

The San Bartolo Lava Flow Field Along the Northeast Flank of Stromboli Volcano: A Preliminary Study for Field Survey

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Abstract

This file pertains the analysis of photos collected during a drone survey carried out in July 2022 in order to map the San Bartolo (SB) lava flow field, cropping out on the NE flank of Stromboli volcano. The SB is the most recent lava flow field emplaced outside the Sciara del Fuoco and affecting the populated area, and has an age of ~ 2 ka (Arrighi et al., 2004; Speranza et al., 2008). The lower part of the lava flow field forms a lava delta along the coast between the Sirenetta wharf and Piscità (Figure 1), where we have recognised 16 lava flow units.

Here below, using Google Maps as reference to locate the flow units and then analysing all photos collected during the drone survey, we identify the 16 lava flow units comprising the SB lava fan, and display in detail the features of each flow unit as observed from the photos collected during the drone survey observed from the coast (frontal view) and from above (vertical view). This work is preliminary and necessary in order to have a basis for the field survey that will analyze and sample each flow unit in detail, trying to connect the features observed along the coast with those detected on the surface of the lava flow field.

The survey of the San Bartolo lava flow field, and the reconstruction of the events and timing occurred during this recent flank eruption, is part of a research project (FIRST-Forecasting eRuptive activity at Stromboli volcano: Timing, eruptive style, size, intensity, and duration) funded by the Istituto Nazionale di Geofisica e Vulcanologia (INGV) Progetto Strategico Dipartimento Vulcani 2019 (Delibera n. 144/2020; Scientific Responsibility: S.C.).

Results

This file comprises 120 slides where we display the San Bartolo lava fan cropping out along the NE coast of the Stromboli island between the Sirenetta wharf to the east and the beach of Piscità to the west, for an extension in plan view of ~ 1 km. The lava fan is made of 16 lava flow units, most of which expand below sea level, as it is possible to observe from several photos taken from above. Given the number of private houses, gardens and roads covering the 16 lava flow units, it is very difficult to identify each lava unit and its boundary directly from the field, and this is the reason for this preliminary study carried out from the air.

In the following slides we show at first the distribution of the 16 lava flow units and of their boundaries as seen from above and recognised on a Google Earth map. We start from the easternmost (SBI 16, located at the Sirenetta wharf) moving westward to Piscità (SBI 12). We show the details of the surface features of each lava flow unit observed from the photos collected during the drone survey, and recognize a few morphology features, such as lava channels, levées, tumuli and possible lava tubes (both drained and undrained, or flow plugs) that will be useful for the field survey and for reconstructing the emplacement history of this compound lava flow field.

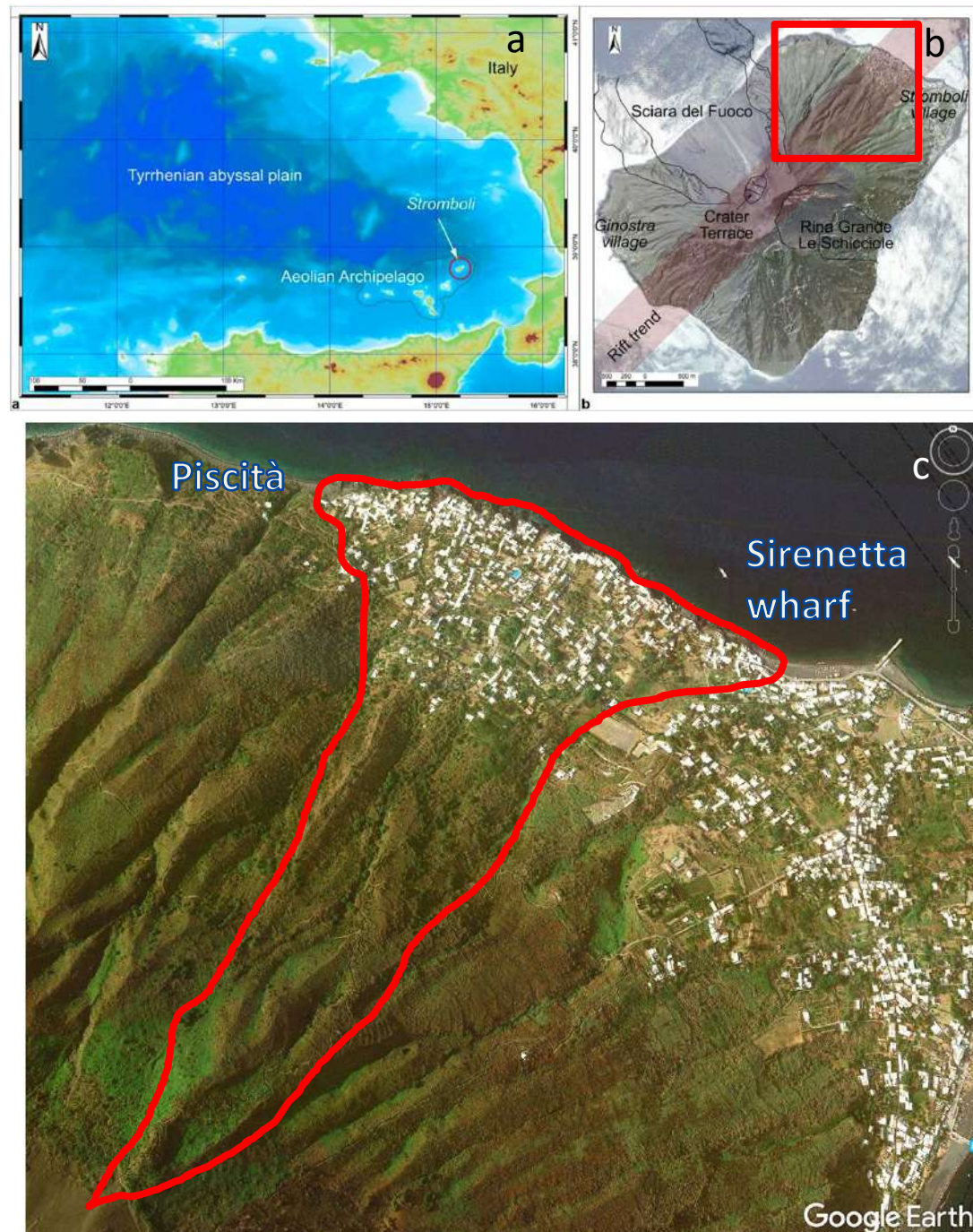
The analysis of the drone photos revealed an unconformity within the San Bartolo lava flow field between an a'a lava flow front above (SBI 1) and a pahoehoe lava flow lobe below (SBI 13). This contact, as well as the nature of the unconformity, need to be verified in the field. SBI 1 appears to be made by an a'a flow to the east and by two pahoehoe flows to the west, apparently erupted from lateral breakouts of the a'a flow front.

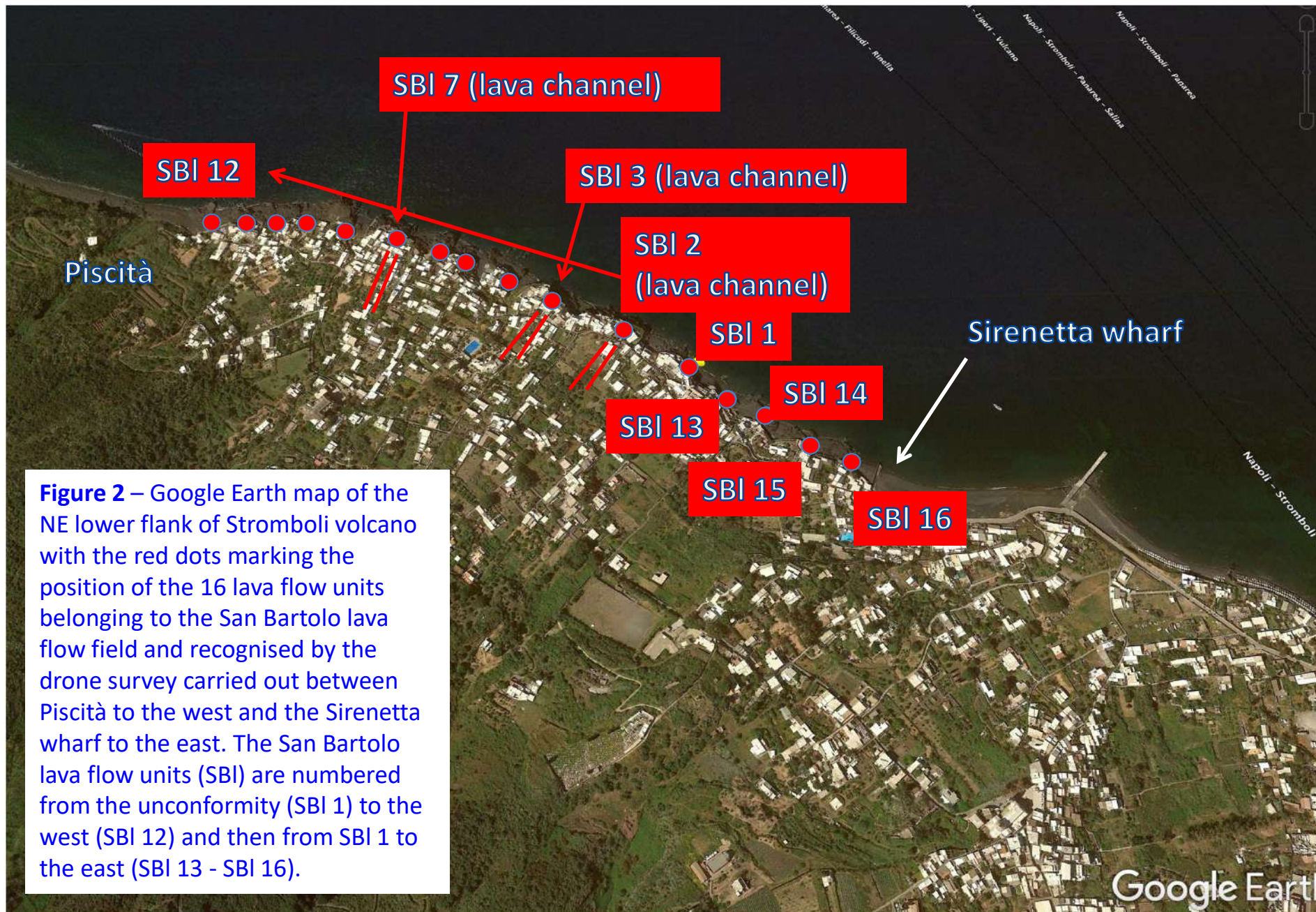
Two possible cavities (lava tubes?) have been observed along the coast in correspondence of two lava flow units: SBI 2 and SBI 7. If the field survey will confirm that these features are lava tubes caused by roofing over lava channels and not by the erosion of the flow bottom, then their spatial relationships with the surface master channels and their inner features might help reconstructing a long-lasting eruption displaying several stages of emplacement of the lava flow field, with possibly initial a'a lava flows emplaced at high flow rate, and final pahoehoe flow lobes erupted from the exit of the lava tubes and from the draining margins of the former a'a lava flows.

Should the lava tubes along the coast display several inner coatings, this might reveal the rheology state of the lava flowing within them as well as the duration of activity of these structures, with several thin inner lining suggesting a long-lived tube fed by fluid lava, and a few thick lining indicating a lava tube active for a short time and fed by viscous lava (Calvari and Pinkerton 1998, 1999).

The slide at page 118 displays a preliminary DEM (digital elevation model) of the whole San Bartolo lava flow field. On this DEM, the master lava channels recognised by Lucchi et al. (2013) are well visible, and their extensions seaward well connect to the two lava tubes detected by the analysis of the photos on the frontal view of the two lava flow units SBI 2 and SBI 7. The final slide at page 119 shows an initial interpretation of the lava flow field, where the lava flow units located in the central part show mainly a'a lava flow surfaces with lava channels, levées, flow plugs and possibly lava tubes (SBI 1 to SBI 8), whereas the lateral lava flow units located along the coast to the east and west margins of the lava flow field display mainly pahoehoe surfaces (SBI 13-16 and SBI 9-12).

Figure 1 – (a) The southern Tyrrhenian sea and the position of the Aeolian Archipelago and of Stromboli volcano (red circle) at its NE end. (b) The island of Stromboli with the red square marking the area magnified in c. (c) Google Earth map of the NE flank of Stromboli volcano with in red the outline of the area covered by the San Bartolo lava flow field (Calvari et al., 2011; Lucchi et al., 2013) and the coastal area interested by the drone survey between Piscità and the Sirenetta wharf.





