effective, multi-layered missile defense shield seriously curtailing the existing and would-be missile proliferators' ability to strike Israel.³⁷

Looking in the direction of north from Turkey, *Russian Federation* stands out as a neighboring country in control of a very large stockpile of nuclear weapons, and accompanying the latter, the world's largest and most varied inventory of ballistic missiles. On the one hand, the bulk of Russia's ballistic missile inventory consists of ICBMs and submarine-launched ballistic missiles (SLBM), forming as such the backbone of Moscow's strategic nuclear deterrent –thereof rendered extraneous with respect to Turkey's day-to-day security agenda. On the other hand, Russia draws no difference between ballistic missiles and any other weapons at its disposal. In other words, Russian military feels and behaves rather unrestrained in employing shorter range ballistic missiles in conventional, in fact even in limited and hybrid warfare scenarios. Conflicts in Georgia, Ukraine and Syria witnessed such mode of employment.³⁸ Russian Army's ongoing program to replace its entire inventory of 120-km range *Tochka* missiles with more sophisticated and longer range (500 km) *Iskander* missiles is further manifestation of this premise.³⁹

33 Mark Urban, "Saudi Arabia's nuclear weapons 'on order' from Pakistan", 6 November 2013, <http://www.bbc.com/news/world-middle-east-24823846> (Accessed on 17 March 2017).

34 These are missiles with ranges of 3,000 to 5,500 km (author's note).

35 Louis Rene Beres, "Changing Direction? Updating Israel's nuclear doctrine", 2014, [http://www.inss.org.il/uploadImages/systemFiles/adkan17_3ENG%20\(3\)_Beres.pdf](http://www.inss.org.il/uploadImages/systemFiles/adkan17_3ENG%20(3)_Beres.pdf) (Accessed on 17 March 2017).

36 "Erdogan: İsrail bölgeye tehdit, atom bombası var", 5 October 2011, <http://t24.com.tr/haber/erdogan-israil-bolge-de-tehdit-atom-bombasi-var,172986> (Accessed on 15 March 2017).

37 "Israel adds upper tier missile defence capability", 27 January 2017, <http://www.janes.com/article/67291/israel-adds-upper-tier-missile-defence-capability> (Accessed on 28 January 2017).

38 "Ukraine rebels claim Tochka ballistic missile shoot-down", 2 February 2015, <https://defence.pk/pdf/threads/ukraine-rebels-claim-tochka-ballistic-missile-shoot-down.357325/> (Accessed on 17 March 2017); "Georgian Military Folds Under Russian Attack", 15 August 2008, http://www.aviationweek.com/aw/generic/story_generic.jsp?channel=awst&tid=news/aw081808p2.xml (Accessed on 27 November 2011); "Russia largest delivery".

39 "Russia's Army retrofitted with nuclear-capable ballistic missile system", 24 February 2017, <http://thediplomat.com/2017/02/russias-army-retrofitted-with-new-nuclear-capable-ballistic-missile-system/> (Accessed on 26 February 2017).

Consequently, it would be safe to assume that Russian ballistic missile threat would be ranking high in Ankara's threat perceptions. Elevating the threat's gravity are occasional statements by Russian officials, implying that Turkey is already at the crosshairs of Russia's ballistic missiles.⁴⁰ Furthermore, in recent years Ankara has witnessed Russian *Iskander* units to blossom across her borders: first at a Russian base in Armenia and on the shores of the Black Sea, then at Crimea and North Caucasus, and most recently in Syria.⁴¹ If this does not create a sense of strategic encirclement, nothing else would.

Greece, Georgia, Azerbaijan and Armenia are the remaining four neighbors of Turkey with ballistic missiles inventories. Of those, **Greece** owns three dozen *ATACM* short-range missiles.⁴² Those are US-supplied tactical missiles for deep strikes behind the battlefield, the examples of which are also operational with the Turkish Army. Georgia and Azerbaijan have inherited handful of *Tochka* and/or *Scud* missiles from the USSR, but their limited numbers and age rendered those missiles rather insignificant.⁴³ Over the years, Georgia's stockpile appears to have decayed altogether.⁴⁴ Whereas **Azerbaijan** has shown more interest in preserving and expanding its small inventory of ballistic missiles, its attempts to this end have not come to fruition.⁴⁵ Above all, Azeri interest appears to be a response to its archrival **Armenia** – a country to have made ballistic missiles the mainstay of its deterrent posture *vis-à-vis* militarily superior neighbors. In this respect, Armenia received its first supplies of *Scud* missiles from Russia during mid-1990s. Those were followed by a smaller consignment of *Tochka* tactical missiles in 2010-2012. The ground shaking delivery took place in 2016, when Armenia paraded its small arsenal of Russian-supplied *Iskander* missiles.⁴⁶ Those are modern and capable weapons that could hit targets with pinpoint accuracy. They are also reputed with a capability to evade missile defenses. In the face of the vastly superior Turkish military, *Iskander* missiles constitute the only military asset available to Armenia capable of inflicting some damage on Turkish targets. In this sense, they are rendered Armenia's sole deterrent short of placing a stress call with Moscow in the event of hostilities with Turkey. Those missiles also join in nicely with the Russian-operated *Iskander* missiles already present on Armenia's soil, and boosting as such the deterrent impact *vis-à-vis* Turkey.

Turkey's Options

Ballistic missile threat faced by Turkey is neither a farfetched contingency, nor a long-term prospect looming in the horizon. Ankara has good reasons to worry about the existing Iranian, Syrian, Russian and Armenian ballistic missile capabilities. Arguably, Israel's and Saudi Arabia's stockpiles could

40 See the interview with Russian Ambassador Vladimir Ivanovski in "Füze kalkanında ısrar misilleme getirir", *Cumhuriyet*, 4 March 2012, p.8-9.

