Getting into shape: The characteristics and significance of Late Chalcolithic basalt vessel decoration in the Southern Levant

Article *in* Paléorient · November 2019

DOI: 10.4000/paleorient.556

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Getting into shape: The characteristics and significance of Late Chalcolithic basalt vessel decoration in the Southern Levant

R. Chasan and D. Rosenberg

Abstract. *The Late Chalcolithic period of the Southern Levant is marked by increased regional behaviour. Despite this, there is an increased production and distribution of finely made basalt vessels. These were frequently adorned with a single row of incised triangles along the rim. This motif is widely distributed throughout the Southern Levant and was formed according to specific morphometric guidelines and standardisation. These include a preference for symmetrical acute triangles filled with hatches. This standardisation attests to a somewhat specialised production and perhaps a shared significance behind the design, tied directly to the value of basalt or the basalt vessels. The triangle design then acts as a commentary on the Chalcolithic socio-economic system.*

Résumé. *La période du Chalcolithique ancien au Levant Sud est marquée par un plus grand développement régional. En addition à cela, une augmentation de la production et de la distribution de fines vaisselles faites de basalte est attestée. Elles sont souvent décorées avec une rangée de triangles incisés le long du rebord du col. Le motif est largement distribué au Levant Sud et est formé selon des lignes directrices typomorphologiques spécifiques. Ces directives comprennent une préférence pour des triangles aigus symétriques remplies de hachures. Cela peut indiquer que leur production était dictée par des conventions portant une signification sociale pour les communautés chalcolithiques. C'est pourquoi l'utilisation courante de ce motif triangulaire nous porte à croire que les villages chalcolithiques ont partagés un système d'utilisation et de production commun des bols de basalte décorés dépassant les limites régionales.*

Keywords. *basalt vessels, decoration, triangles, Chalcolithic, Southern Levant*
Mots-clés. *bols de basalte, décoration, triangles, Chalcolithique, Levant Sud*

The Late Chalcolithic period in the Southern Levant (*ca.* 4500-3900 cal. BC; Gilead 1994; Joffe and Dessel 1995; Braun *et al.* 2013) marks increasing social complexity (Levy 1986) and regional variation (Rowan and Golden 2009). While the division of these regions is debated (Levy 1986; Lovell 2001: 51; Rowan and Golden 2009), the regional boundaries seem to be outside of proposed cultural entities such as the Ghassulian (Albright 1932) and Golanian (Epstein 1998) and are defined based on specific differences and preferences in the material culture, although other aspects of material culture are shared.

Distinct and proposed regional areas include the Beerheva basin, the Golan Heights and the Jordan Valley. The Beersheva basin is characterised by a moderate frequency of cornets and churns, copper and ivory (Perrot 1959; Levy and Shalev 1989; Garfinkel 1999: 219). The Golan is characterised by an absence of painted pottery decoration and the presence of pottery decorated with animal horns, perforated flint discs and basalt pillar figurines (Epstein 1998: 230-233; Garfinkel 1999: 276-278; Rosenberg and Shimelmitz 2017). The material culture of the Jordan Valley is similar in part to what is observed in the Golan, with an additional presence of large pithos (Garfinkel 1999: 249). The characteristics of sites in the central coastal plain and valleys are less discrete, but with more similarities to the Beersheva basin. Vaguer regional boundaries were also proposed, with the Yarkon River used as a

Manuscript received the 26th September 2018, accepted the 27th March 2019

divider of the Southern Levant into a northern and southern region, each with a different set of prestige items (Rosenberg and Shimelmitz 2017).

These regional entities can be viewed in light of different social organisation systems. The Chalcolithic settlements may represent rural farming communities (Gilead 1988) or even proto-chiefdom level societies, defined by centres that organised socio-economic activities (Levy 1986; see Service 1962 for definitions). If we accept Late Chalcolithic sites as part of proto-chiefdom societies with defined territories, then the regionalised material culture is emphasised and, to some extent, uniformity and standardisation of material culture should be observed between sites in a given region as there is greater control over craft production (Levy 1986; see Renfrew 1973: 543 for definitions).

Entangled within this debate is a rise in craft specialisation (Levy 1986; Goren 2008; Kerner 2010; Rosenberg *et al.* 2016; Rosenberg and Shimelmitz 2017)—a process in which production behaviour and variability is regulated or regularised (Rice 1981). Indirect evidence includes increased sophistication, standardisation, efficiency and skill as well as advances in technological knowhow, which are observed in the metallurgy, pottery, flint and stone industries (Rosen 1983; Rowan 1998: 123-124, 195, 206-210; Garfinkel 1999: 206-273; Kerner 2010; Rosenberg *et al.* 2016; Rosenberg and Shimelmitz 2017). Direct evidence encompasses workshops and production tools (Rosen 1983; Shalev and Northover 1987; Shugar 2000; Gilead *et al.* 2004; Golden 2009). Production often involved the importation of raw materials and the use of specialised production techniques (Golden 2009; Rosenberg *et al.* 2016; Rosenberg and Shimelmitz 2017).

Within this framework, there is an increased production and utilisation of basalt vessels (Amiran and Porat 1984; Rowan 1998; Rosenberg *et al.* 2016). Basalt vessels form a high percentage of the ground stone tool assemblages at many settlement sites from the Sinai Desert through the Golan Heights (Lee 1973: LB1; Oren and Gilead 1981; Gilead 1995: 310-315; Rowan 1998; Scheftelowitz 2004: 61-67; Rowan *et al.* 2006: 597-601; Ilan *et al.* 2015: 85-86; Rosenberg *et al.* 2016), and they were incorporated less frequently into burial caves (Chasan and Rosenberg 2018). Many of these sites are remote from basalt sources (van den Brink *et al.* 1999; Philip and Williams-Thorpe 2001). This suggests a deliberate selection of basalt in favour of other locally available materials. However, while efforts to identify the basalt source or sources are currently underway (Gluhak and Rosenberg 2018), the specific origin of the raw material is still unknown.

Late Chalcolithic basalt vessels have a wide V-shaped profile. These are frequently characterised mainly by their flat or fenestrated pedestal bases. The fenestrated pedestal base was formed by hollowing a pedestal base and carving out three or four windows (Amiran and Porat 1984; Rowan 1998: 126-203). Despite their relative ubiquity in domestic contexts and their standardised forms, Chalcolithic basalt vessels were likely regarded as prestige items. This is suggested by the high degree of craftsmanship required for their production, the effort and time invested into the fine finishing and production of symmetrical vessels and, in many cases, the distance of the end products from basalt sources (Rosenberg *et al.* 2016). The value was often augmented by decoration which was mainly incised. Incised decoration is dominated by triangles. However, elaborate patterns, incorporating several motifs, and raised bands formed in relief were also noted (Chasan 2017: 14-20, 172-174). The current paper presents the results of a detailed study of Late Chalcolithic decorated basalt vessels, targeting those decorated with triangles.

INCISED TRIANGLES ON BASALT VESSELS

The most common design utilised on basalt vessels is a horizontal register of incised triangles. The triangles are incised along the entire rim circumference of both flat-based and fenestrated pedestal vessels, and are formed by two oblique lines meeting at a point, the apex pointing to the vessel base. The vessel rim acts as the triangle base.

Our detailed study incorporated 211 decorated basalt vessel fragments found at Chalcolithic sites throughout the Southern Levant (see Chasan 2017 for more details and methodology). The analysis shows that triangles are used on 63.0% of the studied decorated fragments. At several sites incised triangles can appear on as much as 85.0-100.0% of the decorated fragments. In contrast, elaborate decoration and raised bands are typically used on only up to 25.0% of the studied decorated fragments at a given site.