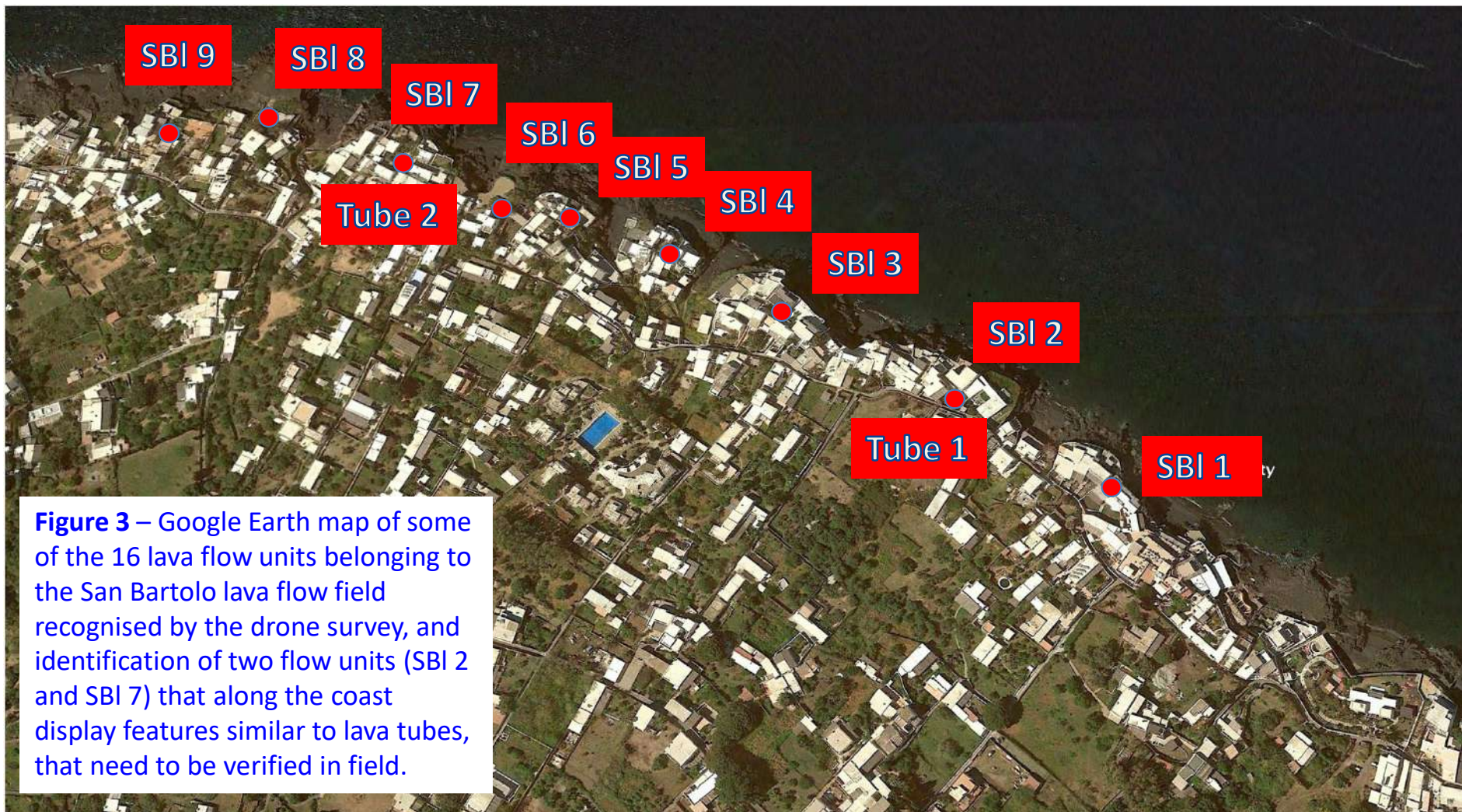




Figure 4 – Google Earth map magnification of four of the 16 lava flow units belonging to the San Bartolo lava flow field recognised by the drone survey, and separation (dotted red lines) between individual flow units (SBI 1 to SBI 4), with the position of a lava tube indicated by the red arrow and possibly located along the coast and belonging to SBI 2, that need to be verified in the field. The red dots identify the center of each lava flow unit.

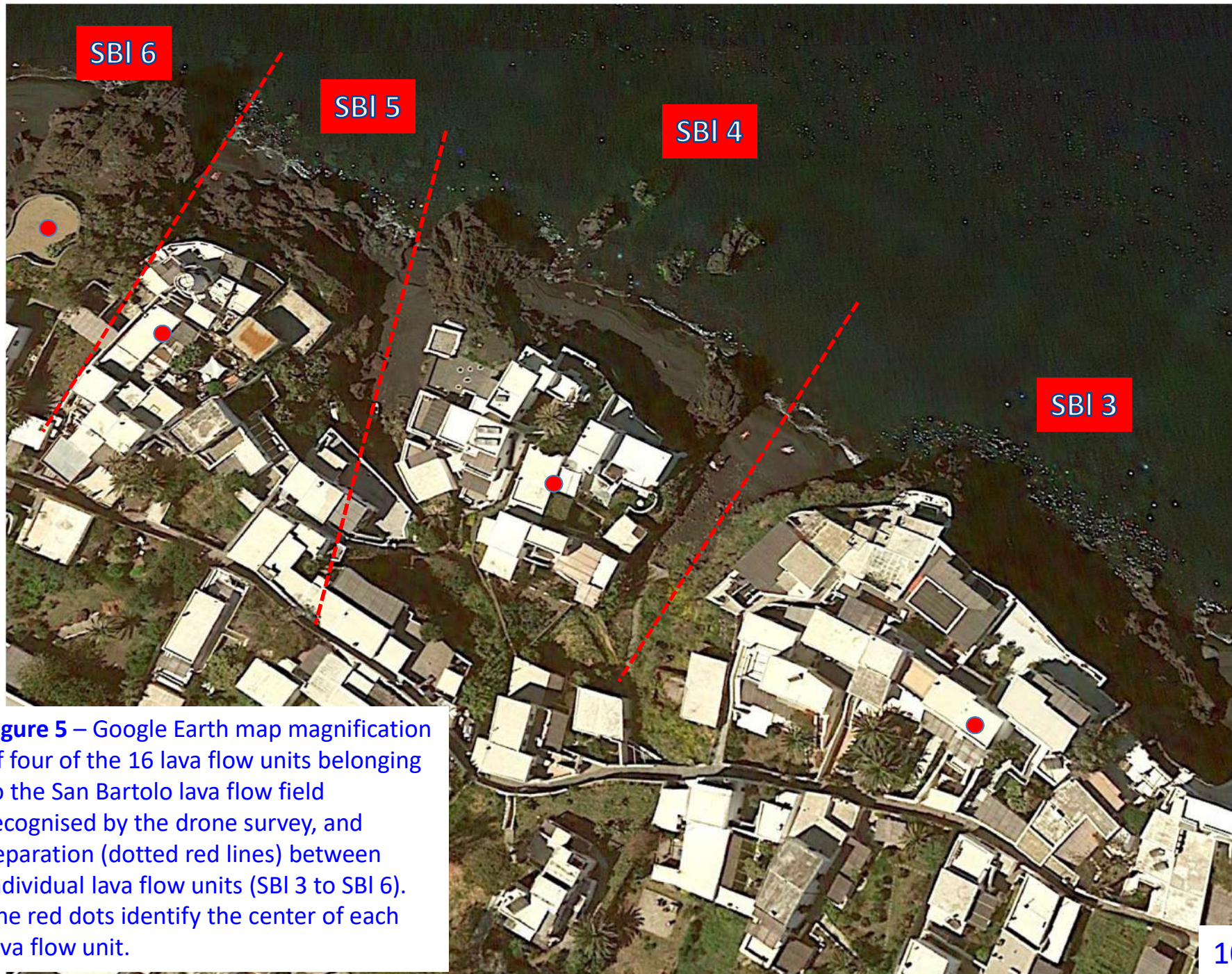


Figure 5 – Google Earth map magnification of four of the 16 lava flow units belonging to the San Bartolomé lava flow field recognised by the drone survey, and separation (dotted red lines) between individual lava flow units (SBI 3 to SBI 6). The red dots identify the center of each lava flow unit.

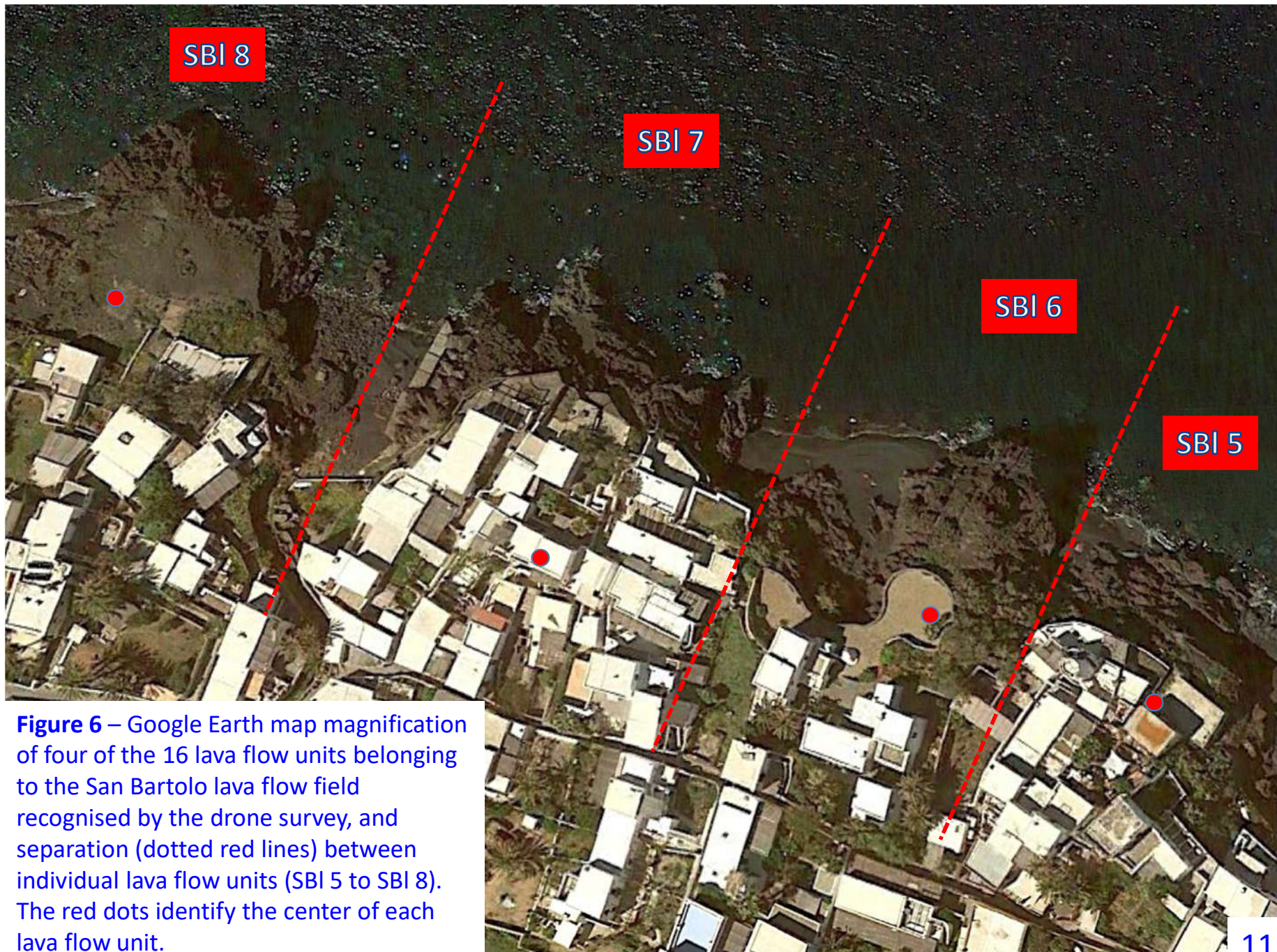


Figure 6 – Google Earth map magnification of four of the 16 lava flow units belonging to the San Bartolo lava flow field recognised by the drone survey, and separation (dotted red lines) between individual lava flow units (SBI 5 to SBI 8). The red dots identify the center of each lava flow unit.



Figure 7 – Google Earth map magnification of five of the 16 lava flow units belonging to the San Bartolo lava flow field recognised by the drone survey, and separation (dotted red lines) between individual lava flow units (SBI 8 to SBI 12). The red dots identify the center of each lava flow unit.

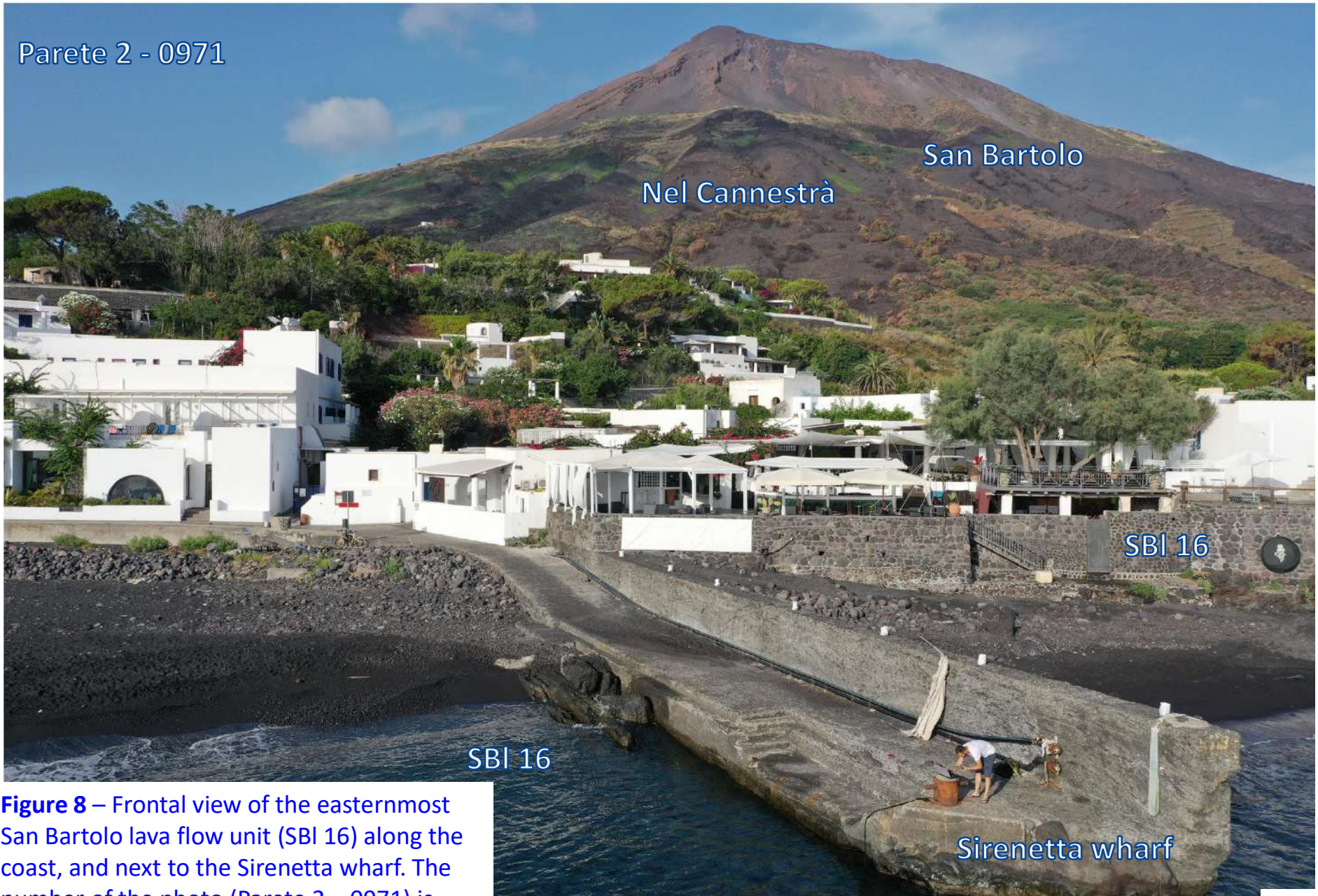


Figure 8 – Frontal view of the easternmost San Bartolo lava flow unit (SBI 16) along the coast, and next to the Sirenetta wharf. The number of the photo (Parete 2 – 0971) is reported on the top left of the image.