41 "Russia deploys advanced missiles to Armenia", *IHS Jane's Defence Weekly*, 3 June 2013, p.22; Jeffrey Lewis, "Iskanders in Kaliningrad", 2 December 2016, www.armscontrolwonk.com/archive/1202268/iskanders-in-kaliningrad/ (Accessed on 13 December 2016); "NATO Commander Breedlove: Imported Russian missiles have turned Crimea into a Black Sea 'Power Projection' platform", 25 February 2015, <http://news.usni.org/2015/02/25/nato-commander-breedlove-imported-russian-missiles-have-turned-crimea-into-a-black-sea-power-projection-platform> (Accessed on 29 March 2015).

42 "Greece – country profile", <https://fas.org/asmp/profiles/greece.htm> (Accessed on 17 March 2017).

43 Duncan Lennox, "Missile Race Continues", *Jane's Defence Weekly*, 23 January 1992, p.18-21.

44 Thomas Reis, "Russia's Military Inheritance", *International Defense Review*, March 1992, p.225; *Military Balance 2014*, p.175.

45 "Azerbaijan interested in various missile technologies", 28 September 2016, <http://www.azernews.az/nation/102933.html> (Accessed on 17 March 2017); "Azerbaijan to buy Israeli, Pakistani missiles", August 11, 2014, <http://ann.az/en/azerbaijan-to-buy-israeli-pakistani-missiles/> (Accessed on 20 July 2016).

46 Eduard Abrahamyan, "Armenia's new ballistic missiles will shake up the neighborhood", 12 October 2016, <http://nationalinterest.org/feature/armenias-new-ballistic-missiles-will-shake-the-neighborhood-18026> (Accessed on 17 March 2017); "Armenia shows new UAV", *Jane's Defence Weekly*, 5 October 2011, p.22.

become direct concerns as well. What are the options available to Turkey to counter and neutralize such threat? Political and diplomatic initiatives to include arms control, disarmament, export and technology controls, and confidence building measures constitute an obvious track. Indeed, Turkey has been a keen supporter and contributor of such efforts. By all means, commitment and support to such initiatives should continue. Yet, in addressing and neutralizing a real and imminent threat, those initiatives must be supplemented by defensive and offensive military measures and instruments as well, and the focus of the subsequent paragraphs would be on identifying those military alternatives.

Accordingly, the wide range of military options could be grouped and analyzed under two broad categories: “deterrence by denial” and “deterrence by punishment”. In this particular context, deterrence by denial seeks to render an opponent’s missile strikes unprofitable by destroying or intercepting those missiles before they can hit their targets. Contrarily, deterrence by punishment involves a threat to hurt an opponent very badly if he dares resorting to his ballistic missiles during a conflict. Deterrence by denial and deterrence by punishment do not have to be mutually exclusive. In fact, using them in tandem would be mutually reinforcing, boosting effectiveness and chances of success for both. But there is one prerequisite that applies them both: they must be backed up by real military capabilities and preparations to carry any credibility. Devoid of credibility, both are bound to fail.

Deterrence by Denial

The first option under deterrence by denial category is **preemption**, along with which the objective would be to destroy threat missiles before they are fired. However, the so-called “Scud-hunting” is herculean task, because locating mobile missile launchers over large swaths of hostile territory is extremely difficult, and engaging them fast and timely enough would necessitate vast amounts of strike assets, primarily combat aircraft. From the perspective of regional powers like Turkey, available air assets would never be abundant enough to be spared for such specific task during the opening phases of a conflict. Consequently, preemption becomes an unrealistic and unattainable goal. Besides, conflict-incidenting and escalatory ramifications of preemption over crisis stability and crisis management should be duly taken into account, too.

A closely associated derivative of preemption is what US defense and military planners are calling “*left of launch*” techniques, along with which an array of non-kinetic capabilities ranging from electronic jamming and directed energy to cyber-attacks and industrial sabotage are used to disable enemy missiles before or seconds after their lift-off.⁴⁷ Yet, for some of those methods to work, getting close enough to the targeted missiles would be imperative. For others, the reliability and the effectiveness of the *left of launch* techniques under the heat of a real-world conflict would always remain untested, thereof questionable. Besides, cutting-edge technologies and sizable investment at stake would be placing “*left of launch*” tool beyond the reach of most regional powers, Turkey not being an exception.

A much more realistic, thereof more frequently resorted means of achieving deterrence by denial is “active defense”, better known as **missile defense**. This involves intercepting and destroying enemy ballistic missiles during their flight. Whereas this was considered as a largely elusive task up to 1990s, technological progress since then has enabled development and deployment of missile defense systems that really work. This does not mean that the current generation of missile defense systems

47 Sydney J. Freedberg Jr, “Joint Staff Studies New Options for Missile Defense”, 16 September 2015, <http://breakingdefense.com/2015/09/joint-staff-studies-new-options-for-missile-defense/> (Accessed on 8 November 2015); “Trump Inherits a Secret Cyberwar Against North Korean Missiles”, *New York Times*, 4 March 2017, https://www.nytimes.com/2017/03/04/world/asia/north-korea-missile-program-sabotage.html?_r=0 (Accessed on 5 March 2017).

is devoid of significant caveats. They can protect comparatively small areas. Multilayered architecture comprising different types of defensive systems and sensors are required to intercept missiles of different ranges and characteristics. Saturating salvo launches, multiple or submunitioned warheads, decoys, and countermeasures continue to pose serious challenges. And perhaps most significantly for regional powers, missile defenses are extremely costly to acquire and operate, and they could easily become the *silver bullet* of a country's defense and procurement posturing.

Focusing on Turkey's missile defense circumstances, the good news is that NATO's assets are already available to protect against ballistic missile threats. From 1990-onwards, Turkey's NATO allies deployed missile defense systems to Turkish territory to provide protection against Iraq's and Syria's short-range ballistic missiles – a task currently fulfilled by Spanish *Patriot* and Italian *SAMP/T* units positioned in Turkey's southeast.⁴⁸ Additionally, since 2011 Turkey has taken advantage of the protection provided by NATO's *EPAA* upper-tier missile defense shield effective against MRBM and IRBM-class ballistic missiles – a capability Turkey cannot hope to acquire through her own technological and budgetary means in the foreseeable future. Also available through NATO channels are early warning cues coming from US satellites, and precise ballistic missile tracking data received through NATO channels.⁴⁹ In retrospect, Turkey has been the foremost among NATO member states in benefitting from the Alliance's missile shield, and a reasonable degree of protection is already available thanks to US and NATO capabilities extended to Turkish territory.