Incised triangles are used most frequently on the interior rims of basalt vessels (98.4% of the fragments with triangle decoration) and infrequently on the exterior rims (4.5% of the fragments with triangle decoration). The exterior was undecorated or was adorned with triangles or elaborate geometric decoration. While the preferential selection of the interior rim is not entirely understood, it may relate to various reasons. The triangles may be related to the vessels' function and more over to the substances the vessels contained.

Triangles are applied to varying frequencies of basalt vessels, used on *ca*. 25.0-65.0% of the basalt vessels and rim fragments found at a given site (Gilead 1995: 311; Rowan 2005: 118; Rowan *et al*. 2006: 601, table 12.28; Rosenberg *et al*. 2016; Chasan 2017: 65, 90). Notably, at some sites, a preference for basalt vessels decorated with raised bands is noted instead, and this may relate to chronological variation or, alternatively, suggest that the raised bands were formed by a different group of individuals or for different aims.

Basalt vessels bearing incised triangles suggest a wide geographic distribution. These were found at sites located from the Negev in the south through the Jezreel Valley in the north and the Jordan Valley in the east (fig. 1). Based on assemblages analysed for this study (Chasan 2017: 186-189), the region including the Shephalah through the Lod Valley and the central coastal plain has the highest concentration of basalt vessels decorated with triangles (62.3% of the studied decorated fragments). In the Northern Negev, triangles were applied to only 30.8% of the studied decorated basalt vessel fragments (Chasan 2017: table 107); with further study and additional publication, these frequencies may change. Notably, incised triangles were not reported at sites in the Northern Jordan Valley, Galilee or Golan Heights.

The incised triangles are usually filled with various incisions. So far we documented six types of triangle fill motifs, with additional sub-types (fig. 2):

– Type 1: unfilled triangle (fig. 2.1).
– Type 2: triangle filled with chevrons (fig. 2.2).
– Type 3: triangle filled with parallel oblique lines (henceforth hatches, fig. 2.3-6).
– Type 3i: triangle filled with hatches that angle left, descending from the triangle upper right side to the lower left side (fig. 2.3).
– Type 3ia: triangle filled with hatches that angle left until they reach an additional hatch formed parallel to the left triangle side (fig. 2.4).
– Type 3ii: triangle filled with hatches that angle right, descending from the triangle upper left side to the lower right side (fig. 2.5).
– Type 3iia: triangle filled with hatches that angle right until they reach an additional incised line that is formed parallel to the right triangle side (fig. 2.6).
– Type 4: triangle filled with cross-hatching (fig. 2.7).
– Type 5: triangle filled with a “herringbone” design (fig. 2.8).
– Type 5a: triangle filled with a “herringbone” design that extends until an additional hatch formed parallel to one triangle side (fig. 2.9).

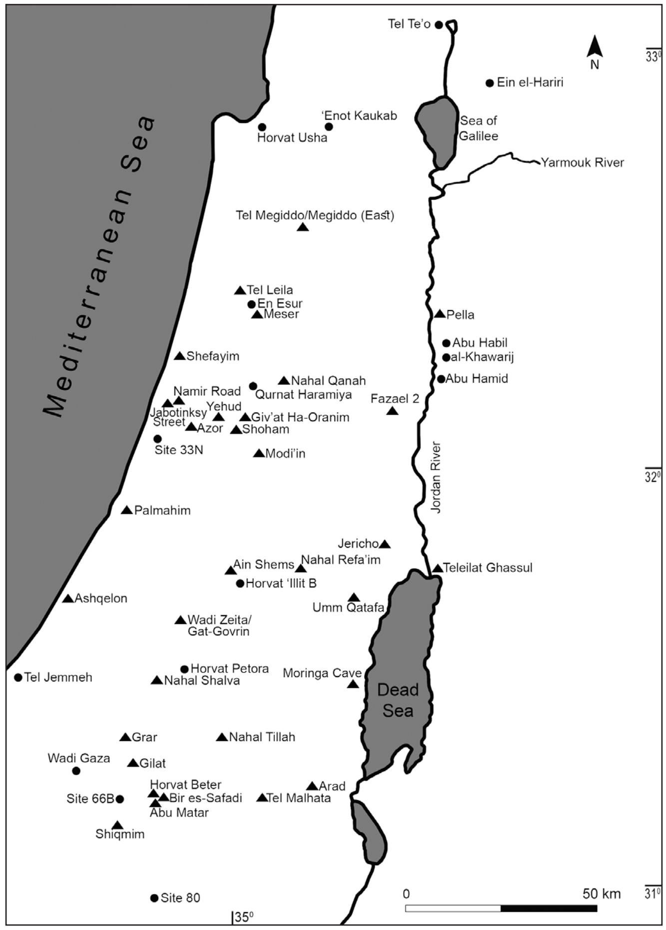


Fig. 1 – *Map of Chalcolithic sites with decorated basalt vessels. Triangles mark sites with basalt vessels decorated with triangles (map authors).*

– Type 6: triangle filled with a wheat-like pattern with a central line and branching incisions (fig. 2.10).

The decorated basalt vessels included in the study (table 1 and fig. 3-7) indicate a clear preference for triangles filled with hatches (Type 3 encompassing 92.9% of triangles). Within this, there is a strong preference for hatches angled left (Types 3i and 3ia encompassing 81.5% of Type 3). In a sample of 32 sites, only four have no fragments decorated with triangles with oblique hatches angled left (Type 3i). These sites (Gilat, Ain Shems, Jabotinsky Street in Tel Aviv and Tel Leila) are geographically widespread with no clear linkage. At every other site, at least 50.0% of the fragments with triangles bear this design, reinforcing the motif’s importance. This preference is observed from the Northern Negev and through the Jezreel Valley, and the triangle type is applied to both flat-based and fenestrated pedestal forms.

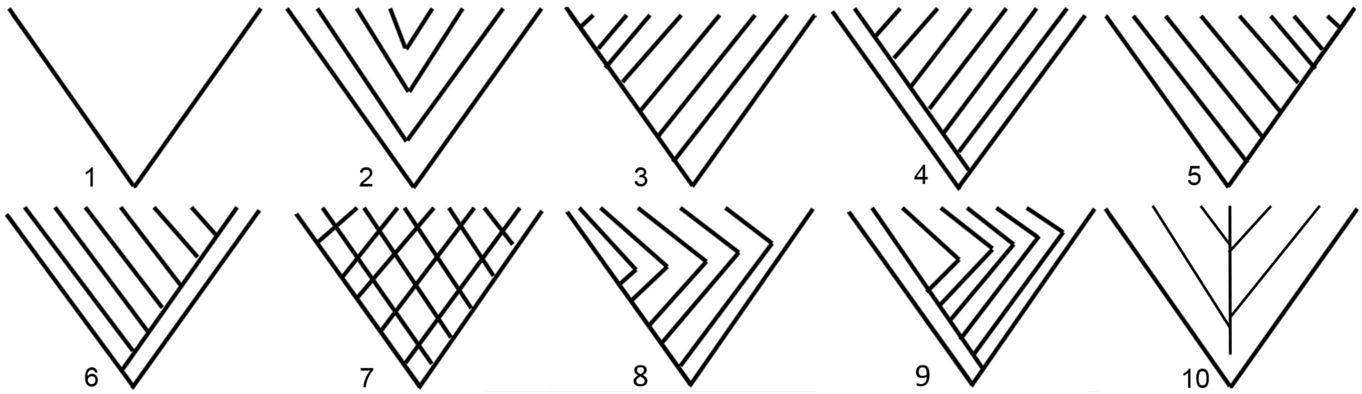


Fig. 2 – *Schematic representations of the triangle types (CAD authors):* ***1.*** *Type 1;* ***2.*** *Type 2;* ***3.*** *Type 3i;* ***4.*** *Type 3ia;* ***5.*** *Type 3ii;* ***6.*** *Type 3iia;* ***7.*** *Type 4;* ***8.*** *Type 5;* ***9.*** *Type 5a;* ***10.*** *Type 6.*

Other triangle types are used in low frequencies and only at a few sites; due to fragmentation, it is unknown if they were applied more commonly to flat-based or fenestrated forms. The unfilled triangles are used more frequently in the Northern Negev (11.8-100.0% at six sites) than at more northern sites (11.8% and 20.9% at two sites). Further, according to our data, the cross-hatching and herringbone motif were seemingly in use only in the Lod Valley, central coastal plain and further north, and the "wheat" motif was so far documented only at Teleilat Ghassul. The low frequency of these motifs in general suggests that they do not signify regional preferences. Further variation is noted in triangle typology based on the triangle location; on the interior rim, all triangle types are used, while on the exterior rim, only Types 1, 3ii and 5a are used.