Figure 9 – Frontal view of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. The number of the photo (Parete 2 – 0007) is reported on the top left of the image.



Figure 10 – Frontal view of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. The number of the photo (Parete 2 – 0019) is reported on the top left of the image.



Figure 11 – Frontal view of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. The number of the photo (Parete 2 – 0032) is reported on the top left of the image.

Parete 2 - 0043

Nel Cannestrà

SBI 16

Figure 12 – Frontal view of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. The number of the photo (Parete 2 – 0043) is reported on the top left of the image.

Parete 2 - 0046

Figure 13 – Frontal inclined view of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. The number of the photo (Parete 2 – 0046) is reported on the top left of the image.

Nel Cannestrà

SBI 16

Spiaggia 1 - 0639



SBI 16



Figure 14 – View from above of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. Photomosaic of two images. The numbers of the photos (Spiaggia 1 – 0639 and Spiaggia 1 - 0592) are reported on the top left and bottom right of the image, respectively.

Spiaggia 1 - 0592



Figure 15 – View from above of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. The number of the photo (Spiaggia 1 – 0641) is reported on the top left of the image. In red the lava flow unit outline.

Spiaggia 1 - 0641



Figure 16 – View from above of the easternmost San Bartolo lava flow unit (SBI 16) along the coast. The number of the photo (Spiaggia 1 – 0641) is reported on the top left of the image. Note the lava flow crests parallel to the coast, probably formed when the lava encountered the sea.



Figure 17 – Frontal view of the two easternmost San Bartolo lava flow units (SBI 16 and SBI 15) along the coast. The red circle marks the flow plug. The number of the photo is reported on the top left of the image.

Parete 2 - 0079

Nel Cannestrà

SBI 15

Figure 18 – Frontal view of the San Bartolo lava flow unit (SBI 15) along the coast. The number of the photo is reported on the top left of the image.



Figure 19 – Frontal view of the San Bartolo lava flow unit (SBI 15) along the coast. The number of the photo is reported on the top left of the image.



Figure 20 – Vertical view from above of the San Bartolo lava flow unit (SBI 15) along the coast. The red outline marks the boundary of the flow unit. The number of the photo is reported on the top left of the image.



Figure 21 – Vertical view from above of the San Bartolo lava flow unit (SBI 15) along the coast. The number of the photo is reported on the top left of the image.

Parete 2 - 0081

Figure 22 – Frontal view of the San Bartolo lava flow unit (SBI 15) along the coast. The number of the photo is reported on the top left of the image.

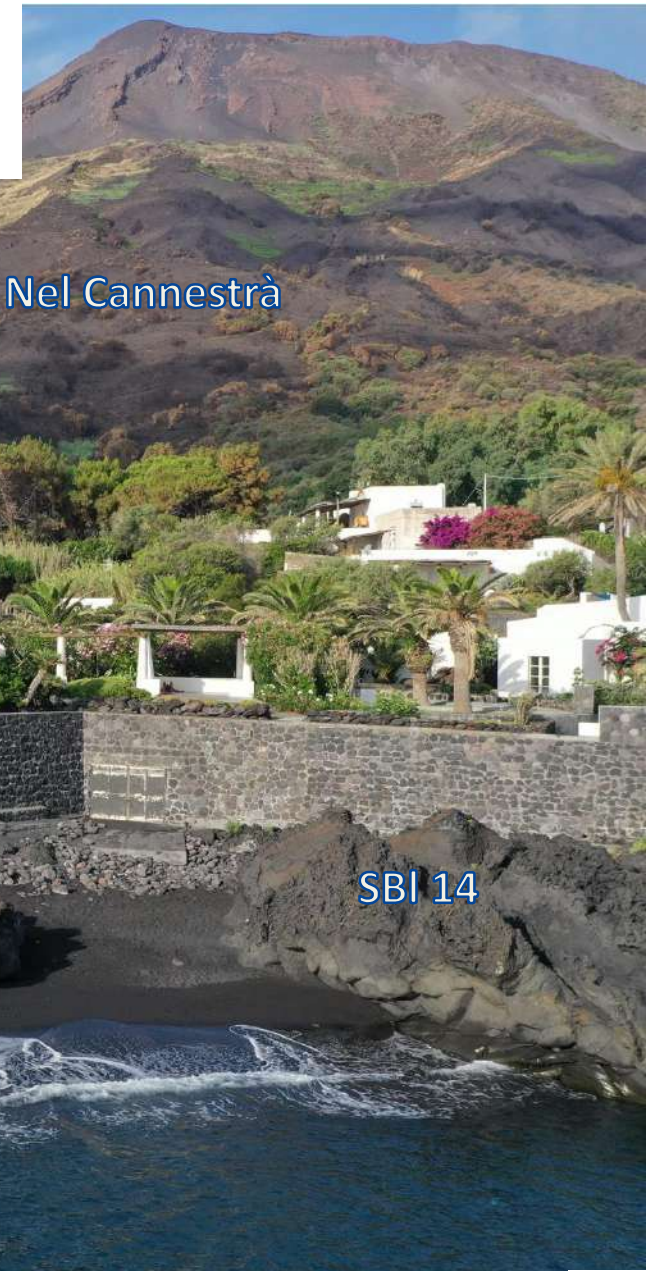
Nel Cannestrà

SBI 15



Parete 2 - 0091

Figure 23 – Frontal view of the San Bartolo lava flow units (SBI 15 and SBI 14) along the coast. The number of the photo is reported on the top left of the image.



Parete 2 - 0104

Figure 24 – Frontal view of the San Bartolo lava flow units (SBI 15 and SBI 14) along the coast. The red oval shows an inflated tumulus. The number of the photo is reported on the top left of the image.



Nel Cannestrà

Tumulus

SBI 15

SBI 14

Parete 2 - 0114

Figure 25 – Frontal inclined view of the San Bartolo lava flow units (SBI 15 and SBI 14) along the coast. The number of the photo is reported on the top left of the image.



Nel Cannestrà

San Bartolo

Tumulus

SBI 15

SBI 14

Parete 2 - 0172

Figure 26 – Inclined frontal view of the San Bartolo lava flow units (SBI 15 and SBI 14) along the coast. The number of the photo is reported on the top left of the image.



Parete 2 - 0128

Figure 27 – Frontal view of the San Bartolo lava flow unit (SBI 14) along the coast. The SBI 14 lava flow unit comprises three branches. The number of the photo is reported on the top left of the image.



San Bartolo

Nel Cannestrà

SBI 14

SBI 14

SBI 14

Parete 2 - 0167

Figure 28 – Oblique view of the San Bartolo lava flow unit (SBI 14) along the coast. The SBI 14 lava flow unit comprises three branches. The number of the photo is reported on the top left of the image.



Nel Cannestrà

SBI 14

SBI 14

Parete 2 - 0140

Figure 29 – Oblique view of the San Bartolo lava flow unit (SBI 14) along the coast. The SBI 14 lava flow unit comprises three branches. The number of the photo is reported on the top left of the image.

San Bartolo

Nel Cannestrà



Parete 2 - 0152

Nel Cannestrà

San Bartolo

STROMBOLI

SBI 14

SBI 13

SBI 14

SBI 14

Figure 30 – Frontal view of the San Bartolo lava flow units (SBI 14 and SBI 13) along the coast. The number of the photo is reported on the top left of the image.

Spiaggia 1 - 0655

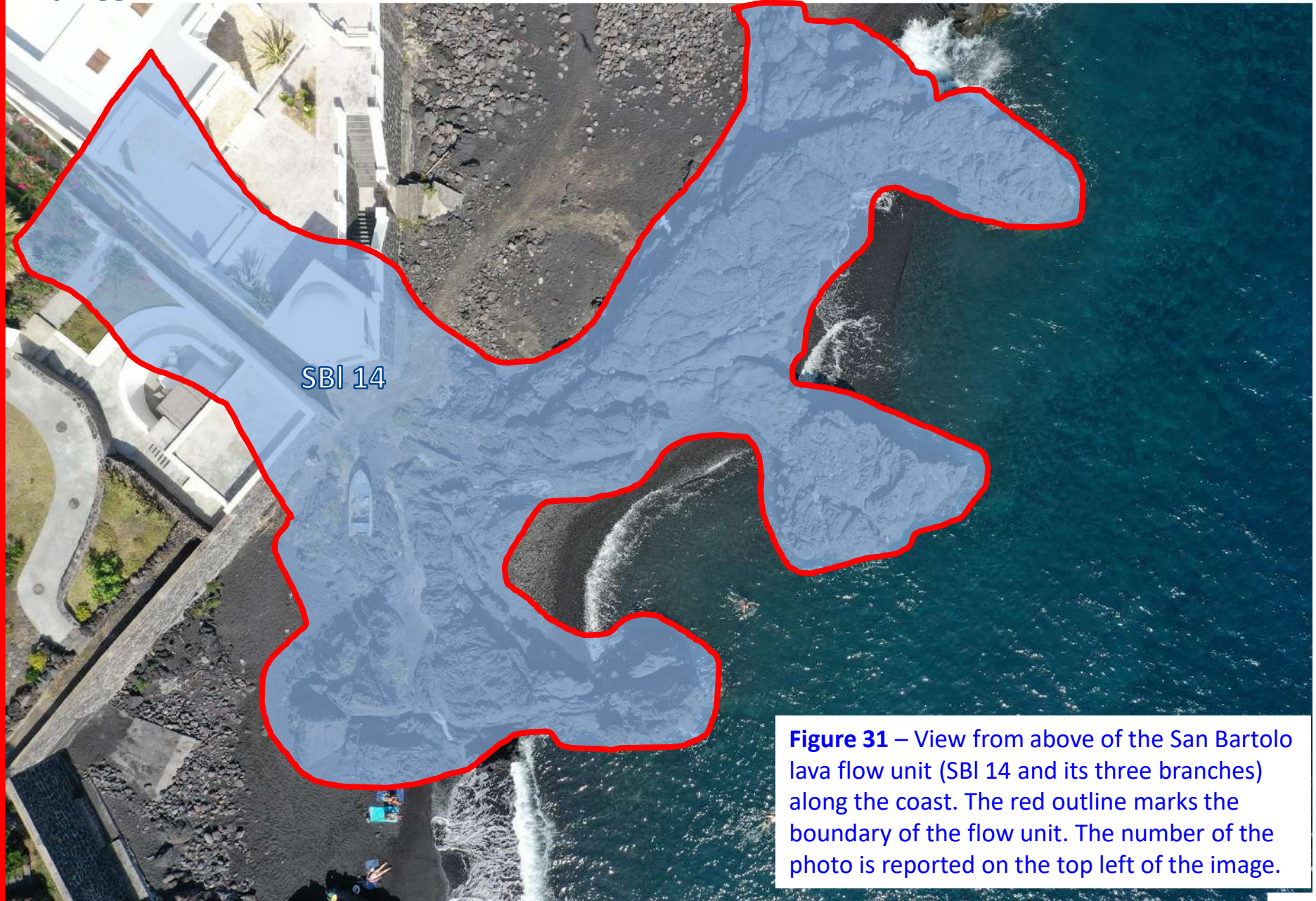


Figure 31 – View from above of the San Bartolo lava flow unit (SBI 14 and its three branches) along the coast. The red outline marks the boundary of the flow unit. The number of the photo is reported on the top left of the image.