The dimension lagging behind badly tough has been Turkey's own efforts and programs aimed at defending against ballistic missiles. Paradoxically, this has been a Turkish requirement whose origins go back to early-1990s. After a number of false starts during 1990s and 2000s, a formal competition could finally be launched in 2009 to acquire missile defense-capable air defense systems.⁵⁰ In 2013, decision was made in favor of a Chinese offer, but faced with NATO's objections over integration of such "foreign" system into NATO's air and missile defense architecture, Ankara was convinced to reverse her decision and opted instead to develop such systems indigenously.⁵¹ In a further iteration, it was announced during 2017 that the development effort would be run in close partnership with NATO allies France and Italy.⁵² On the other hand, given the long-term development work at stake, Turkey embarked upon the purchase of off-the-shelf systems so as to meet her urgent operational requirements. The recent tilt toward Russia and its *S-400* system in this regard has managed to bewilder Turkey's western allies once more. Turkish authorities were quick to clarify that no integration with NATO assets would be sought; instead *S-400* would be used standalone.⁵³ In effect, such standalone deployment could not possibly contribute much to Turkey's national missile defense capacity, because

48 "Spain to stay with Patriots in Turkey; Italy could deploy SAMP/T missiles", *Defense News*, 28 December 2015, <http://www.defensenews.com/story/defense/2015/12/28/spain-stay-patriots-turkey-italy-could-deploy-sampt-missiles/77965082/> (Accessed on 22 March 2017); "Italian SAMP/T unit arrives in Turkey, 9 June 2016, <http://www.janes.com/article/61125/italian-samp-t-unit-arrives-in-turkey> (Accessed on 22 March 2017).

49 Patrick J. O'Reilly, *Ballistic Missile Defense Overview – European Phased Adaptive Approach*, Washington, D.C., Missile Defense Agency, 2011, p.3-7.

50 Sıtkı Egeli, *Füze Tehdidi ve NATO Füze Kalkanı*, İstanbul, Bilgi Üniversitesi, 2012, s.25-26.

51 "Turkey cancels T-LORAMIDS program after eight years", *Defense News*, 16 November 2015, http://www.defense-aerospace.com/articles-view/release/3/168852/more-on-turkey%E2%80%99s-cancellation-of-t_loramids-program.html (Accessed on 2 March 2017); "Turkey in talks to locally develop long-range air defense systems", *Hürriyet Daily News*, 5 August 2016, <http://www.hurriyetdailynews.com/turkey-in-talks-to-locally-develop-long-range-air-defense-system-official.aspx?pageID=238&nID=102538&NewsCatID=345> (Accessed on 23 March 2017).

52 "Füze tartışmasına Milli Savunma Bakanı son noktayı koydu", 5 July 2017, <http://www.kokpit.aero/fuze-tartismasi-bakan-isik> (Accessed on 7 July 2017).

53 "Bakan Işık'tan açıklama: NATO sistemine entegre etmiyoruz", 16 March 2017, <http://dirilispostasi.com/n-30551-bakan-isiktan-s-400-aciklamasi-nato-sistemine-entegre-etmiyoruz.html> (Accessed on 16 March 2017).

like any other missile defense system, S-400s would depend on early-warning cueing coming from satellites so as to initiate ballistic missile engagement sequence early enough.⁵⁴ Turkey does not have such satellites and relies on US and NATO to get vitally important missile launch warnings. Devoid of inputs coming from satellites and specialized missile detection and tracking radars, S-400s would be confined to the role of theater air defense against aircraft. Nor could it be used in contingencies involving other NATO allies.⁵⁵ This effectively means until the arrival of the systems developed by herself and/or in cooperation with Italy and France, Turkey would continue to rely exclusively on NATO's missile defense shield and assets.

The third and last option to achieve deterrence by denial is *passive defense*, which is a reference to the measures aimed at increasing the survivability and resilience of the possible targets of ballistic missile strikes. Hardening or perhaps dispersing of strategic assets, as well as civil defense measures aimed at minimizing losses among civilian population are obvious examples.⁵⁶ However, for a large and crowded country like Turkey, passive defense does not constitute a realistic and comforting alternative, especially when ballistic missiles tipped with WMD warheads are at stake.

Deterrence by Punishment

Turning our attention now to the other broad category, namely deterrence by punishment, the first option available to Turkey is *extended deterrence*: defense and security guarantees extended to Turkey by NATO and US. For those threats involving ballistic missiles armed with WMD warheads, probably there is little ambiguity that NATO's and US nuclear deterrent would be triggered. The credibility of this deterrent is further augmented by permanent deployment of US nuclear aircraft bombs on Turkish soil.⁵⁷ Conversely, in the event of ballistic missile strikes confined to conventional warheads, or for those contingencies that may be categorized as "out-of-area" by some NATO allies, automatic activation thereof credibility of NATO's security guarantees becomes questionable. Indeed, some NATO members' foot-dragging in coming to Turkey's help in 1991 and again in 2003 has already left deep scars in the memories of Turkish defense planners and policy makers.⁵⁸

It is against such background that Turkey's second option to achieve deterrence by punishment gains utmost importance, whereby the primary instrument to achieve deterrence by punishment becomes the retaliatory capabilities of Turkish military. Turkey is one of the countries to have renounced her right to possess WMD, thence confined her retaliatory prowess to the realm of conventional military capabilities. The first and foremost among those is Turkey's air power – a potent force holding qualitative and quantitative edge in its region, barring Russia and Israel. Over the years her large fleet of modern strike

54 "USAF Missile Warning Satellite Providing 90 Sec. Scud Alert", *Aviation Week & Space Technology*, 21 January 1991, p.60-61.