The triangle decoration is found primarily on basalt vessels unearthed at settlement sites. The burial caves Nahal Qanah, Azor, Giv'at Ha-Oranim and Shoham (North) also have basalt vessel fragments decorated with triangles (Chasan and Rosenberg 2018). This suggests that vessels bearing incised triangles were taken from the habitation sites to use as grave goods. In each of these burial caves, only a few fragments decorated with triangles were found (1-5 fragments). At Nahal Qanah 11.1% of the rim fragments bear this decoration, and at Azor the only rim fragment found bears this decoration. At Shoham (North) 31.3% of the rim fragments bear this decoration, and at Giv'at Ha-Oranim the exact percentage could not be calculated (Chasan and Rosenberg 2018). Discounting Azor, these numbers are consistent with the frequencies observed at settlement sites. Other geometric motifs were used very minimally on basalt vessels found in burial caves (Gopher and Tsuk 1996: 248; Rowan 2005: fig. 9.17).

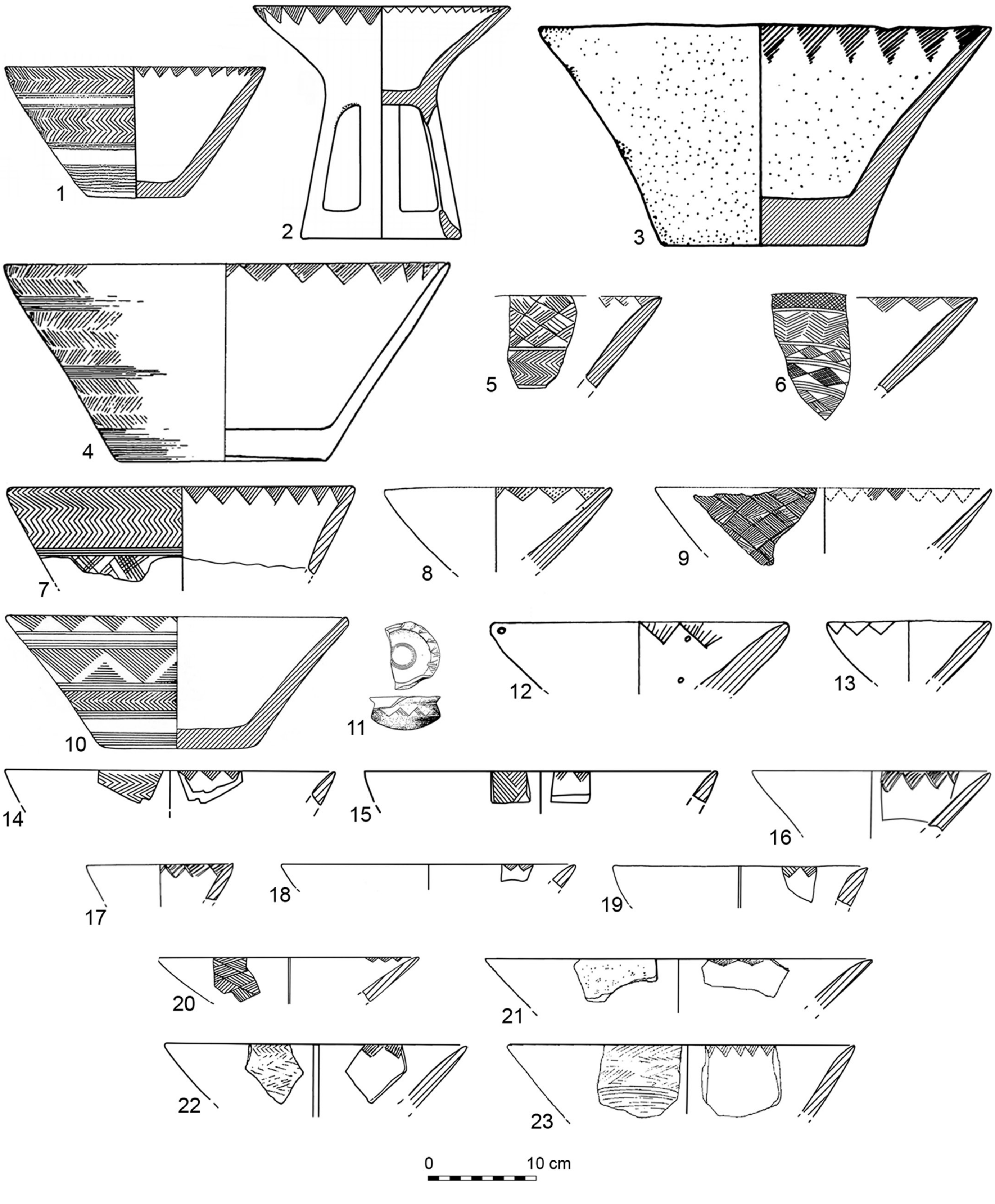
Furthermore, in varied domestic and mortuary contexts, incised and painted triangles were used minimally on pottery (Mallon *et al.* 1934: 125, pl. 50.97, 53.1, 54.5, 54.14, 65.1-2; Perrot and Ladiray 1980: fig. 70.5; Commenge-Pellerin 1990: pl. IX; Levy *et al.* 1991: fig. 9; van den Brink *et al.* 2001; Roux *et al.* 2013: fig. 4.7-8), phosphorite (Gilead 1995: fig. 7.2.9-10) and limestone vessels (Lee 1973: LB1c). The greater frequency of this motif on basalt vessels, despite the difficulty in incising basalt, suggests that the basalt vessel industry was the originator of this design that the other industries mimicked. This connection is unusual because stone vessels were infrequently decorated in the preceding periods (however, see Perrot 1966: fig. 15.10; Rosenberg 2011: fig. 8.25.1, 8.26-27, 8.30.1, 8.32.2-3, 8.33.5, 8.39.10; Bekker and Garfinkel 2016: fig. 6; Getzov 2016: fig. 15.10) and the decorations (*e.g.*, herringbone, diamonds, cross-hatching, rope bands) mimicked the pottery industry with some examples akin to Yarmukian ware and Tel Tsaf decoration (Garfinkel 1999: 64-67, 186-188). This suggests that during the Late Chalcolithic period, the basalt vessel industry gained an independent decoration system, separate from that of the pottery vessels.

On other mediums characteristic of the Late Chalcolithic period, namely copper items, triangles oriented in a single row were not used; instead, other geometric patterns were applied. However, on copper standards and crowns, triangles were sometimes used in multiple registers or to form herringbone motifs (Moorey 1988: fig. 2b and 3a-c). In the case of the crowns, these were aligned along the circumference. The connection between the decorations of these two mediums is not clear, but the designs may have shared roots.