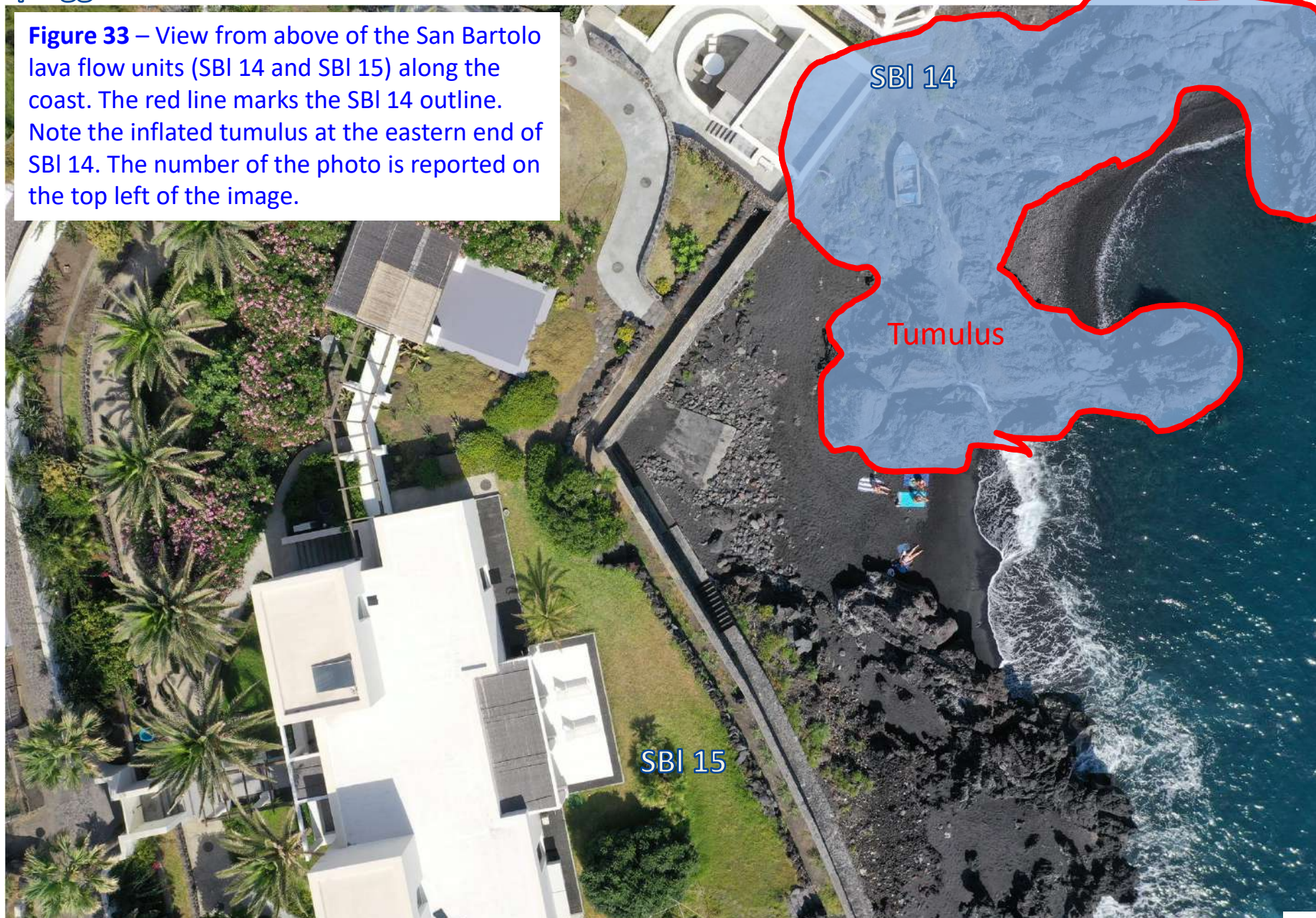
Spiaggia 1 - 0655



Figure 32 – View from above of the San Bartolo lava flow unit (SBI 14 and its three branches) along the coast. Note the tumulus at the eastern end (bottom left of the image) of SBI 14. The number of the photo is reported on the top left of the image.

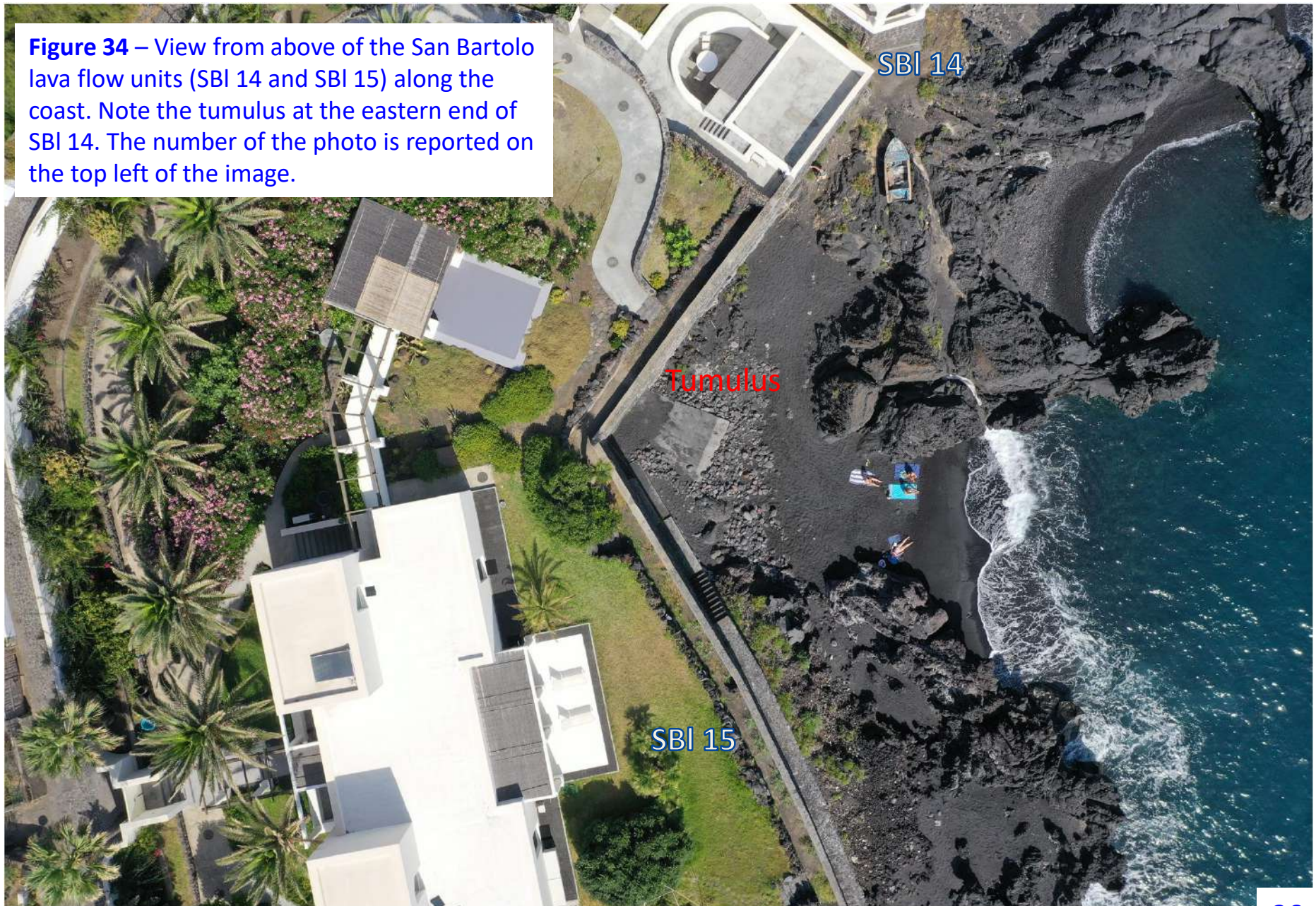
Spiaggia 1 - 0650

Figure 33 – View from above of the San Bartolo lava flow units (SBI 14 and SBI 15) along the coast. The red line marks the SBI 14 outline. Note the inflated tumulus at the eastern end of SBI 14. The number of the photo is reported on the top left of the image.



Spiaggia 1 - 0650

Figure 34 – View from above of the San Bartolo lava flow units (SBI 14 and SBI 15) along the coast. Note the tumulus at the eastern end of SBI 14. The number of the photo is reported on the top left of the image.



Parete 2 - 0163

Figure 35 – Side view of the San Bartolo lava flow units (SBI 14 and SBI 13) along the coast. The number of the photo is reported on the top left of the image.



SBI 14

SBI 14

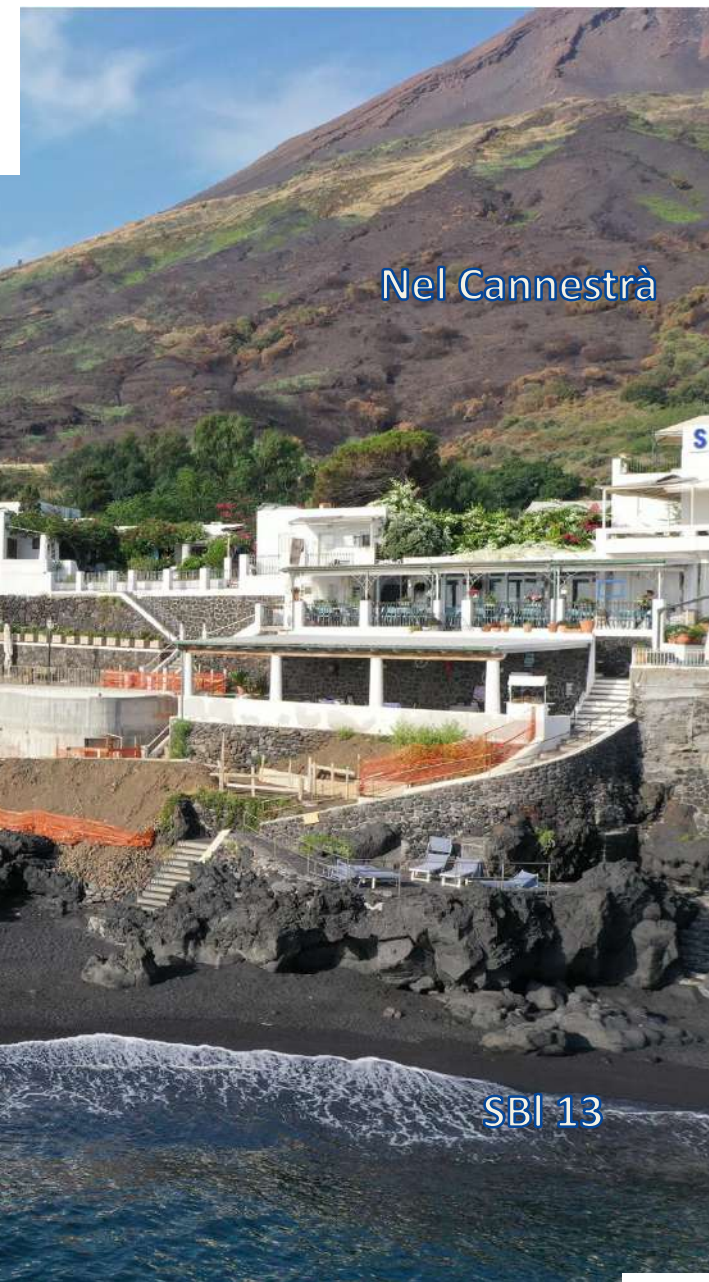
SBI 13

San Bartolo

Nel Cannestrà

Parete 2 - 0177

Figure 36 – Side view of the San Bartolo lava flow units (SBI 14 and SBI 13) along the coast. The number of the photo is reported on the top left of the image.



Nel Cannestrà

SBI 14

SBI 14

SBI 13

Parete 2 - 0186

Figure 37 – Side view of the San Bartolo lava flow units (SBI 14 and SBI 13) along the coast. The number of the photo is reported on the top left of the image.



Nel Cannestrà

SBI 14

SBI 13

Parete 3 - 0202

Figure 38 – Frontal view of the unconformity (marked by the red line) between an a'a lava flow front of the San Bartolo lava flow unit (SBI 1, above) and the pahoehoe SBI 13 (below) along the coast. The number of the photo is reported on the top left of the image.

San Bartolo

Nel Cannestrà

UNCONFORMITY

SBI 1

SBI 13





Figure 39 – View from above of the San Bartolo lava flow unit (SBI 13 and its three branches) along the coast. The red line marks the outline of the lobe. The number of the photo is reported on the top left of the image.



Figure 40 – View from above of the San Bartolo lava flow unit (SBI 13 and its three branches) along the coast. The number of the photo is reported on the top left of the image.

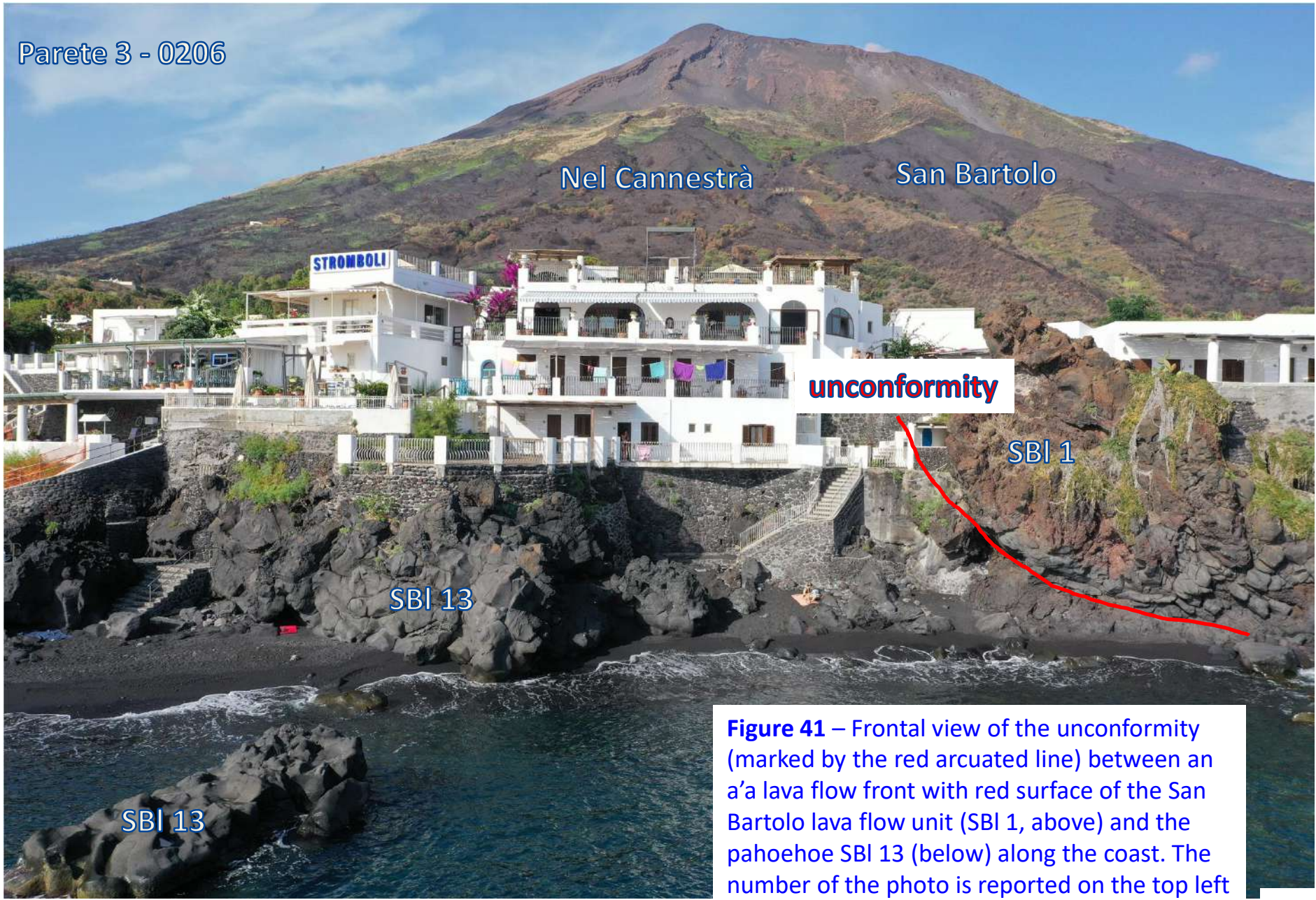


Figure 41 – Frontal view of the unconformity (marked by the red arcuated line) between an a’a lava flow front with red surface of the San Bartolo lava flow unit (SBI 1, above) and the pahoehoe SBI 13 (below) along the coast. The number of the photo is reported on the top left of the image.