55 Sertaç Canalp Korkmaz and Arda Mevlütoğlu, *Turkey's Air Defense Umbrella and S-400*, Orsam Report, No.123, September 2017, http://orsam.org.tr/files/Raporlar/213/213_eng.pdf (Accessed on 29 September 2017); Sıtkı Egeli, "S-400 alımı, hava savunması, füze savunması, NATO: Mitler ve Gerçekler", *kokpitaero*, 2 August 2017, <http://www.kokpit.aero/s400-sitki-egeli> (Accessed on 2 August 2017).

56 For a more complete overview of passive defense in the context of ballistic missile threat see Egeli, *Taktik Balistik Füzeler*, p.101-108.

57 Robert S. Norris and Hans M. Kristensen "Nuclear Notebook: Worldwide deployment of nuclear weapons, 2009", *Bulletin of the Atomic Scientists*, Vol.65, No.6, 2009, <http://www.yorku.ca/splekhan/docs/4280-5280/State%20of%20the%20arsenals,%202009%20-%20BAS.pdf> (Accessed on 31 March 2013), p.94; Hans M. Kristensen, "U.S. Nuclear Weapons in Europe", 2005, <https://www.nrdc.org/sites/default/files/euro.pdf> (Accessed on 23 March 2017), p.8-9.

58 "Germany reluctant to defend Turkey if Iraq retaliates", *Washington Post*, 22 January 1991, p.A20; "Deadlock Broken, NATO to Defend Turkey", 17 February 2003, <http://www.cbsnews.com/stories/2003/02/17/iraq/main540829.shtml> (Accessed on 14 April 2012).

aircraft has come to constitute the mainstay of Turkey's retaliatory and deterrent posture, countering a full array of threats, including the threat posed by ballistic missiles. In this sense, air power could be seen as Turkish military's **asymmetric retaliatory response** to the missile threat.

Symmetric retaliatory response to ballistic missile threat is yet another alternative available to Turkish military planners, along with which Turkey would be deploying her own ballistic missiles as a more direct, "eye-for-eye" means to punish, thereof deter an opponent's missile strikes. The absence of highly-visible programs should by no means be taken as an indication that symmetric response has been overlooked by Turkish military. On the contrary, as the overview under the subsequent section illustrates, just the opposite has been the case and since the end of 1980s, ballistic missiles scored high on Turkish military's wish list. Turkey's Undersecretary for Defense Industries has more recently described the reasoning:

It is difficult for a country to be deterrent with defensive missiles only... This is why offensive missiles too should be developed... The political authority is determined that Turkey should possess such missile capabilities. How, at what cost and how soon are questions that remain to be examined.⁵⁹

One year after those remarks, his organization officially acknowledged the existence of a program and a pursuant contract to develop surface-to-surface missiles.⁶⁰ But, Turkey's bid to develop ballistic missiles preceded this official acknowledgement by at least 25 years. All the while, despite its direct role in identifying the requirement in the first place, it is somewhat perplexing that Turkish military continues to be completely silent and discreet on the subject.

Turkey's Rocket and Missile Programs⁶¹

Having comfortably relied on NATO and its collective defense throughout the preceding decades, the event to have drawn Turkish attention to the ballistic missile threat was the Iran-Iraq war of 1980s, and the extensive exchange of *Scud* missiles targeting the cities in both countries.⁶² Turkish military's understandable reaction was to scrutinize the benefits and drawbacks of fielding ballistic missiles in response to the apparent threat. Apparently, the advantages weighed in more heavily and the decision was taken probably during late-1980s to pursue ballistic missile capabilities. Yet, at that period in time Turkish military's and industry's capacities in the field of rocketry were limited to the very short-range, unguided artillery rockets, plus more modern *MLRS* systems whose order had just been placed with the US. Additionally, Turkey's state-run scientific research organization TUBITAK, as well as the state-owned arms manufacturer MKEK had generic research and testing activity to gain familiarity with rocketry and artillery rockets. But none of those were mature or streamlined enough to lead to rapid development and deployment of ballistic missiles. Consequently, in early-1990s Turkish military appears to have devised a twin-track effort spread over several years. The first track comprised

59 Burak Ege Bekdil, "Turkey eyes offensive missiles to boost deterrence", *Defense News*, 16 January 2016, <http://www.defensenews.com/story/defense/land/weapons/2016/01/16/turkey-eyes-offensive-missiles-boost-deterrence/78733576/> (Accessed on 16 June 2016).

60 "B (BORA) Füzesi ve B (BORA) Silah Sistemi Projesi", 30 January 2017, <http://www.ssm.gov.tr/anasayfa/projeler/Sayfalar/proje.aspx?projeID=415> (Accessed on 30 January 2017).

61 Unless cited otherwise, all data on Turkey's missile activities were drawn from the author's own observations and insights, as well as the following sources: İbrahim Sünnetçi, "TSK Füze Programları; Dün, Bugün ve Gelecek-I", *Savunma ve Havacılık*, No.123, 2007, p.128-129, 133; İbrahim Sünnetçi, "TSK Füze Programları; Dün, Bugün ve Gelecek-II", *Savunma ve Havacılık*, No.124, 2008, p.133-137; Sünnetçi, "Özgün Geliştirme", p.119-121; Mevlütoğlu, "Turkish Missile Systems".

62 "Tehdit artık güneyden", *Milliyet*, 13 December 1989.

off-the-shelf acquisition of 150-300 km range ballistic missiles as a way to meet urgent operational requirements. In parallel, adding new capabilities to Turkey's nascent defense industry was sought so as to enable eventual production of ballistic missiles domestically. The latter entailed an incremental approach, along with which ranges of 150 km, then 300 km, and ultimately 1,000 km were targeted. To accelerate the pace of local development, technical assistance and technology transfer from ready and willing foreign suppliers were not ruled out.⁶³

In mid-1990s, off-the-shelf track came to fruition with the acquisition from the US of 72 ATACM tactical missiles, as a precondition of which Turkey has acceded to the MTCR. Soon afterwards, in 1998, the high-tension quarrel over the expulsion of PKK leader from Syria witnessed the positioning of Turkey's novice ATACM missiles close to Syrian border.⁶⁴ In the context of ballistic missiles, this signified Turkish military's first time ever resort to "symmetric response" in achieving deterrence (or in this case coercion) by punishment.