Table 1 – *Frequency of fragments decorated with typologically identifiable triangles (credits authors).*

Site	% of fragments with each type											Reference	Figure
	N	1	2	3i	3ia	3ii	3iia	4	5	5a	6		
Shiqmim	2	–	–	50.0	50.0	50.0	–	–	–	–	–	Levy and Alon 1985: fig. 4.5; Levy *et al.* 1991: fig. 12 (see also Chasan 2017: 46-51)	3.10-11
Abu Matar	8	25.0	–	75.0	-	12.5	12.5	–	–	–	–	Amiran and Porat 1984; fig. 1.1-2; Braun 1990: fig. 2.3; Rowan 1998: fig. 20a (see also Chasan 2017: 25-30)	3.1-4
Bir es-Safadi	17	11.8	5.9	88.2	5.9	11.8	–	–	–	–	–	Rowan 1998: fig. 53b and fig. 53d (see also Chasan 2017: 31-36)	3.5-6
Horvat Beter	3	33.3	–	100.0	–	–	–	–	–	–	–	Dothan 1959a: fig. 19.1 (see also Chasan 2017: 39-42)	3.7
Arad	2	50.0	–	50.0	–	–	–	–	–	–	–	Amiran 1978: pl. 67.8-9	3.12-13
Gilat	1	100.0	–	–	–	100.0	–	–	–	–	–	Chasan 2017: 53-55	
Grar	4	25.0	–	50.0	–	25.0	–	–	–	–	–	Gilead 1995: fig. 7.1-4 and 7.1.6 (see also Chasan 2017: 43-45)	3.8-9
Nahal Shalva	3	–	–	100.0	–	–	–	–	–	–	–	Israel *et al.* 2014: fig. 28	3.14-15
Gat-Govrin	2	–	–	100.0	–	–	–	–	–	–	–	Khalaily and Hermon 2013: fig. 12.1-2	3.16-17
Ashqelon-Barnea	3	–	–	100.0	–	33.3	–	–	–	–	–	Rosenberg forthcoming[1]	3.18-20
Ashqelon-Afridar (Area E)	5	–	–	100.0	–	–	–	–	–	–	–	Rowan 2004: fig 4.1-3	3.21-23
Umm Qatafa	2	–	–	100.0	–	–	–	–	–	–	–	Neuville and Mallon 1931	
Ain Shems	1	–	–	–	100.0	–	–	–	–	–	–	Braun 1990: fig. 4.2	4.1
Nahal Refa'im	1	–	100.0	100.0	–	–	–	–	–	–	–	Milevski and Barzilai 2011: fig. 28	4.10
Teleilat Ghassul	8	–	12.5	62.5	–	25.0	–	–	–	–	12.5	Lee 1973: LB1 and LB11; Rowan 1998: appendix b; Bourke *et al.* 2000: fig. 23.10	4.2-9
Jericho	1	–	–	100.0	–	–	–	–	–	–	–	Garstang *et al.* 1936: pl. 33.17	4.11
Palmahim	1	–	100.0	100.0	–	–	–	–	–	–	–	Gophna and Lifshitz 1980: fig. 4.10	4.12
Modi'in	17	11.8	5.9	76.5	23.5	5.9	–	–	–	–	–	Chasan 2017: 58-64	
Shoham (North)	5	–	–	100.0	–	–	–	–	–	–	–	Rowan 2005: 118, fig. 9.7.5, 9.8, 9.9.1 and 9.17.2 (see also Chasan 2017: 65-66)	4.13-17
Azor	1	–	–	100.0	–	–	–	–	–	–	–	Perrot and Ladiray 1980: fig. 77.2	5.11
Yehud	7	–	–	71.4	–	28.6	–	–	–	–	–	Ilan *et al.* 2015, fig. 88 (see also Chasan 2017: 91-94)	
Giv'at Ha-Oranim	31	–	–	51.6	16.1	6.5	–	22.6	12.9	3.2	–	Scheftelowitz 2004: 61, fig. 4.3.1-2, 4.3.4-5 and 4.7.2-3 (see also Chasan 2017: 70-77)	5.1-10
Jabotinsky Street	1	–	–	–	–	–	–	–	–	100.0	–	Kaplan 1958: fig. 19	5.12
Namir Road	43	20.9	–	72.1	4.7	14.0	–	4.7	–	–	–	Rosenberg *et al.* 2016: fig. 7.1-20, 22-24 and 26-27 (see also Chasan 2017: 79-86)	6
Fazael 2	4	–	–	100.0	–	–	–	–	–	–	–	Chasan 2017: 95-96	
Nahal Qanah	3	–	–	100.0	–	–	–	–	–	–	–	Gopher and Tsuk 1996: 109, fig. 14.14-1 and 14.14.3	7.1-2
Shefayim	1	–	–	100.0	–	–	–	–	–	–	–	Gophna 1992: fig. 4.2	7.3
Pella	1	–	–	100.0	–	–	–	–	–	–	–	Bourke *et al.* 1994: fig. 7.7	7.4
Meser	1	–	–	100.0	–	–	–	100.0	–	–	–	Dothan 1959b: fig. 5.15	7.5
Tel Leila	1	–	–	–	100.0	–	–	–	–	–	–	Aharoni 1959: fig. 2	7.6
Tel Megiddo	1	–	–	100.0	–	–	–	–	–	–	–	Loud 1948: pl. 262.3	
Megiddo (East)	2	–	–	100.0	–	–	–	–	–	–	–	Greener pers. com.	
% of fragments (n=183)		**10.4**	**2.7**	**73.8**	**8.2**	**10.9**	**0.5**	**5.5**	**2.2**	**1.1**	**0.5**		

1. Rosenberg D. (forthcoming), Stone tools of coppersmith's community: The stone assemblage of Early Bronze Ashkelon-Barnea. *In*: Golani A. (ed.), *The Early Bronze Age I site of Ashqelon Barnea. Vol. II: The finds*. Jerusalem: Israel Antiquities Authority (IAA Reports).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◀ **Fig. 3** – *Basalt vessels decorated with triangles (CAD authors):* ***1-4.*** *Abu Matar (after Amiran and Porat 1984: fig. 1.1-2; Braun 1990: fig. 2-3; Rowan 1998: fig. 20a);* ***5-6.*** *Bir es-Safadi (after Rowan 1998: fig. 53.b-d);* ***7.*** *Horvat Beter (after Dothan 1959a: fig. 91.1);* ***8-9.*** *Grar (after Gilead 1995: fig. 7.1.4-6);* ***10-11.*** *Shiqmim (after Levy and Alon 1985: fig. 4-5; Levy* et al. *1991: fig. 12);* ***12-13.*** *Arad (after Amiran 1978: pl. 67.8-9);* ***14-15.*** *Nahal Shalva (after Israel* et al. *2014: fig. 28.2-3);* ***16-17.*** *Gat-Govrin (after Khalaily and Hermon 2013: fig. 12.1-2);* ***18-20.*** *Ashqelon-Barnea (after Rosenberg forthcoming);* ***21-23.*** *Ashqelon-Afridar (Area E; after Rowan 2004: fig. 4.1-3).*