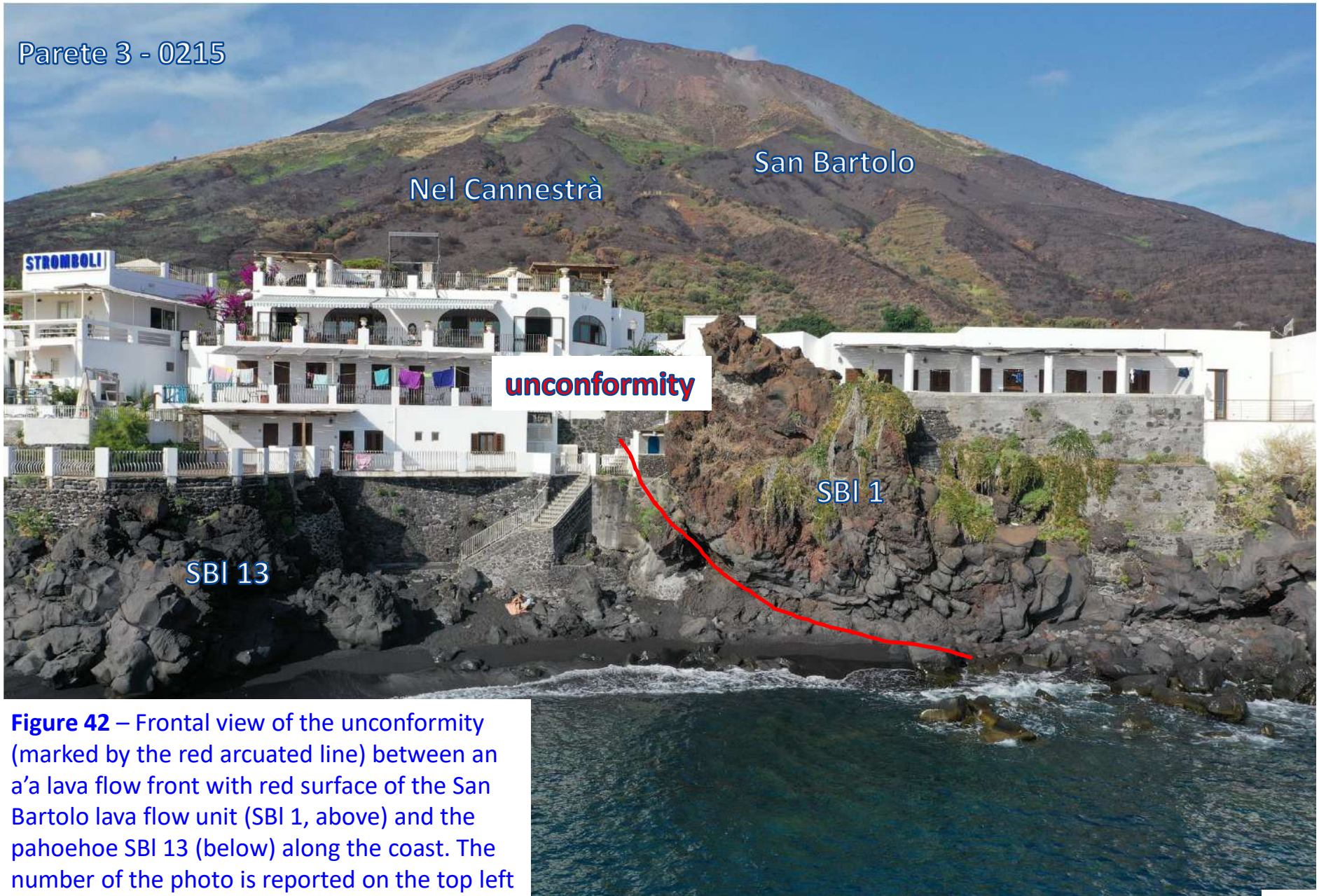


Figure 42 – Frontal view of the unconformity (marked by the red arcuated line) between an a'a lava flow front with red surface of the San Bartolo lava flow unit (SBI 1, above) and the pahoehoe SBI 13 (below) along the coast. The number of the photo is reported on the top left of the image.



Figure 43 – Frontal view of the unconformity (marked by the red arcuated line) between an a’a lava flow front with red surface of the San Bartolo lava flow unit (SBI 1, above) and the pahoehoe SBI 13 (below) along the coast. The number of the photo is reported on the top left of the image.



Figure 44 – View from above of the unconformity (red line) between the San Bartolo lava flow units SBI 1 (a'a) and SBI 13 (pahoehoe). The number of the photo is reported on the top left of the image.



Figure 45 – Frontal view of the unconformity (marked by the red arcuated line) between an a’a lava flow front with red surface of the San Bartolo lava flow unit (SBI 1, above) and the pahoehoe SBI 13 (below) along the coast. The number of the photo is reported on the top left of the image.



Figure 46 – Frontal view of the unconformity (marked by the red arcuated line) between an a’a lava flow front with red surface of the San Bartolo lava flow unit (SBI 1, above) and the pahoehoe SBI 13 (below) along the coast. The number of the photo is reported on the top left of the image.



Figure 47 – Frontal view of the mostly a’a lava flow front of the San Bartolo lava flow unit (SBI 1). The number of the photo is reported on the top left of the image.



Figure 48 – Frontal view of the San Bartolo lava flow unit (SBI 1 and its three branches) along the coast. The number of the photo is reported on the top left of the image. The red square marks the flow plug.



Figure 49 – View from above of the San Bartolo lava flow unit (SBI 1) along the coast. The red line marks the boundary of the lobe. The number of the photo is reported on the top left of the image.



Figure 50 – View from above of the San Bartolo lava flow unit (SBI 1) along the coast. The number of the photo is reported on the top left of the image.



Figure 51 – View from above of the San Bartolo lava flow unit (SBI 1 and its three branches) along the coast. The red line marks the boundary of the lobe. The number of the photo is reported on the top left of the image.



Figure 52 – View from above of the San Bartolo lava flow unit (SBI 1 and its three branches) along the coast. The number of the photo is reported on the top left of the image.

Spiaggia 1 - 0789



Figure 53 – View from above of the San Bartolo lava flow units (SBI 1 and SBI 2) along the coast. The red lines mark the boundaries of the flow units. The number of the photo is reported on the top left of the image.



Figure 54 – View from above of the San Bartolo lava flow units (SBI 1 and SBI 2) along the coast. The number of the photo is reported on the top left of the image.



Figure 55 – View from above of the San Bartolo lava flow unit (SBI 2) along the coast. The red line marks the boundary of the lobe. The number of the photo is reported on the top left of the image.



Figure 56 – View from above of the San Bartolo lava flow unit (SBI 2) along the coast. The number of the photo is reported on the top left of the image.



Figure 57 – View from above of the San Bartolo lava flow unit (SBI 2) along the coast. The red line marks the flow unit boundary. The number of the photo is reported on the top left of the image.



Figure 58 – View from above of the San Bartolo lava flow unit (SBI 2) along the coast. The number of the photo is reported on the top left of the image.

Spiaggia 1 - 0799



Figure 59 – View from above of the San Bartolo lava flow unit (SBI 2) along the coast. The number of the photo is reported on the top left of the image.



Figure 60 – Side view of the San Bartolo lava flow units (SBI 1 and SBI 2) along the coast. The number of the photo is reported on the top left of the image.



Figure 61 – Side view of the San Bartolo lava flow units along the coast. The number of the photo is reported on the top left of the image.



Figure 62 – Side view of the San Bartolo lava flow unit (SBI 2) along the coast. The two circles show the flow’s plugs, and the red arrow marks the position of a possible lava tube. The number of the photo is reported on the top left of the image.



Figure 63 – Frontal view of the San Bartolo lava flow unit (SBI 2) along the coast with the plug (red circle), the lava channel (u-shaped red line) and the lava tube (cavity marked by the red arrow). The number of the photo is reported on the top left of the image.

Parete 3 - 0361

Figure 64 – Frontal view of the San Bartolo lava flow unit (SBI 2) along the coast, with the flow plug marked by the red circle and the lava tube displayed by the red arrow. The number of the photo is reported on the top left of the image.



Parete 4 - 0042

Figure 65 – Frontal view of the San Bartolo lava flow units (SBI 2 and 3) and of their lava channels visible along the coast. The master channel of the upper flow field is also shown on the upper flank of the volcano. The number of the photo is reported on the top left of the image.



Spiaggia 2 - 0637

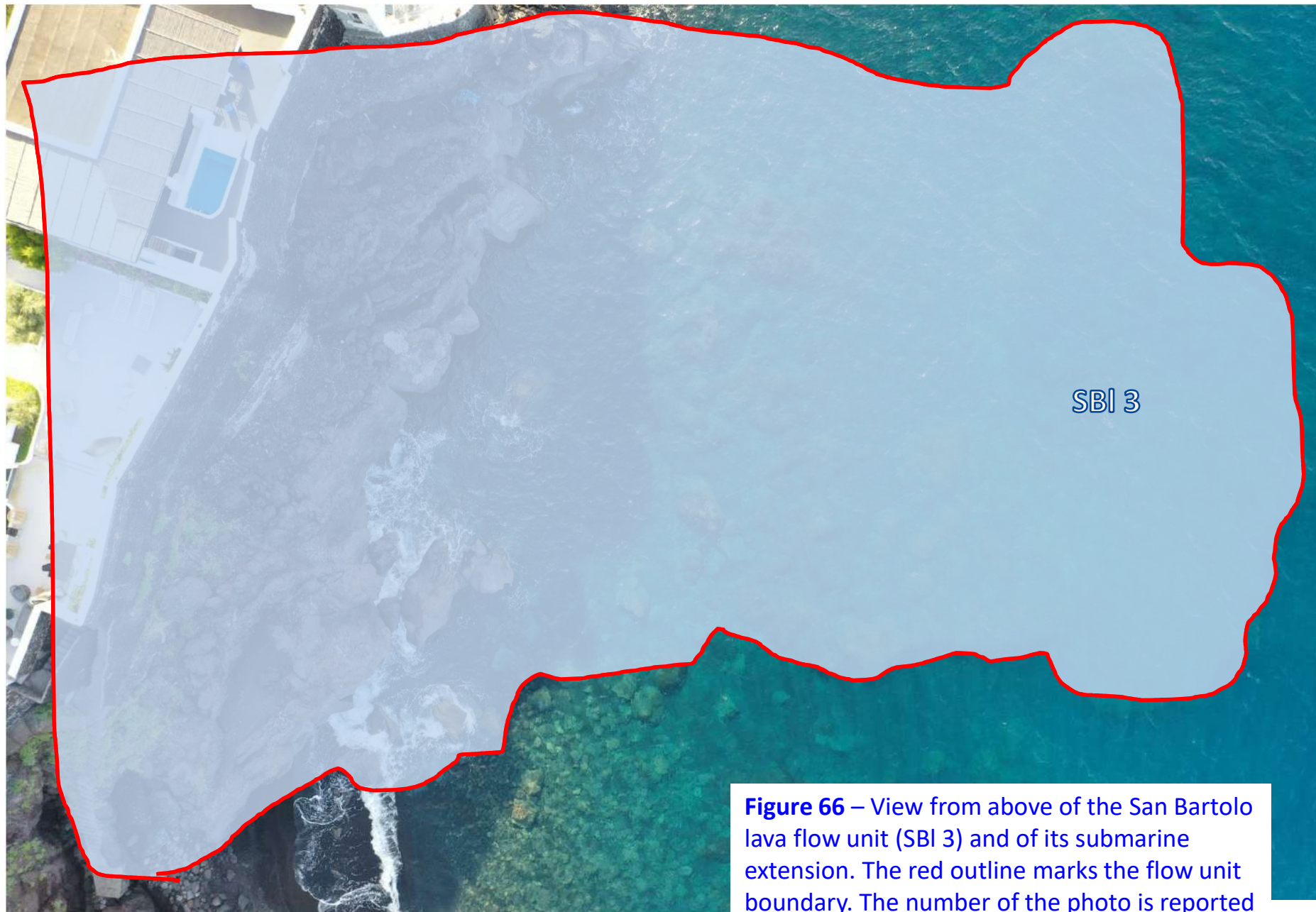


Figure 66 – View from above of the San Bartolo lava flow unit (SBI 3) and of its submarine extension. The red outline marks the flow unit boundary. The number of the photo is reported on the top left of the image.