During this early period, off-the-shelf ballistic missiles with longer ranges (i.e. *Scuds* and derivatives) were not sought very keenly, probably not to anger Turkey's western allies; because the only suppliers were the unwelcome suppliers like North Korea and China. Instead, the emphasis was placed on accelerating development of local industrial capabilities. Accordingly, overlapping and often competing rocketry programs of the two state-affiliated entities (TUBITAK-SAGE and MKEK) were sacrificed in favor of rendering ROKETSAN as the power house for all long-range ballistic missile activity in Turkey. At the time, ROKETSAN was recently created as a joint-stock enterprise, combining the capital might of public sector with the flexibility and innovative strengths of private sector. By 1997, ROKETSAN initiated the deliveries of *Sakarya* artillery rockets to Turkish Army – its comparatively short range of 40 km aside, this happened to be the first Turkish-made rocket system to reach operational status and proved as such the worth and potential of ROKETSAN in tackling with the challenge of developing reliable missile systems.

Meanwhile, technological assistance of an experienced foreign party was seen as a useful shortcut to accelerated production of ballistic missiles. The U.S. and a number of Turkey's western allies, as well as Pakistan were approached, but the country to have been selected turned out to be People's Republic of China. In 1997, \$250-million contract was signed with the state-owned CPMIEC for the *WS-1* unguided rocket system, capable of taking 150kg-warhead to a distance of 100 km, tough with low accuracy. The package for the so-called *Project-K* comprised off-the-shelf delivery of 200 rockets from China, accompanied by technical assistance and technology transfer to ROKETSAN for customization and local production of a further batch of roughly 1,300 copies of the same rocket, now called *Kasırga* (Hurricane). First deliveries took place at the end of 1998. *Kasırga* has been continuously improved over the years to give it better accuracy, range and reliability. The most recent variant entered serial production in 2016 under the name *Kaplan* (Tiger). It is a vastly improved, INS/GNSS course-corrected rocket capable of reaching 120 km with a claimed accuracy of 30 meters. It is also on offer to export customers under the designation *Tiger*.⁶⁵

In December 1998, a second contract of roughly \$300 million in value was signed again with China, this time for local production of a modified version of CPMIEC's 150-km range, solid-fuelled B611 tactical ballistic missile. This was referred to as *Project-J* or *Jaguar*, and the missile to have been

63 Tefik Kadan, "Milli füzenin Balyozcu mimarı", *Aydınlık*, 2 February 2017, <https://www.aydinlik.com.tr/turkiye/2017-subat/milli-fuzenin-balyozcu-mimari> (Accessed on 4 February 2017).

64 Sünnetçi, "Füze Programları-I", p.133.

65 Miroslav Gyürösi, "Roketsan markets new Tiger surface-to-surface rocket", 28 June 2016, <http://www.janes.com/article/61822/roketan-markets-new-tiger-surface-to-surface-rocket> (Accessed on 28 June 2016).

developed and series-produced afterwards took the designation *Yıldırım* (Lightning). The warhead weight was 480kg and INS-based course correction provided 150-meter accuracy. *Yıldırım* was paraded for the first time in 2007, but deliveries of roughly 200 units are believed to have begun as early as the year 2000. Within a decade, Turkish military's multi-phased program had thus attained its first milestone: 150-km range ballistic missiles of local make.

The next step down the road was taken in 2009, when the contract for the so-called *Project-B* was signed with ROKETSAN in order to extend the range of *Yıldırım* missiles from 150 to 300 km. As customary with similar missile programs elsewhere in the world, *Bora's* range has been symbolically reduced to +280 km –so as to remain below the threshold of MTCR-induced restrictions. Once again, China's CPMIEC appears to have been designated as the technology partner, implying strong influence of China's B611M tactical ballistic missile over what Turkish authorities began calling *Bora* missiles.⁶⁶ Mirroring China's own transition from B611 to B611M, *Bora* appears to be a lengthened and containerized offspring of the earlier *Yıldırım*. 470 kg warhead is retained, but a new INS/GNSS guidance system is reputed to have bettered the accuracy from 150 meters to less than 50 meters. A successful test firing was made public in spring 2014, and the first deliveries appear to have taken place shortly afterwards, probably during 2015 or 2016. An export version by the name *Khan* was revealed in 2017.⁶⁷ In effect, *Bora* signifies the passing of the second milestone in Turkish military's multi-year missile development scheme: indigenous ballistic missiles with a range of 300 km.

Table 2 Turkey's Inventory of Ballistic Missiles and Long-Range Rockets.

Name	Range (km)	Warhead (kg)	Accuracy (meters)	Year (operational)	Quantity
ATACM	128	560	<50	1996	<72
Kasırga	100	150	≈1,000	1998	<1,500 (e)
Yıldırım	150	480	150> (e)	2000 (e)	≈200 (e)
Kaplan ⁶⁸	120	105	30	2016	40> (d)
Bora	280+	470	<50	2016 (e)	NK (d)

e: estimated; d: deliveries underway; NK: not known

What are the subsequent phases and the ultimate objective of Turkey's long-term, multi-phased missile development endeavor? Public domain data implies that the next milestone in Turkish military's master plan could as well be missiles with a range of 500 km, to be followed with the next and ultimate range bracket of 1,000 km.⁶⁹ It is not known if those 500 or 1,000 km-range missiles would be the offshoots of the *Yıldırım-Bora* family, whereby longer ranges would be achieved by extending the fuselage and adding more fuel. More plausibly, wider fuselage and larger engines would become necessary; thereof shift towards a different design also incorporating such new features as separating warhead. For the time being, public domain information is too scarce to allow any meaningful predictions.