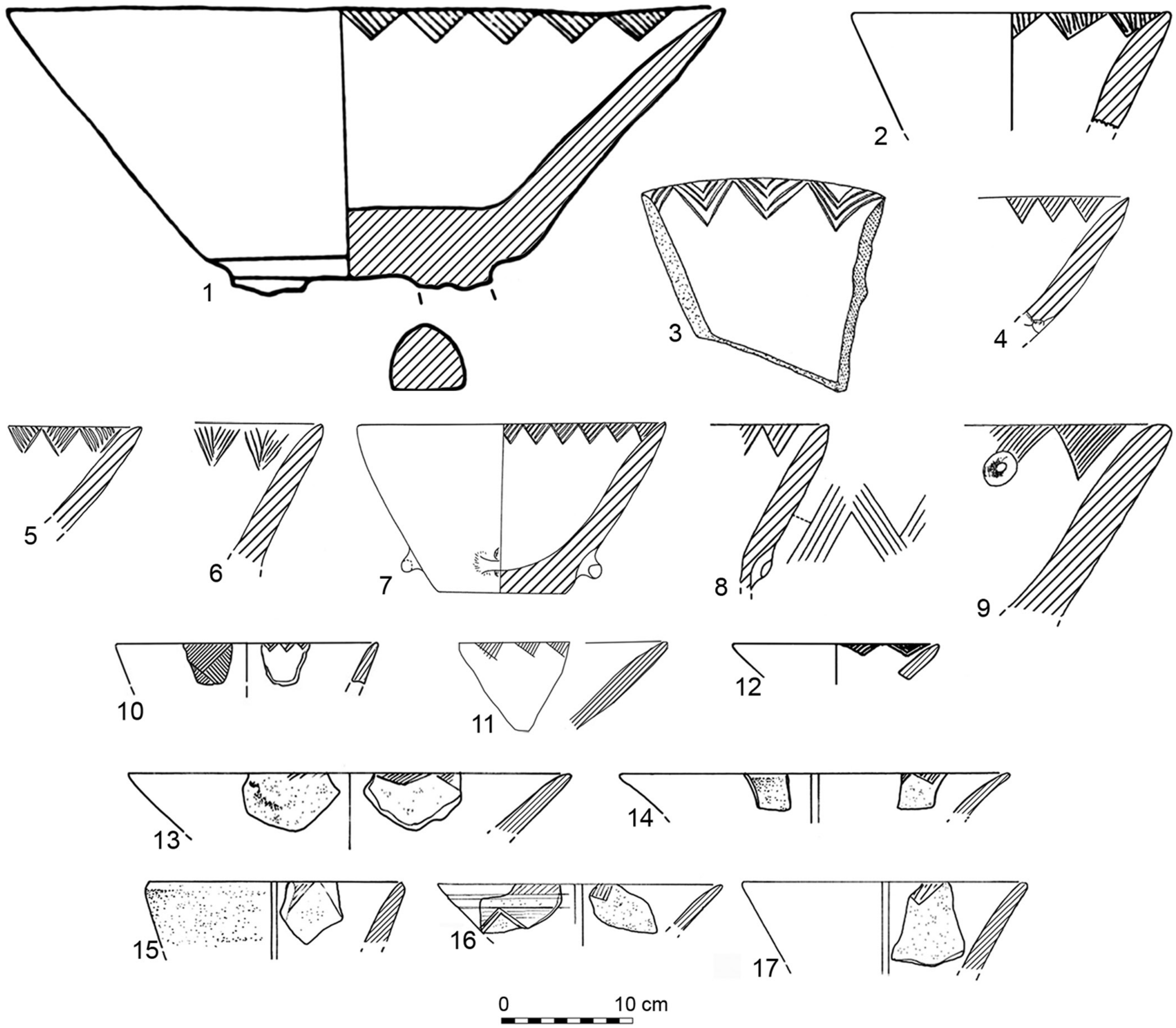

Fig. 4 – *Basalt vessels decorated with triangles (CAD authors):* ***1.*** *Ain Shems (after Braun 1990: fig. 4.2);* ***2-9.*** *Teleilat Ghassul (after Lee 1973: LB1, LB11; Bourke* et al. *2000: fig. 23.10);* ***10.*** *Nahal Refa'im (after Milevski and Barzilai 2011: fig. 28);* ***11.*** *Jericho (after Garstand* et al. *1936: pl. 33.17);* ***12.*** *Palmahim (after Gophna and Lifshitz 1980: fig. 4.10);* ***13-17.*** *Shoham (after Rowan 2005: fig. 9.7.5, 9.8, 9.9.1 and 9.17.2).*

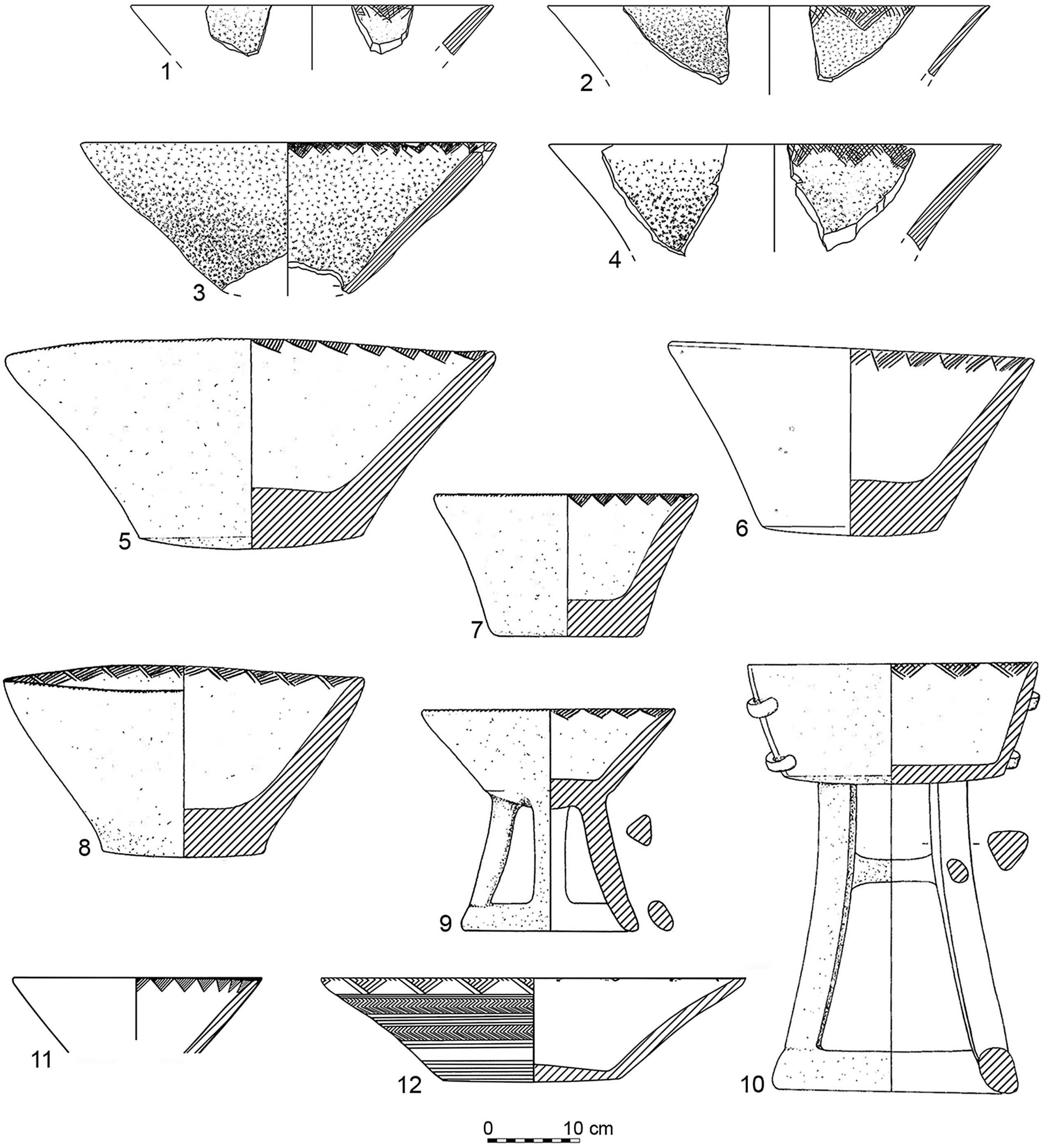

Fig. 5 – *Basalt vessels decorated with triangles (CAD authors):* ***1-10.*** *Giv'at Ha-Oranim (after Scheftelowitz 2004: fig. 4.3.1-2, 4.3.4-5 and 4.7.2-3; Chasan 2017: fig. 38);* ***11.*** *Azor (after Perrot and Ladiray 1980: fig. 77.2);* ***12.*** *Jabotinsky Street (after Kaplan 1958: fig. 19).*