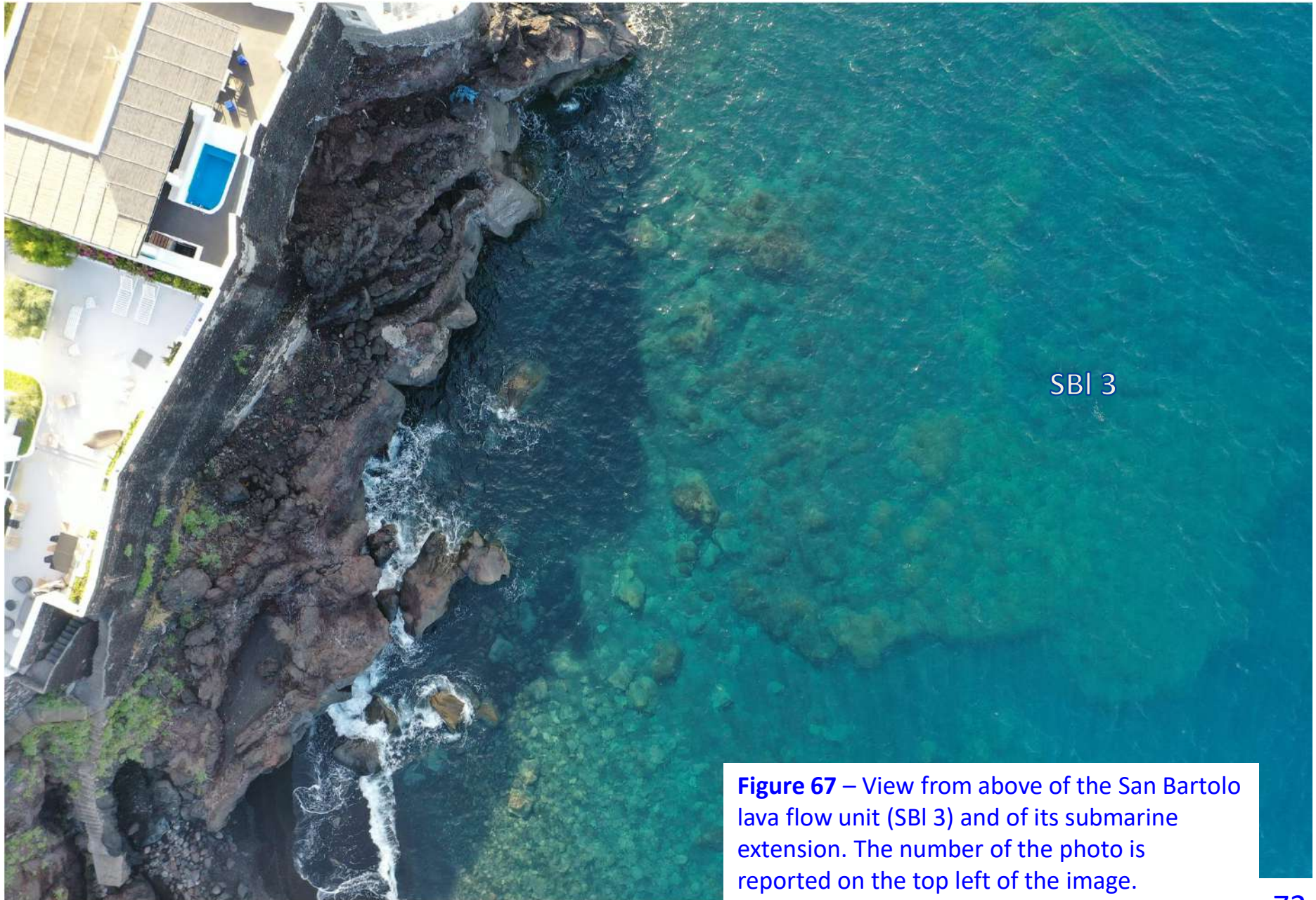


Figure 67 – View from above of the San Bartolo lava flow unit (SBI 3) and of its submarine extension. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0638

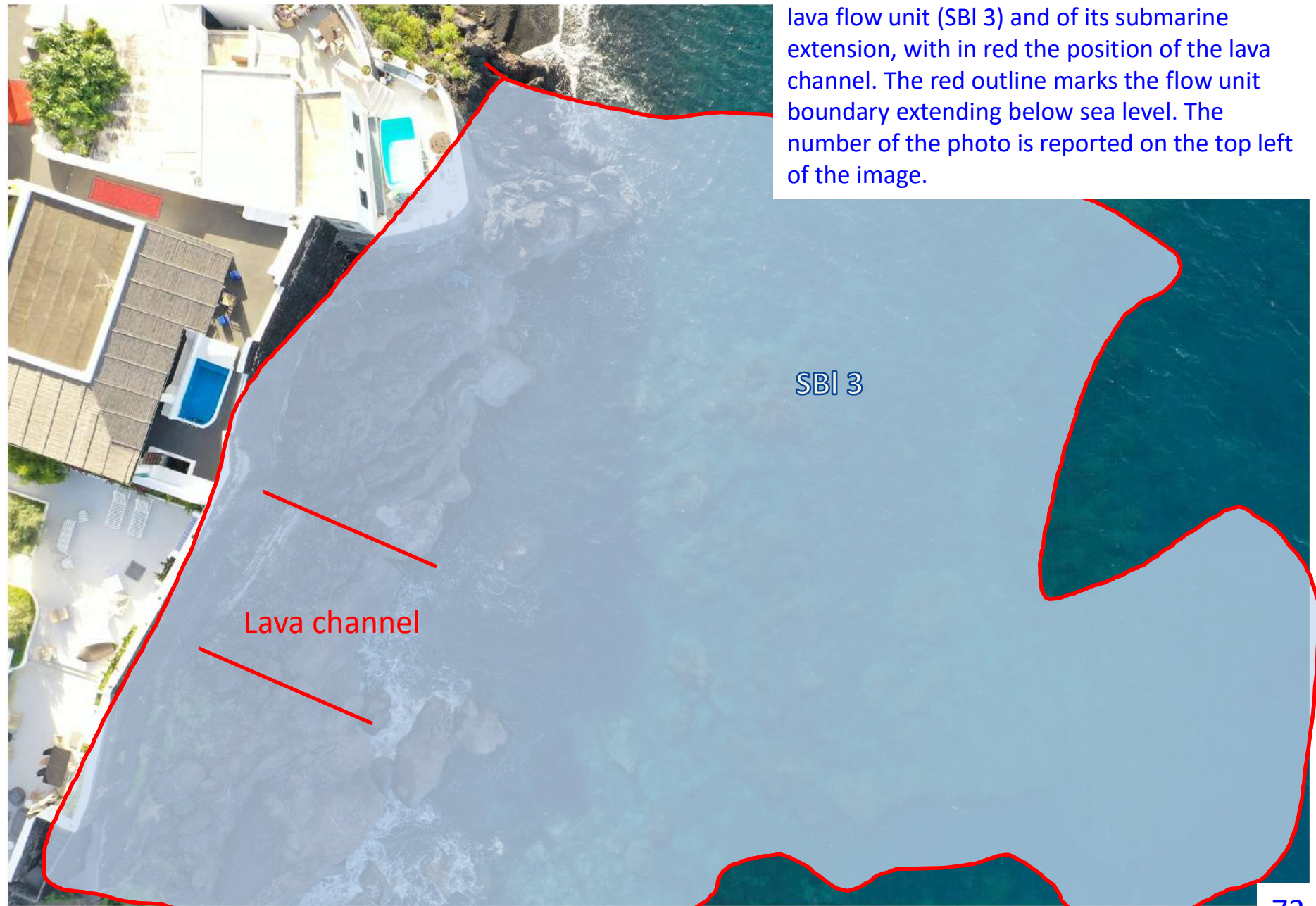


Figure 68 – View from above of the San Bartolo lava flow unit (SBI 3) and of its submarine extension, with in red the position of the lava channel. The red outline marks the flow unit boundary extending below sea level. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0638



Figure 69 – View from above of the San Bartolo lava flow unit (SBI 3) along the coast. The number of the photo is reported on the top left of the image.



Figure 70 – Lateral view of the San Bartolo lava flow unit (SBI 3) along the coast with the position of the lava channel. The number of the photo is reported on the top left of the image.

Parete 4 - 0012

Figure 71 – Frontal view of the San Bartolo lava flow unit (SBI 3) and its lava channel with lateral levées. The number of the photo is reported on the top left of the image.



Parete 3 - 0361

Figure 72 – Side view of the San Bartolo lava flow unit (SBI 2) and its lava tube. The number of the photo is reported on the top left of the image.





Figure 73 – View from above of the San Bartolo lava flow unit (SBI 4) along the coast. The red outline marks the boundary of the flow unit. The number of the photo is reported on the top left of the image.



Figure 74 – View from above of the San Bartolo lava flow unit (SBI 4) along the coast. The number of the photo is reported on the top left of the image.

Figure 75 – View from above of the San Bartolo lava flow unit (SBI 4) along the coast. The red outline marks the boundary of the flow unit. The number of the photo is reported on the top left of the image.



Spiaggia 2 - 0606

Figure 76 – View from above of the San Bartolo lava flow unit (SBI 4) along the coast. The number of the photo is reported on the top left of the image.





Figure 77 – Inclined view of the San Bartolo lava flow unit (SBI 4 and its branches) along the coast. The number of the photo is reported on the top left of the image.

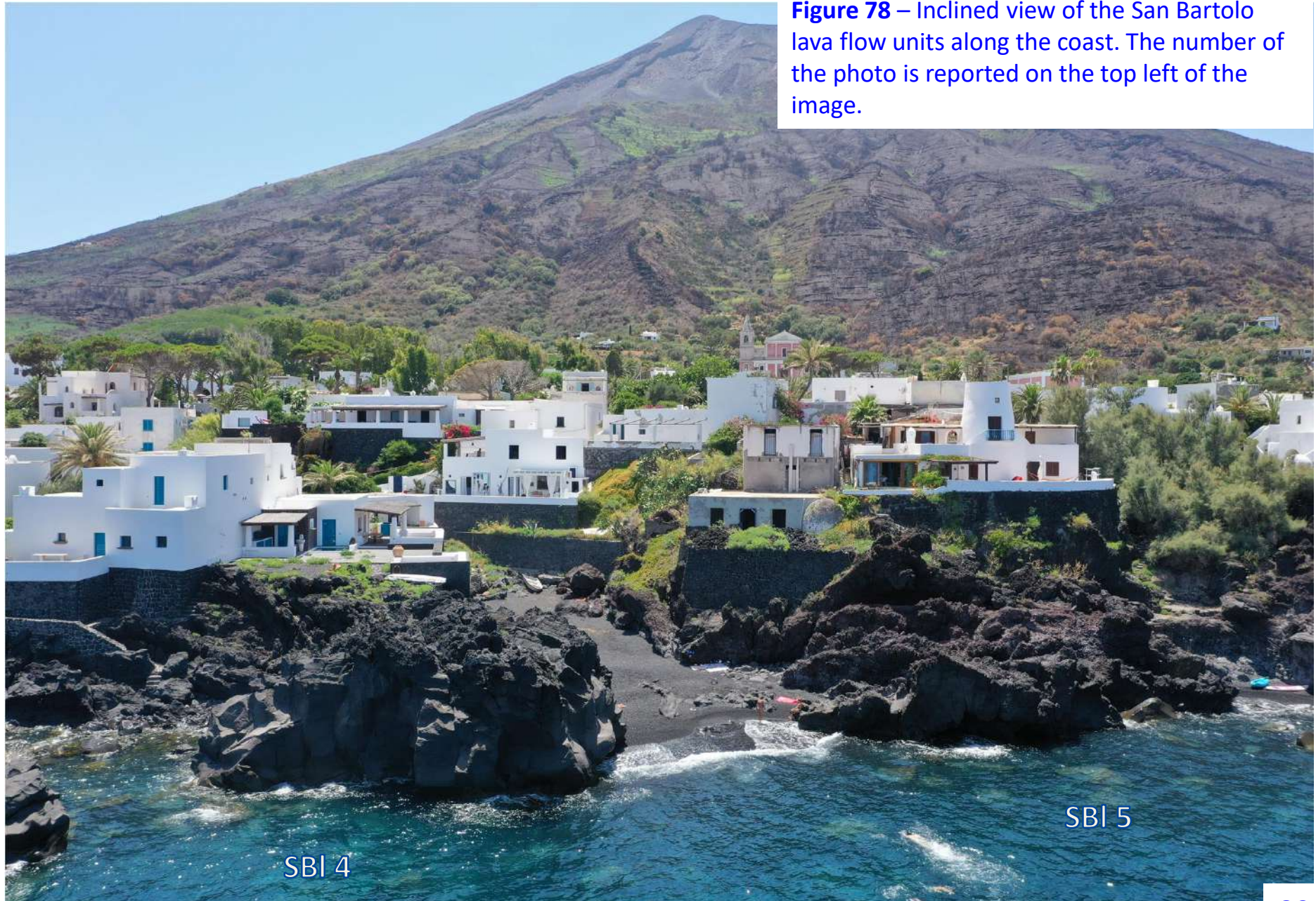




Figure 79 – View from above of the San Bartolo lava flow unit (SBI 5) along the coast. The red outline shows the boundary of the lava flow unit. The number of the photo is reported on the top left of the image.