66 Kadan, "Milli Füze".

67 "TSK 300 km menzilli füzelerine kavuştu!", 27 February 2015, <http://www.kokpit.aero/tsk-300-km-fuze-teslimat> (Accessed on 4 February 2017); "Türkiye'nin ilk uzun menzilli füzesi ortaya çıktı", *Milliyet*, 20 February 2017, <http://www.milliyet.com.tr/turkiye-nin-ilk-uzun-menzilli-ekonomi-2399587/> (Accessed on 26 February 2017); "Yerli Füze 'Kaan' Görücüye Çıkıyor", 26 April 2017, <http://aa.com.tr/tr/bilim-teknoloji/yerli-fuze-kaan-gorucuye-cikiyor/805375> (Accessed on 1 May 2017).

68 *Savunma Sanayii Müsteşarlığı Yıllık Faaliyet Raporu 2016*, <http://www.ssm.gov.tr/anasayfa/kurumsal/Faaliyet%20Raporlar/2016%20Y%C4%B1%C4%B1%20Faaliyet%20Raporu.PDF> (Accessed on 1 March 2017), p.38.

69 İbrahim Sünnetçi, "Türk Hava Kuvvetleri Yarınlarını Tanımlıyor", *Savunma ve Havaçılık*, No.147, 2011, p.128-129.

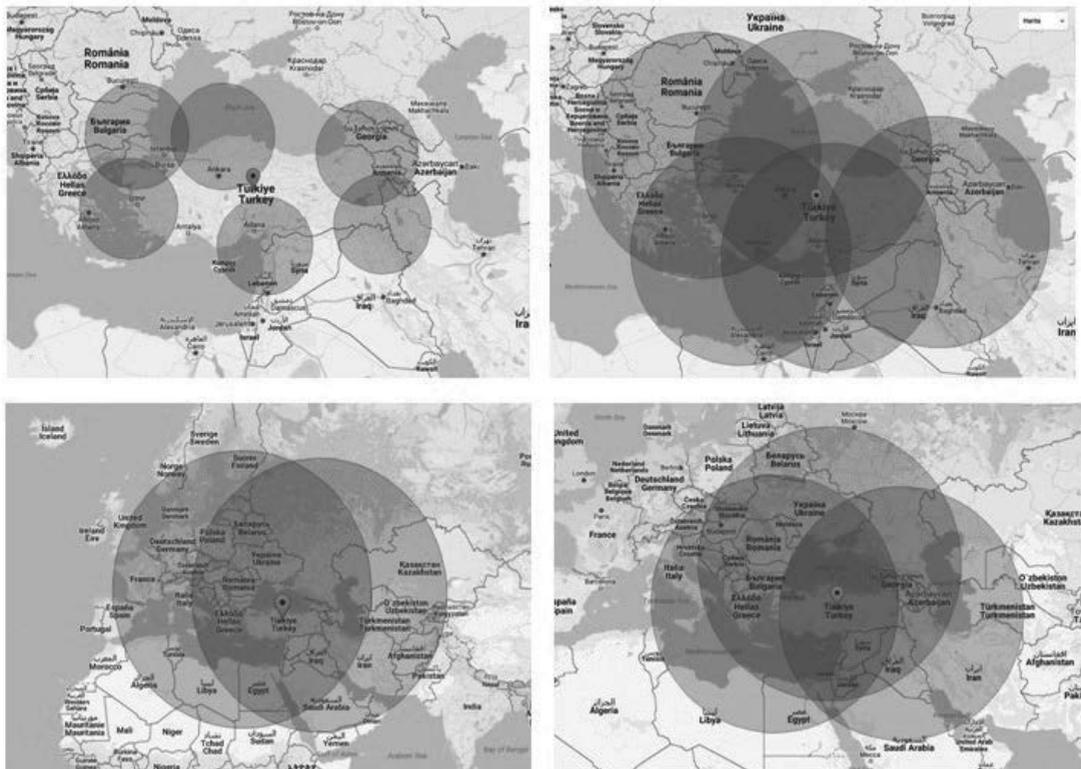
Even more controversial and discrete at the moment are the details pertaining to the ballistic missiles with even longer ranges – for instance 2,500 km – to have been cited by several Turkish officials. In the absence of tangible and reliable information, one plausible method to come up with predictions on the nature and confines of Turkey’s long-term ballistic missile aspirations is to ponder the range bracket(s) that makes more strategic and operational sense against the background of Turkey’s geostrategic circumstances.

What Missile Range Makes Sense For Turkey?

A straightforward way to identify the right range bracket for Turkey’s ballistic missile inventory is to draw range circles with Turkey at their center, and see what plausible targets are covered by each. Map-1 illustrates the results of such basic exercise, along with which the territory of the countries covered by Turkey-centric range circles is identified.

Accordingly, using her 300 km-range *Bora* missiles Turkey is already capable of reaching most of her immediate neighbors and their capital cities, plus strategically significant military bastion of Sevastopol recently annexed by Russia. Going up to the 750-km bracket, the capitals of all regional states, including those of Iran, Syria, Israel and Iraq, as well as the city of Novorossiysk, another Russian military and energy hub of strategic importance, comes within range.

Map 1 Range circles for 300 – 750 – 1,500 – 2,500 kilometers (clockwise)⁷⁰



Harita verileri ©2017 GeoBasis-DE/BKG (©2009), Google, Inst. Geogr. Nacional, Mapa GISrael, ORION-ME

⁷⁰ Maps were produced using © Google Maps.

Conversely, paying tribute to Turkey's geopolitical and strategic circumstances and her corresponding threat perceptions, the range circles beyond the 750-km threshold are devoid of additional countries with a central place in Turkey's threat perceptions and strategic calculations. Two possible exceptions are the Russian Federation's capital Moscow and Saudi Arabia's capital city Riyadh, both of which are roughly 1,500 km away from Turkey. Yet, Moscow happens to be the capital of a former superpower which continues to field half of the world's nuclear warheads and strategic missiles (ICBMs and SLBM). Given the dramatic asymmetry between the two sides, the prospects of striking Moscow with handful of ballistic missiles are rendered fatally dangerous, thence ineffective for the purposes of either deterrence or coercion. Besides, in the event Turkey somehow feels an urge to gain the capability to strike critical Russian targets with her ballistic missiles, then strategically important Russian cities of Sevastopol and Novorossiysk are a mere 300 to 400 km away from Turkey. As for Saudi Arabia, should a need arises, the geography allows for getting closer to targets and use alternative strike instruments, like air and sea-launched cruise missiles.