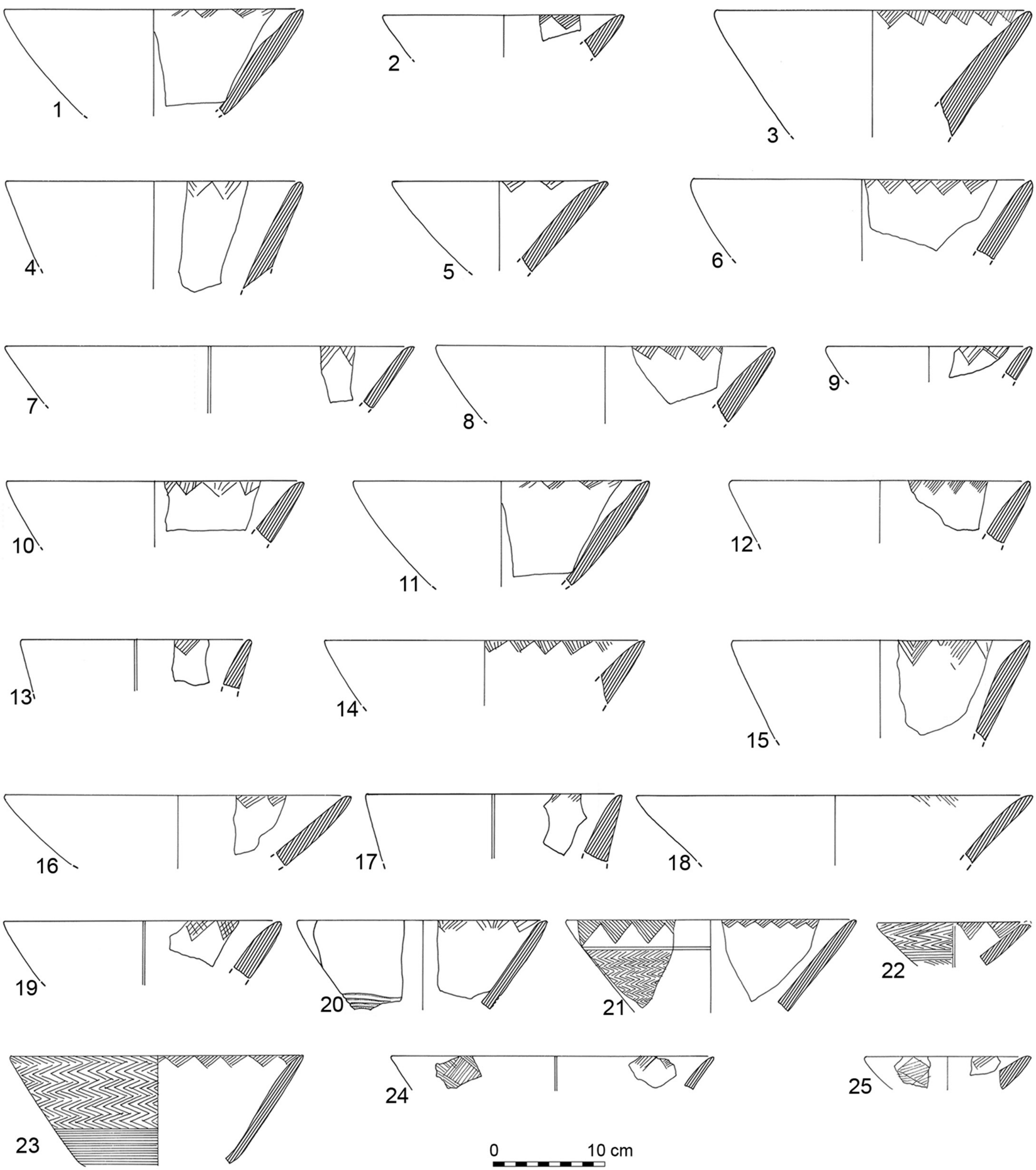

Fig. 6 – *Basalt vessels decorated with triangles from Namir Road (after Rosenberg* et al. *2016: fig. 7.1-20, 22-24 and 26-27; CAD authors).*

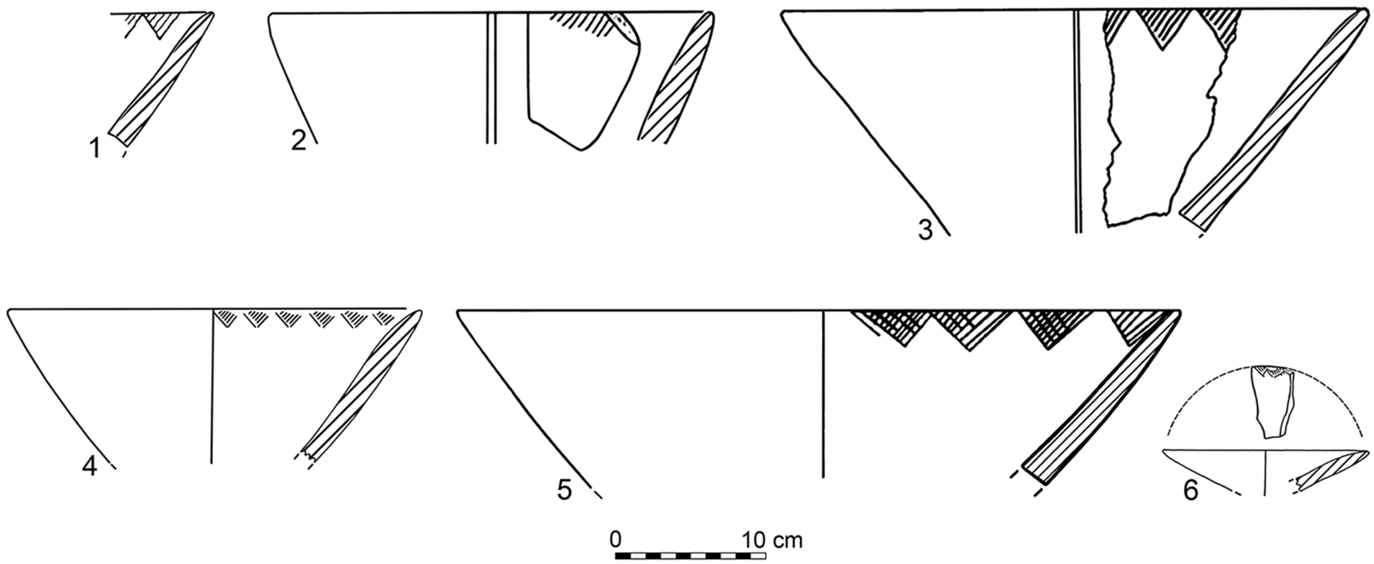

Fig. 7 – *Basalt vessels decorated with triangles (CAD authors):* ***1-2.*** *Nahal Qanah (after Gopher and Tsuk 1996: fig. 14.14.1 and 3);* ***3.*** *Shefayim (after Gophna 1992: fig. 4.2);* ***4.*** *Pella (after Bourke* et al. *1994: fig. 7.7);* ***5.*** *Meser (after Dothan 1959b: fig. 5.15);* ***6.*** *Tel Leila (after Aharoni 1959: fig. 2).*

METRIC ATTRIBUTES

Comprehensive attribute analyses of a sample of decorated basalt vessels from twelve Late Chalcolithic sites was conducted (Chasan 2017; tables 2-3). The analyses include a sample of the decorated basalt vessels found at sites in the Northern Negev (Abu Matar, Bir es-Safadi, Horvat Beter, Grar, Shiqmim and Gilat), the Shephalah, the central valleys and the central coastal plain (Modi'in, Shoham (North), Giv'at Ha-Oranim, Namir Road and Yehud) and the Central Jordan valley (Fazael 2). Metric attributes include triangle height, side lengths and base length. The average and standard deviation (SD) were calculated as well as the metric range most triangles follow (greater than 80.0%).