SBI 5

Figure 80 – View from above of the San Bartolo lava flow unit (SBI 5) along the coast. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0600

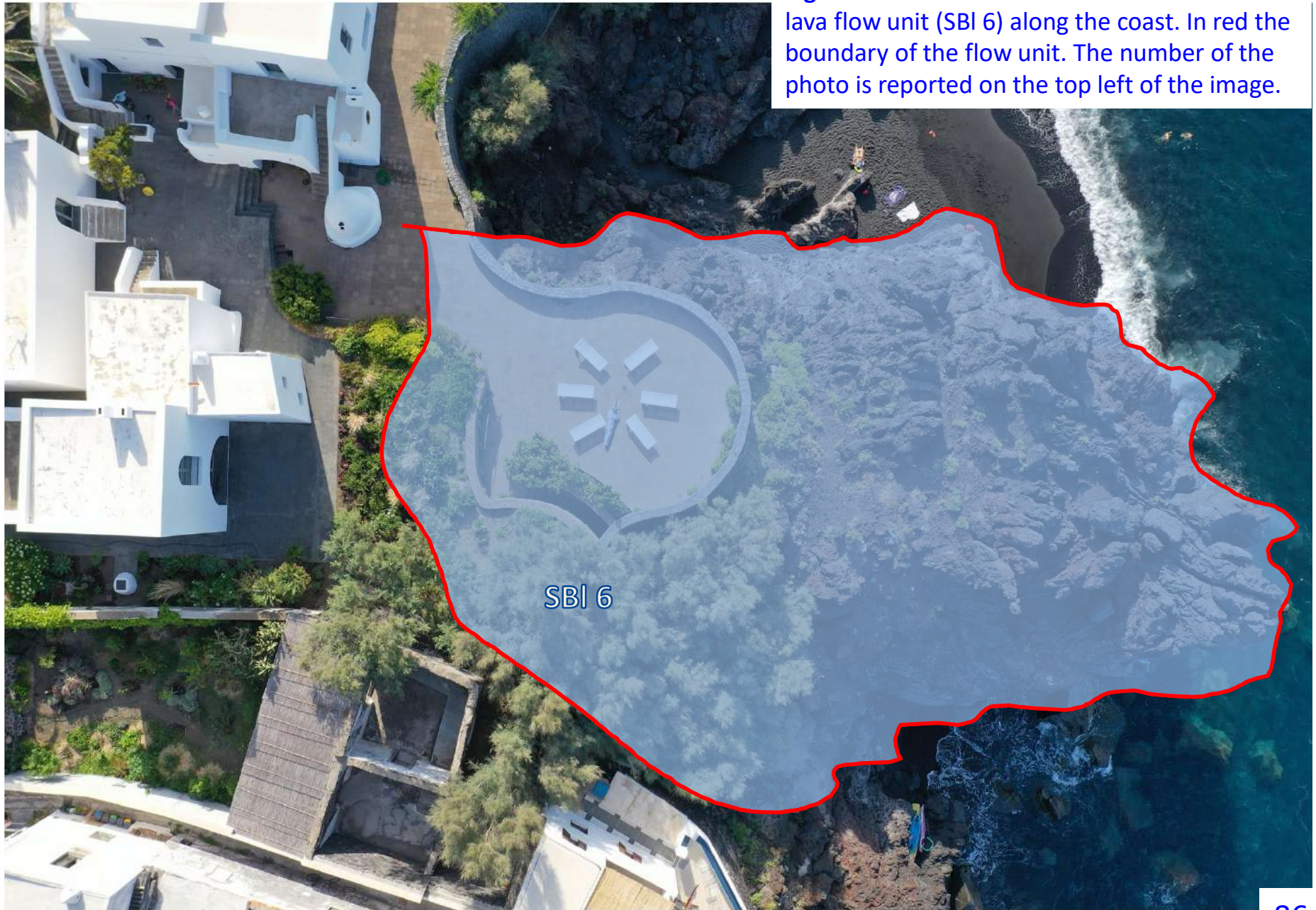


Figure 81 – View from above of the San Bartolo lava flow unit (SBI 6) along the coast. In red the boundary of the flow unit. The number of the photo is reported on the top left of the image.



Figure 82 – View from above of the San Bartolo lava flow unit (SBI 6) along the coast. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0655



Figure 83 – View from above of the San Bartolo lava flow unit (SBI 6) along the coast. The number of the photo is reported on the top left of the image.

SBI 6

Parete 5 - 0171

Figure 84 – View from the sea of the San Bartolo lava flow units. The number of the photo is reported on the top left of the image.

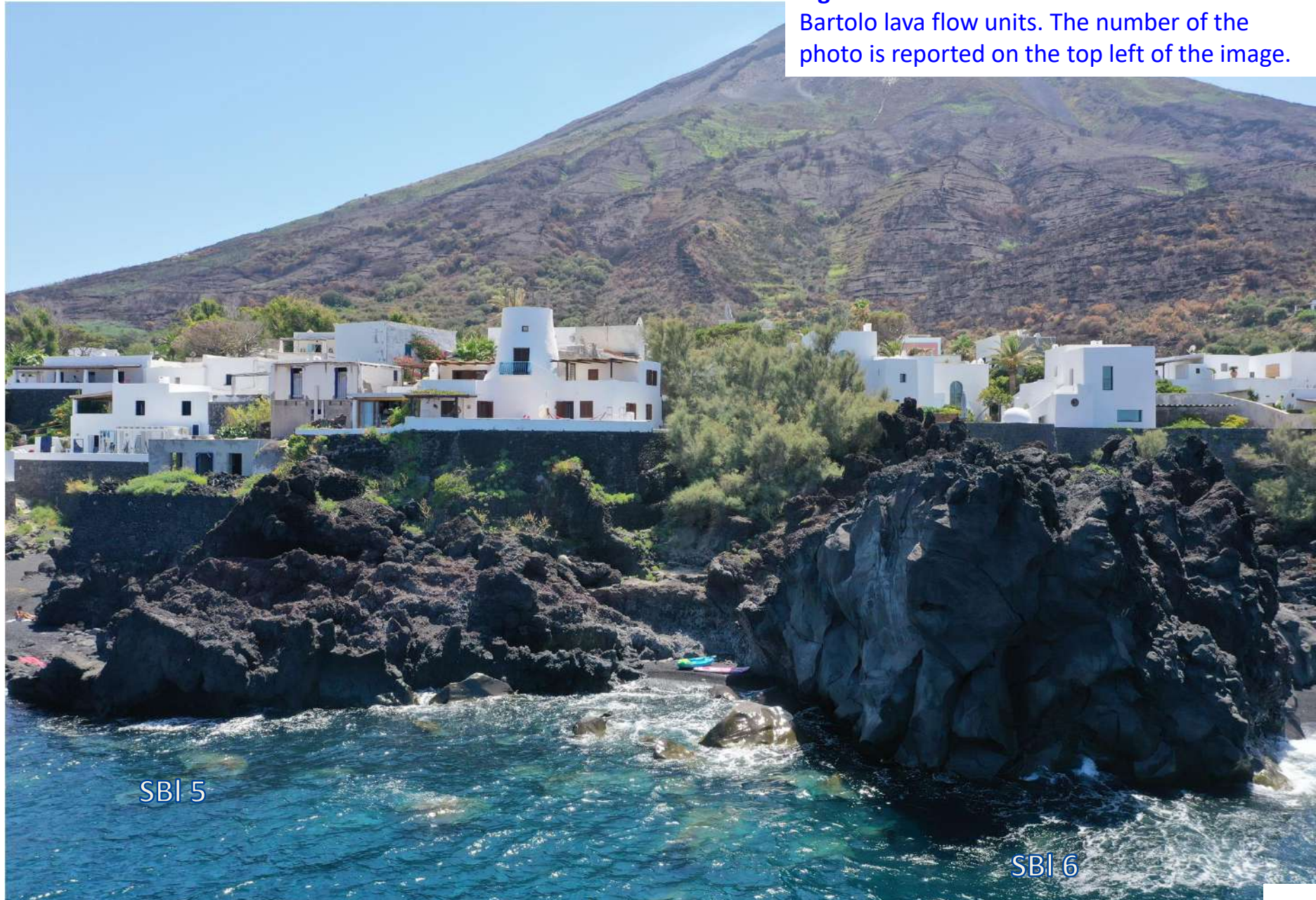
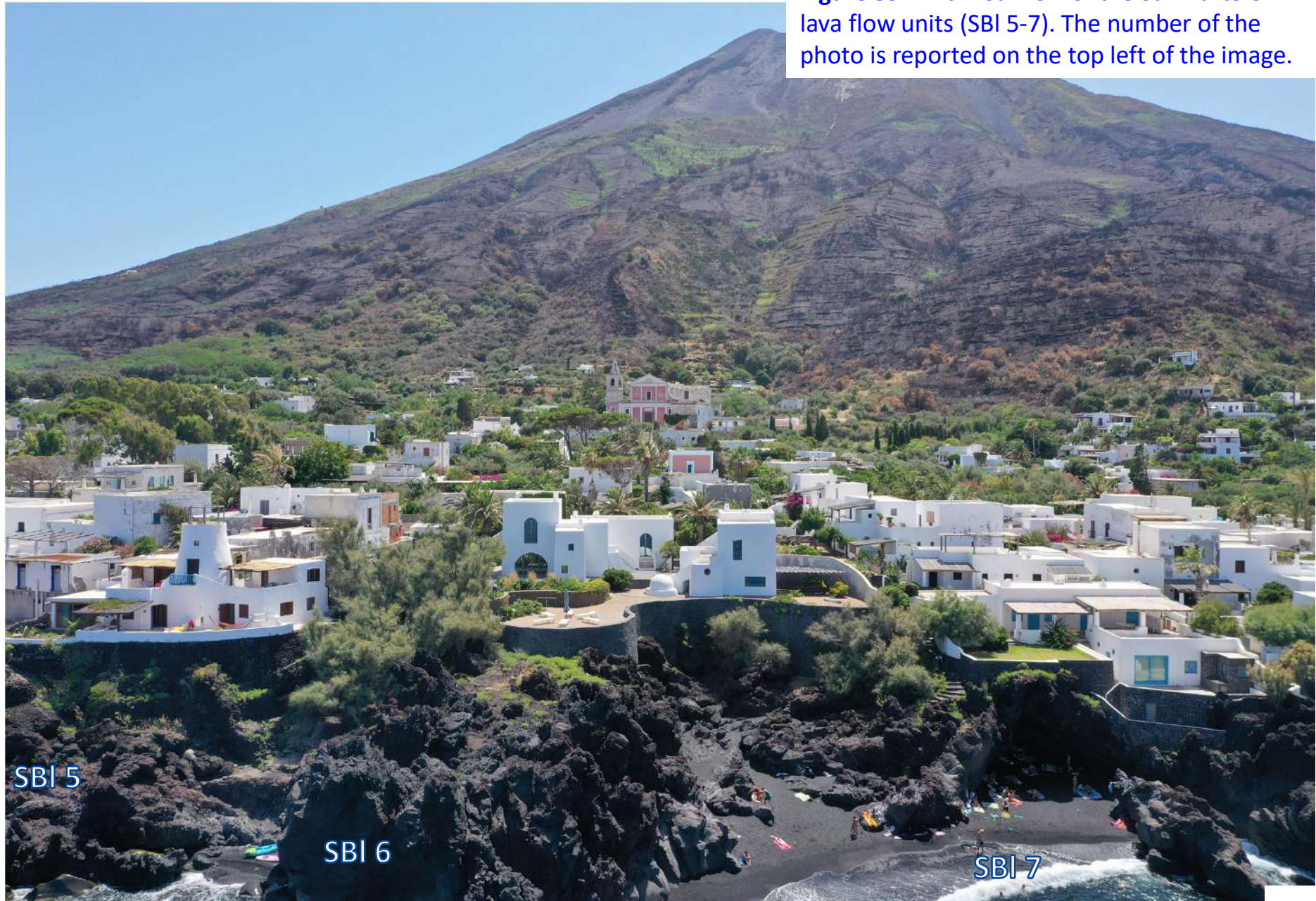


Figure 85 – Inclined view of the San Bartolo lava flow units (SBI 5-7). The number of the photo is reported on the top left of the image.



Spiaggia 2 - 0662



Figure 86 – View from above of the San Bartolo lava flow unit (SBI 7) and its lava channel. The red line shows the boundary of the flow unit. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0662



Figure 87 – View from above of the San Bartolo lava flow unit (SBI 7) and its lava channel. The number of the photo is reported on the top left of the image.

Figure 88 – Inclined view of the San Bartolo lava flow unit (SBI 7). The number of the photo is reported on the top left of the image.



Figure 89 – Inclined view of the San Bartolo lava flow unit (SBI 7). The number of the photo is reported on the top left of the image.



Spiaggia 2 - 0584



Figure 90 – View from above of the San Bartolo lava flow unit (SBI 8). The red line shows the outline of the flow unit. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0584



Figure 91 – View from above of the San Bartolo lava flow unit (SBI 8). The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0669



Figure 92 – View from above of the San Bartolo lava flow unit (SBI 8) and its shallow submarine extension. The number of the photo is reported on the top left of the image.

SBI 8
and its submarine
extension

Parete 5 - 0239

Figure 93 – Inclined view of the San Bartolo lava flow units (SBI 7-8). The number of the photo is reported on the top left of the image.



Parete 6 - 0091

Figure 94 – Side view of the San Bartolo lava flow unit (SBI 8). The number of the photo is reported on the top left of the image.



SBI 8

Parete 7 - 0050

Figure 95 – Side view of the San Bartolo lava flow unit (SBI 8) along the coast. The red circle marks the lava plug. The number of the photo is reported on the top left of the image.



Figure 96 – View from above of the San Bartolo lava flow units (SBI 9-10). The red outline marks the boundary of SBI 9. The number of the photo is reported on the top left of the image.



Figure 97 – View from above of the San Bartolo lava flow units (SBI 9 and 10) along the coast. The number of the photo is reported on the top left of the image.



Figure 98 – Side view of the San Bartolo lava flow units (SBI 9 and 10) along the coast. The number of the photo is reported on the top left of the image.