Coincidentally, the range of 750 km which appears to fit nicely in Turkey's geostrategic circumstances also happens to hit a sweet spot at the cross-section of operational, technological, cost and diplomatic considerations. We shall explain why. First, the technological dimension. Until a decade ago, conventional wisdom used to maintain that ballistic missiles were so inaccurate that they could not provide a tactically useful and cost-effective alternative to air power –unless of course coupled with WMD warheads. After all, ballistic missiles were costly, inaccurate, inflexible and escalatory weapon systems for one time use. Yet, this predisposition is being challenged recently by rapid progress in a number of enabling technologies. Those include affordable and easily-accessible navigation techniques, miniaturization of electronics and sensors, and frog leaps in data processing, computing, and advanced materials. Advances in those areas are giving rise to a new generation of comparatively shorter range ballistic missiles (e.g. up to 1,000 km) with greater accuracy, reliability, and affordability than their forebears of the infamous *Scud* generation.⁷¹ In this sense, shorter-range ballistic missiles with their accuracy measured in meters, have become effective tools for taking out high-value, well-defended targets. Once such a missile is fired, its impact on the target is swift and virtually guaranteed. The same could hardly be said of strike aircraft, which are all the while becoming ever more costly to own and operate. Ramifications of this shift on concepts of operations and military force structures are best reflected in the following comments of a senior Israeli officer:

(Ability) to strike targets within less than 10 meters — regardless of range — is driving a conceptual and operational revolution. The concept is crystallizing in the realization that forces on the ground are just as capable as air power in delivering precision strikes, whether targets are a few tens of kilometers or hundreds of kilometers away. You don't need to plan or await complex air operations, and don't have to deal with fog, smoke or bad weather. From the moment you identify the target, (...) it's a matter of one to three minutes, according to the flight time of the rocket. You don't need to wait for an airplane or helicopter to arrive. Capabilities that we only dreamed of lots of years ago are now being deployed. And this allows an unburdening of sorts for the Israel Air Force, which can focus on missions that are essentially air power in nature.⁷²

71 Tony Capaccio and Larry Liebert, "Missile Threats Surging Worldwide, U.S. Defense Study Finds", 26 June 2017, <https://www.bloomberg.com/news/articles/2017-06-26/missile-threats-are-surging-worldwide-u-s-defense-study-finds> (Accessed on 20 July 2017).

72 Barbara Opall, "Israeli Artillery Corps poised for longer-range, improved precision strikes", *Defense News*, 21 February 2017, <http://www.defensenews.com/articles/israeli-artillery-corps-poised-for-longer-range-improved-precision-strikes> (Accessed on 25 February 2017).

In fact, a similar trend in favor of comparatively shorter range, yet highly accurate ballistic missiles is clearly visible in South Korea, China, Iran and elsewhere in the world.⁷³ Even the US has spent 560 copies of ATACMS short-range ballistic missiles in combat since 1990s, a figure that makes US the leading user of ballistic missiles in combat.⁷⁴ Without a doubt, this technological trend towards increased tactical and operational benefits, thereof attractiveness of short-range ballistic missiles has not been missed by Turkish military planners.

Besides their operational advantages, shorter-range ballistic missiles accrue additional benefits for regional powers like Turkey. For ranges up to roughly 1,000 km, technical, technological, budgetary and timescale hurdles of developing longer-range, multi-staged ballistic missiles could be avoided. Single-stage missiles could fly roughly up to 1,000 km in distance. To extend the range beyond this threshold, second or third stages must be added –implying astronomic jumps in costs and complexity. In other words, as compared to 2-stage or 3-stage missiles, single-stage ballistic missiles are much less likely to be saddled with increased risks, skyrocketing costs, and international export controls. Given the wider availability of the dual-use technologies and items at stake, in-country production and deployment is rendered easier, less risky and cheaper in comparison with multi-stage missiles.

And lastly, diplomatic advantages abound, too. By limiting the range of its deployed missiles to 800 km, Turkey could hope to benefit from the precedent set by international community's toleration of South Korea's ballistic missile program. From 1980s onwards, South Korea has been willing to respond in kind to North Korea's rapidly expanding ballistic missile capabilities, yet did not want to become the subject of restrictions and sanctions imposed by MTCR and U.S. non-proliferation legislation. The solution came in the shape of a tacit agreement between Seoul and Washington, along with which South Korea agreed to limit the range of its missiles to MTCR's 300-km threshold. In return, South Korea's access to international arms supplies and technologies continued uninterrupted. The 300-km limit was subsequently increased to 800 km. Nowadays South Korean military is on the verge of deploying ballistic missiles of such range.⁷⁵ Noteworthy enough, there may already be other states shaping their missile ambitions by paying tribute to this *ad-hoc* limit of 800 km.⁷⁶ The bottom line is, a self-imposed limit of 800 km could be an effective way to avoid or at least minimize negative repercussions of ballistic missile development over Turkey's defense and technology programs run in collaboration with her Western allies.

73 Gabriel Dominguez and Neil Gibson, "South Korea's military to increase number of Hyunmoo missiles, says report", 16 August, 2016, <http://www.janes.com/article/62967/south-korea-s-military-to-increase-number-of-hyunmoo-missiles-says-report> (Accessed on 9 September 2016); Bill Sweetman, "Great Wall", *Aviation Week & Space Technology*, 17 November 2014, p.38-39; Richard D. Fisher Jr, "Analysis: Chinese moves to adopt new guided rocket system show ongoing value of domestic competition", *Jane's Defence Weekly*, 26 March 2015, p.21.