The triangle heights range between 5.9-38.1 mm long (averaging 16.7 mm, SD 5.4 mm). While this is a wide range, nearly 90% of all triangles have heights 10.0-25.0 mm long. The triangle sides are 7.5-46.9 mm long (averaging 21.4 mm, SD 7.5 mm), although nearly 90% of triangles have sides 10.0-30.0 mm long. When the left and right sides are compared, no clear difference is observed. The left side is 21.9 mm long on average (SD 7.9 mm), while the right side is 20.9 mm long on average (SD 7.0 mm). The sides in a given triangle differ only 2.0 mm on average (SD 2.2 mm). A typological analysis of the symmetry of the triangle sides indicates a significant difference ($f = 5.45$; $p < 0.001$). Type 4 triangles show a greater tendency toward asymmetry. Highly asymmetric triangles are rare, although the side lengths can differ up to 10.7 mm. The triangle base length ranges between 10.1-66.6 mm (averaging 27.9 mm, SD 11.5 mm). About 85.0% of all triangles have base lengths between 10.1-40.0 mm.

In addition, the triangle proportion and area were calculated. These relate to the general triangle appearance. The triangle proportion is calculated based on the triangle height divided by the triangle base length. Triangles that are proportionally narrow have a height that is greater than the base length and a ratio above 100.0%. Triangles that are proportionally wide have a height that is less than the base length and a ratio below 100.0%. Among all the triangles, the height is 36.9-102.0% of the base length. However, nearly 85.0% of the ratios are between 40.0 and 80.0%, indicating that most triangles are proportionally wide with a base length that is greater than the triangle height. The few proportionally narrow triangles are more suggestive of imperfect equilateral triangles.

The triangle surface area ranges between 29.8-1076.3 mm^2 (averaging 250.5 mm^2, SD 180.1 mm^2). This wide range may relate to the size of the vessels that the triangles are incised on. While further analysis is required, a positive correlation between vessel and triangle size was noted (see Chasan 2017: 61-62, 74, 82-83). However, the distribution is generally more

Table 2 – *Typological comparison of triangle surface area and proportion on fragments from Chalcolithic sites in the Southern Levant (authors).*

Triangle type	N triangles	Surface area average (mm²)	Surface area SD (mm²)	Minimum surface area (mm²)	Maximum surface area (mm²)	Height: base length ratio (%)	Height: base length ratio SD (%)	Minimum height: base length ratio (%)	Maximum height: base length ratio (%)
1	26	147.9	43.6	77.2	231.0	56.3	7.7	45.9	75.5
2	1	167.4		167.4	167.4	54.4		54.4	54.4
3i	255	211.6	149.3	29.8	941.3	66.1	14.4	41.9	102.3
3ia	31	155.1	66.0	60.0	290.8	62.1	11.7	40.6	78.9
3ii	47	310.0	149.8	62.8	582.5	59.7	10.9	40.5	84.4
4	40	480.1	201.8	231.8	1072.3	48.0	6.2	36.9	59.7
5	8	954.0		954.0	954.0	45.3		45.3	45.3

Table 3 – *Typological comparison of triangle angles on fragments from selected Chalcolithic sites in the Southern Levant (authors).*

Triangle type	N triangles	Average base angle (degrees)	Base angle SD (degrees)	Minimum base angle (degrees)	Maximum base angle (degrees)	Average point angle (degrees)	Point angle SD (degrees)	Minimum point angle (degrees)	Maximum point angle (degrees)
1	1	46.3	5.4	35.0	60.0	80.6	11.0	60.0	105.0
2	1	44.0	1.4	43.0	45.0	85.0		85.0	85.0
3i	255	50.5	6.5	35.0	70.0	72.6	10.6	50.0	105.0
3ia	31	50.9	6.0	40.0	62.0	75.8	8.6	55.0	90.0
3ii	48	48.1	6.3	35.0	65.0	76.7	10.7	60.0	105.0
3iia	2	53.5	2.1	52.0	55.0	72.5	2.5	70.0	75.0
4	40	45.3	5.0	38.0	62.0	86.0	8.7	63.0	105.0
5	8	45.4	2.0	43.0	49.0	83.5	4.9	80.0	87.0
5a	2	44.0	1.4	45.0	45.0	85.0	7.1	80.0	90.0

limited, with nearly 90% of the triangles having a surface area between 60.0-500.0 mm². This could relate to the relative standardisation of vessel size (Rowan 1998: 195, 206-210).

When the general triangle shape is analysed typologically, clear variation is observed (table 2). Statistically significant differences are shown within the triangle surface area ($f = 22.69$; $p < 0.001$) and proportion ($f = 12.29$; $p < 0.001$). Type 3ii, 4 and 5 triangles are larger on average than Type 1, 2, 3i and 3ia triangles. Furthermore, Type 4 and 5 triangles are wider on average. Even within each triangle type, there is no precise norm. This is shown most acutely in Type 3i.

The triangle base angles are all acute, ranging between 35.0-70.0° (averaging 49.1°, SD 6.5°). Over 80.0% of the analysed triangles have base angles between 40.0-55.0°. A comparison of the left and right angles indicates no clear variation. The left angle averages 48.7° (SD 6.2°), while the right angle averages 49.5° (SD 6.9°). In a given triangle, the base angles differ 5.2° on average (SD 5.3°). However, there are some triangles with highly asymmetric angles, differing up to 28.0°. Such asymmetric triangles are rare and should perhaps be considered production flaws.

The triangle point angles are more variable, ranging between 50.0-105.0° (averaging 75.7°, SD 11.0°). Most point angles are acute, less than 90.0°. More specifically, over 90.0% of all triangles have a point angle between 60.0-90.0°. Obtuse angles, while rare, are used at various sites that are not geographically bound. The observed results show no preference for right angle or equilateral triangles.

A typological analysis reflects similar standardisation (table 3). Within each triangle type, the average base angle is between 44.0-54.0°, and the average point angle is between 72.0-86.0°. However, statistical analysis indicates a significant difference between the base (f = 8.02; p < 0.001) and point angles (f = 8.56; p < 0.001) of the triangle types. This may relate to deviant small and large base and point angles. These are used invariably and infrequently in several triangle types.

The hatches commonly incised within most triangles are straight and thin (usually < 1.0 mm wide). In the fully preserved triangles, 1-20 hatches are incised (averaging 8.4 hatches per triangle). This wide range could relate to issues of preservation or the state of triangle production; hatches can wear away with time and post depositional processes, and more hatches can be added diachronically, but there is clearly no preferential number of hatches utilised. The hatches are spaced 0.1-9.7 mm apart (averaging 1.9 mm, SD 1.0 mm). However, over 80.0% are spaced 0.4-2.4 mm apart. This suggests that while there are some outliers, most hatches were spaced deliberately close together. The variation may relate to the triangle surface area. Larger triangles tend to be filled with hatches spaced farther apart and vice versa. A comparison of the minimum and maximum hatch spacing within a given triangle shows limited variation. On average, the minimum and maximum hatch spacing in a triangle differs by 1.0 mm (SD 0.7 mm). This suggests that care was taken to ensure that the hatches were spaced consistently, although the difference can range up to 6.2 mm.

While from a modern perspective, the observed metric variation is wide and the triangles are inconsistent, acknowledging the difficulty in incising basalt and the restricted Late Chalcolithic tool box, the triangle metrics were likely considered consistent by the Chalcolithic populations. Differences of only a few millimetres and degrees attest to imperfect standardisation and not immense or even intentional variability. Instead, the Chalcolithic artisans actively selected to make triangles of such a size and shape as befits the vessel size, with greater consistency obtained on a single vessel.

DISCUSSION

Basalt vessels in general and decorated basalt vessels in particular represent hallmarks of the Late Chalcolithic period in the Southern Levant. These vessels were produced in limited forms and distinct size groups (Rowan 1998: 123-124, 195, 206-210). Basalt vessels were used in a significantly greater frequency than in the preceding periods in domestic contexts and are found, albeit considerably less frequently, in mortuary contexts (Rowan 1998; Chasan and Rosenberg 2018). Many of these were supplemented by incised decorations.

Several conclusions stem from the current study that focused on the most common Late Chalcolithic basalt vessel decoration—the incised triangles. Triangles were mainly formed along the interior rim in a chain, always pointing down and using the rim as a "base". This may suggest that their importance was directly related to the substance these bowls contained. Most triangles are of a similar size and proportionally wide, with acute angles and a symmetrical shape. The majority were filled with hatches that descend from the triangle's upper right side to the lower left side. While the hatches are varied in number, an effort was made to space them consistently close together. The motif is applied nearly exclusively on basalt vessels, directly linking this design with the function of the basalt vessels. However, the common presence of both decorated and undecorated basalt bowls suggests that at least two functions are represented by these and/or that at least two sets of value systems existed.

Further, this triangle motif enjoys a wide distribution, covering a span of almost 100 *sq.* km and a challenging uneven topography, crossing mountains and valleys from the Northern Negev through the Jezreel Valley, with no regionally bound morphometric variation. Vessels from opposite poles of the distribution bear nearly identical incised triangles. The distribution range may correlate with the area of the proposed Ghassulian culture (Albright 1932); however, the boundaries and definition of the Ghassulian need additional refinement. Regardless, the current distribution suggests that the triangles were a fundamental element of the Late Chalcolithic material culture. According to the iconological approach presented by Sackett (1982), this commonality is based on social transmission and interaction. The level and characteristics of the interaction are unknown, but the connection between these widespread sites is clear. Thus, the use of a common decoration may suggest social ties (Braun 1991) and shared social norms.

We further suggest that these patterns indicate standardisation of basalt vessel decorations during the Late Chalcolithic period in the Southern Levant that by and large goes hand in hand with standardisation in vessel morphology (variation in vessel size and volume seems more fluid). Standardisation is "a relative degree of homogeneity or reduction in variability… Standardisation is not a matter of presence/absence but one of degree" (Rice 1991: 268). The degree standardisation of the stone vessel decoration increased during the Late Chalcolithic period whereas in the preceding periods, variable incised geometric and in relief motifs were inconsistently applied to different raw materials (Garrard *et al.* 1986: fig. 9f; Rosenberg 2011: 208-209; Gopher 2012: fig. 24.3.2; Rosenberg and Garfinkel 2014: 82; Bekker and Garfinkel 2016: fig. 6; Getzov

2016: fig. 15.10). In addition, the basalt vessel decoration is also standardised in comparison to the Chalcolithic pottery industry in which multiple motifs and decoration techniques are utilised on morphologically equivalent V-shaped forms (Garfinkel 1999: 271-275).

Increased standardisation may relate to specialisation as standardisation forms in part with repeated production, a key component of specialisation (Rice 1991: 268). Regardless, the artisans operated within a defined and limited spectrum of techno-stylistic guidelines and constraints. Significantly, prestige items, such as the suggested basalt vessels, are often standardised because their production and distribution was probably controlled (Rice 1981: 227). The protocols formulating these conventions were possibly governed by social conventions. These conventions were dictated by some kind of authorities or by certain social norms, and they were related to the proper use of these vessels with the Late Chalcolithic communities.

The triangle design may also be significant; triangles are ubiquitously used as decoration well before and after the Late Chalcolithic period in the Southern Levant, formed on a variety of mediums. During the Neolithic and Middle Chalcolithic periods, triangles were applied to pottery (Garfinkel 1999: fig. 37, 39, 41, 114), although unlike during the Late Chalcolithic period, they were applied in multiple registers and varying orientations. Triangles were also used as anatomical representations on female figurines in the Late Neolithic/Early Chalcolithic Wadi Rabah culture as representations of the vulva (Getzov 2011: fig. 10.43; Orrelle and Horwitz 2016: fig. 2). The triangle motif continued to be used on various mediums in later periods in the Southern Levant (Orrelle 2014: fig. 125.1; Budin 2016: fig. 1 and 3).

Many attribute the triangle motif symbolic meanings, and while decoration could be merely an aesthetic feature, it seems that the prior is the case in the Late Chalcolithic period. In the Levantine archaeological record, triangular motifs are occasionally associated with fertility as the V-shape is interpreted as a representation of the vulva (Gopher and Orrelle 1996; Orrelle 2014: 71). Others suggest that the shape could represent a human torso, so multiple triangles may represent a group of people. By placing them around the vessel rim, an illusion of movement and dancing is created (Garfinkel 2003: 19). While it is unclear if these comparisons are appropriate, the prevalence of sexual depictions on various aspects of Late Chalcolithic material culture (Perrot 1959: fig. 1; Fox 1995: fig. 1; Milevski 2002: fig. 8; Shalem 2015: fig. 6a) could suggest the existence of fertility-based rituals in which the decorated basalt vessels played a role. We should perhaps also consider that these adorned vessels were household paraphernalia used for different purposes, the economic and symbolic values of the vessels and their decorations supplying specific significance to the occasions (see Epstein 1978: 32 for similar suggestions concerning Chalcolithic pottery). If this is accepted, then when the people used the vessels, they may have also "experienced the meaning behind the imagery" (Hopwood 2017: 240).

The presence of standardisation and perhaps craft specialisation and shared symbolic value attests to a previously unidentified complex socio-economic network supporting basalt vessel decoration and utilisation. The utilised socio-economic network could be correlated with "proto-chiefdom" level societies proposed by some (Levy 1986) as a key archaeological indicator for chiefdoms is craft specialisation (Renfrew 1973: 543). In such a system, the commonalities attested by the basalt vessel decoration would be formed and enforced by centres that coordinated socio-economic activities (Service 1962: 143). However, the widespread distribution of this design does not correlate with a clear territory as required for chiefdom societies, although further multifaceted research is required to identify if and what territories existed. The intricacy of basalt vessel production, decoration and distribution though seems to be beyond simple rural household based farming communities. Thus, the common utilisation of the basalt vessel decoration invites a renewed interpretation of the Late Chalcolithic socio-economic interaction sphere that will include and combine additional data sets.

ACKNOWLEDGEMENTS

We would like to thank the researchers who gave us permission to study items from their excavations and G. Litani for allowing us to study bowls from the IAA collections. We are also indebted to A. Regev-Gisis for her infinite patience and assistance in the preparation of the graphics. Finally, we would like to thank the reviewers for their most helpful comments.

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