74 "U.S. Army awards Lockheed Martin with \$78 million Contract for ATACMS modernization", 7 January 2015, <http://www.lockheedmartin.com/us/news/press-releases/2015/january/mfc-010715-US-Army-Awards-LM-78-million.html> (Accessed on 29 March 2015).

75 Bradley Perret, "Beyond the peninsula", *Aviation Week & Space Technology*, 21 May 2012, p.27-28; Sebastian Falletti and James Hardy, "Seoul to extend the range of its ballistic missiles", *Jane's Defence Weekly*, 17 October 2012, p.8; "S.Korea succeeds in test of 800km-range new missile: source", 6 April 2017, <http://english.yonhapnews.co.kr/northkorea/2017/04/05/0401000000AEN20170405011300315.html> (Accessed on 13 April 2017).

76 "Cruise missiles indispensable for Polish submarines –required range: 800 km", 6 November 2014, http://www.defence24.com/news_cruise-missiles-indispensable-for-the-polish-submarines-required-range-800-km (Accessed on 9 December 2014).

Where Does the Range of 2,500 km Fit?

As our previous analyses indicate, there seems to be few if any additional targets and benefits to be attained by extending the range of Turkish missiles beyond 750 km. Yet, since 2011 there has been an abundance of reporting and official statements implying the range of 2,500 km. If 2,500 km does not necessarily correspond to Turkey's geostrategic circumstances and her current security posturing, could such statements and the ambitions they reveal be devoid of consistent strategic reasoning and justification? How to explain this apparent discrepancy between declaratory stand on the one hand and Turkey's geostrategic and security circumstances on the other?

One plausible explanation relates to the basic competitive instincts and the desire to outdo regional rivals, primarily Iran and its 2,200 km *Sejil* missiles. The first ever public remarks on the subject (in late-2011) by the then Prime Minister Erdoğan give some credence to the competitive reasoning by Turkey's decision makers:

Our neighbor Iran has built missiles with ranges of 2,000-2,200 kilometers. During the meeting of the YAŞ (Supreme Military Board), I've asked the commanders the range of our own missiles. They told me 150 kilometers. This is utterly unacceptable. We have to develop what our next-door neighbor Iran has got already.⁷⁷

In retrospect, "country X has got them, so should we" or "the longer, the better" type of simplistic and uni-dimensional judgments and decisions taken on the basis of such superficial reasoning risk becoming damaging and counter-productive. What would normally be expected instead is an all-inclusive and complex cost-benefit analysis, paying tribute to Turkey's geographic, strategic, tactical, technological and budgetary circumstances alongside her international commitments and obligations. The results obtained by scrutinizing the range brackets and pros and cons of shorter and longer-range ballistic missiles may be taken as proof that such comprehensive cost-benefit analysis may not have taken place, and at least some of the public statements may be the outcome of simplistic, secluded and unarticulated convictions.

A second line of explanation emanates from the appeal to general public of advanced and exotic weapon systems such as ballistic missiles. The so-called "prestige factor", public recognition and boost to national leadership's prestige, which has been identified long ago as one of the important drivers of ballistic missile proliferation.⁷⁸ Suffice it to say, one would normally expect the prestige factor to be applicable to the case of Turkey as well, whereby the rhetoric and speculation over long-range, even intercontinental ballistic missiles could be expected to bring political benefits. Whether and to what extent they have produced such benefits could be the subject of separate research.

The third explanation of the 2,500 km figure places Turkey at the spotlight for harboring clandestine nuclear weapon ambitions, thereby presents Turkey's interest in MRBM-class ballistic missiles as the evidence and harbinger of her nuclear weapon aspirations. This alarmist predisposition is encountered more frequently in the non-proliferation literature in recent years. Yet, on the basis of the public domain information, it is very difficult if not outright impossible to substantiate or discredit such predisposition. All the while, controversial and puzzling statements by figures and advisors close

⁷⁷ Aydemir, "Türk füzesi".

⁷⁸ Work elaborating drivers behind missile proliferation and the prestige factor is abundant. See Martin Navias, "Ballistic Missile Proliferation in the Third World", *Adelphi Papers*, No.262, Summer 1990, p.9-10; Sitki Egeci, "Europe and the future of ballistic missile threat", *Bulletin of Arms Control*, King's College Council for Arms Control, No.22, July 1996, p.11.

to Turkey's top policy-making circles continue to increase the suspicions, and they play into the hands of what could be termed Turkey alarmists. "Turkey has built missiles with long enough ranges to reach countries within EU borders" said one leading advisor to the President, without identifying at all the significance or relevance of such feat.⁷⁹ Another prominent presidential advisor wrote in his newspaper column that since real power resided in nuclear weapons, Turkey should not lose a single moment in developing nuclear weapons as a counter-balance to the dominance of the West.⁸⁰

In the future, when and if Turkey's MRBM rhetoric transitions towards a concrete and visible development program, it would be realistic to expect those suspicions to grow. In such eventuality, and because of the presumed link to nuclear weapon aspirations, the drawbacks of a long-range missile program may not be confined to the realm of foreign relations and alliance ties. Equally damaging would be economic and technological ramifications on foreign investment, foreign trade, and Turkey's entire range of financial and industrial activities. This is a contingency that must be duly factored in by Turkey's decision makers when drawing the confines and the objectives of their drive for ballistic missiles.

79 Live interview with President Erdoğan's top advisor Yiğit Bulut in "Derin Analiz", *TRT*, 31 January 2017, <https://www.youtube.com/watch?v=O3KrnEl8o8> (Accessed on 6 February 2017).

80 Hayrettin Karaman, "Ne Yapmalı?", 16 March 2017, *Yeni Şafak*, <http://www.yenisafak.com/yazarlar/hayrettinkaraman/ne-yapmali-2036778> (Accessed on 17 March 2017); "Nuclear Turkey? Imam close to Erdogan calls for weapons now amid tension with EU", *Express*, 16 March 2017, <http://www.express.co.uk/news/world/780240/TURKEY-Imam-Erdogan-nuclear-weapons-NOW-EU-tension-Germany-Netherlands> (Accessed on 17 March 2017).