Spiaggia 2 - 0448



Figure 99 – View from above of the San Bartolo lava flow unit (SBI 10) with the red line marking its boundary. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0448



Figure 100 – View from above of the San Bartolo lava flow unit (SBI 10) and its ropy surface. The number of the photo is reported on the top left of the image.

Figure 101 – Side view of the San Bartolo lava flow units (SBI 9 and 10) along the coast. The number of the photo is reported on the top left of the image.



Spiaggia 2 - 0445



Figure 102 – View from above of the San Bartolo lava flow unit (SBI 11 and its branches), with the red line marking its boundary along the coast. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0445



Figure 103 – View from above of the San Bartolo lava flow unit (SBI 11) along the coast. The number of the photo is reported on the top left of the image.

SBI 11

Spiaggia 2 - 0551



SBI 11
And its submarine extension

Figure 104 – View from above of the San Bartolo lava flow unit (SBI 11) and its submarine extension. The number of the photo is reported on the top left of the image.

Figure 105 – Lateral view of the San Bartolo lava flow units (SBI 9-11) along the coast. The number of the photo is reported on the top left of the image.



SBI 9

SBI 10

SBI 11

Figure 106 – Lateral view of the San Bartolo lava flow unit (SBI 11 and its branches) along the coast. The number of the photo is reported on the top left of the image.



SBI 11

Spiaggia 2 - 0426



Figure 107 – View from above of the San Bartolo lava flow unit (SBI 12 and its two branches) with the red line marking its boundary. The number of the photo is reported on the top left of the image.

Spiaggia 2 - 0426



Figure 108 – View from above of the San Bartolo lava flow unit (SBI 12 and its two branches) along the coast. The number of the photo is reported on the top left of the image.

Figure 109 – Side view of the San Bartolo lava flow units (SBI 11 and 12) along the coast. The number of the photo is reported on the top left of the image.

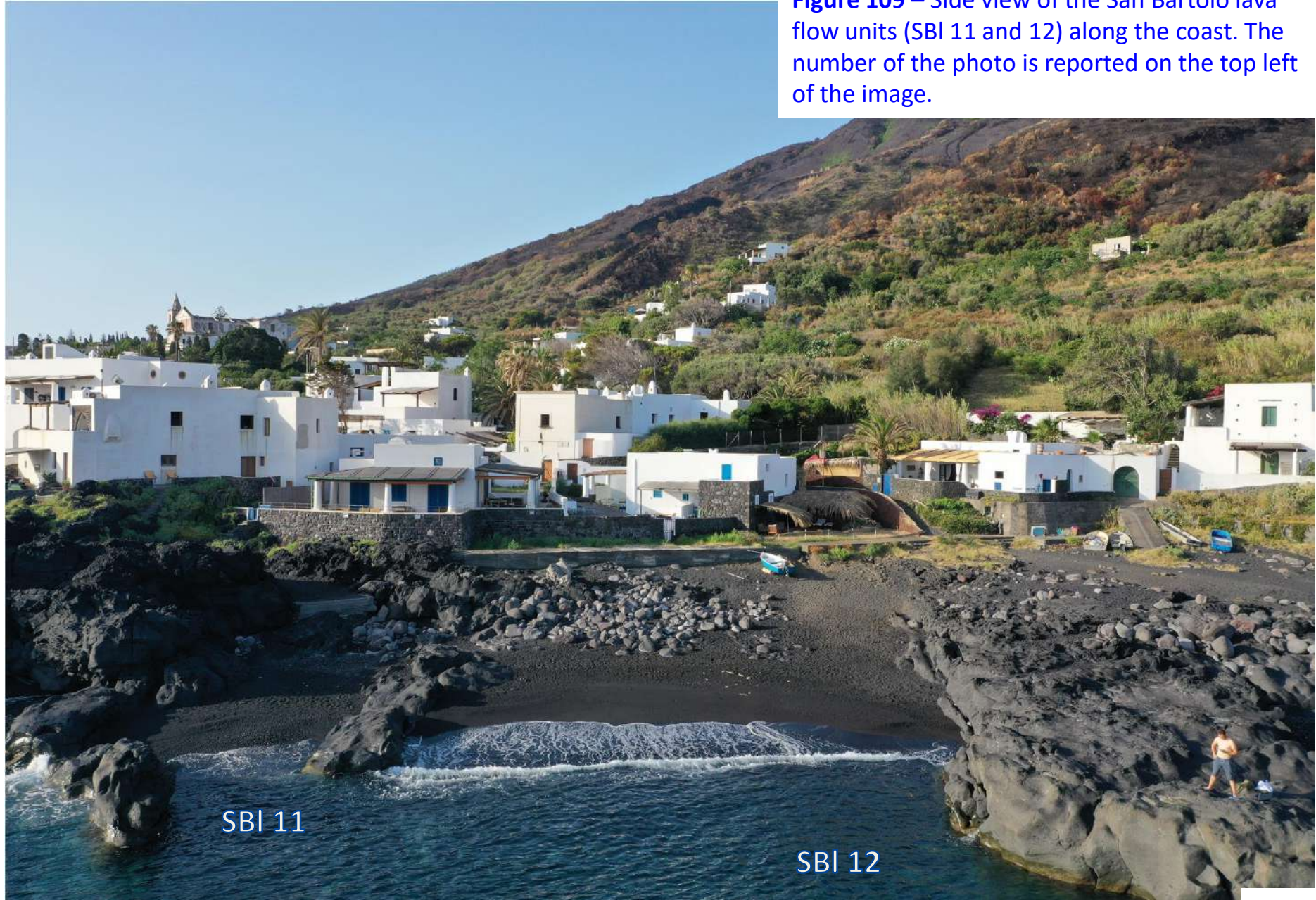


Figure 110 – Side view of the San Bartolo lava flow unit (SBI 12 and its two branches) along the coast. The number of the photo is reported on the top left of the image.



Figure 111 – Google Earth map summarizing the distribution of the San Bartolo lava flow units from 1 to 9, with the possible lava tubes located within SBI 2 and SBI 7. The unconformity below SBI 1 is shown by the yellow pin.

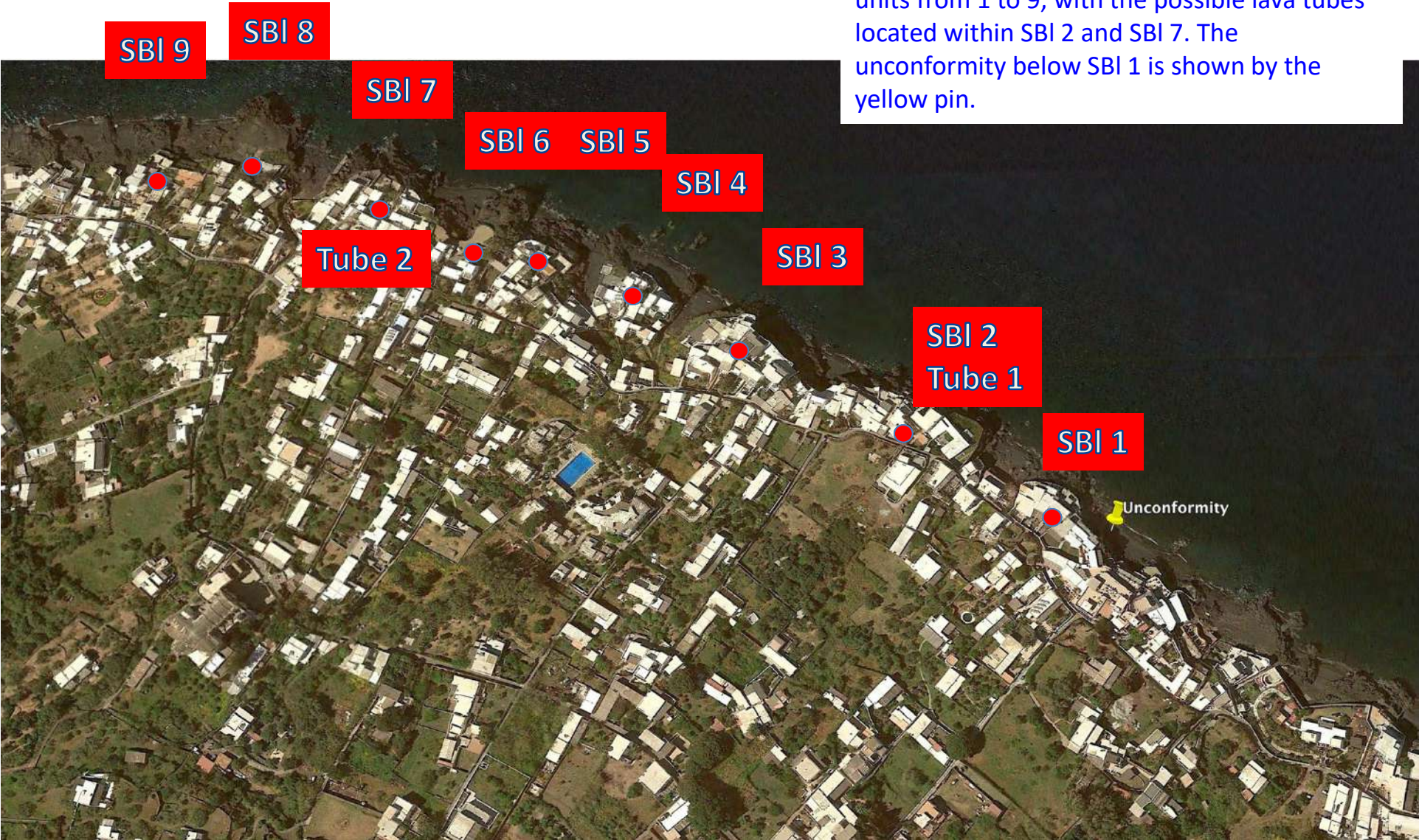


Figure 112 – Google Earth map of the San Bartolo lava flow units (SBI 13-9) recognised along the coast with the position of two lava channels probably feeding the Tube 1 and Tube 2 structures found along the coast at SBI 2 and SBI 7, respectively. The unconformity separating SBI 1 from SBI 13 is shown with the yellow pin.

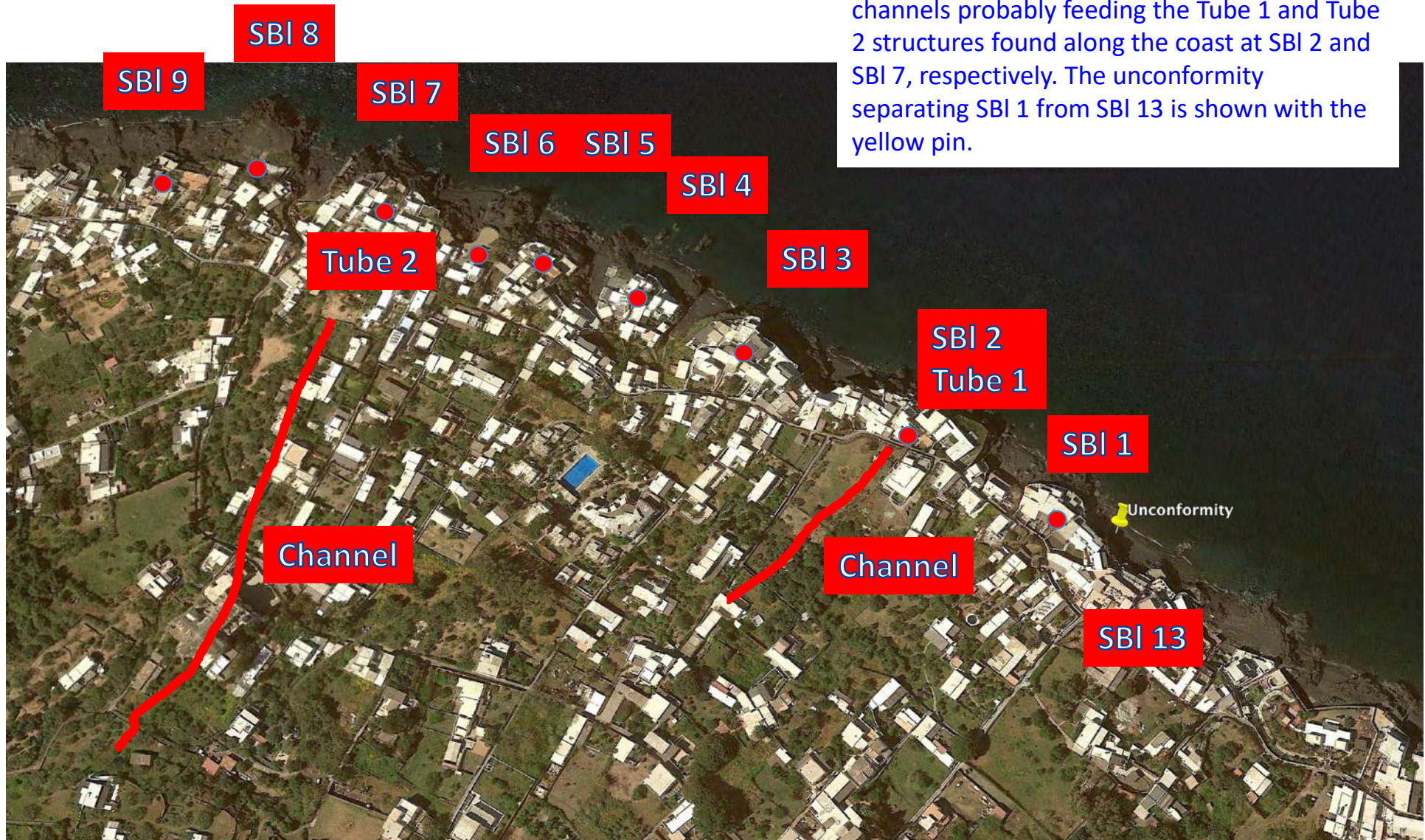
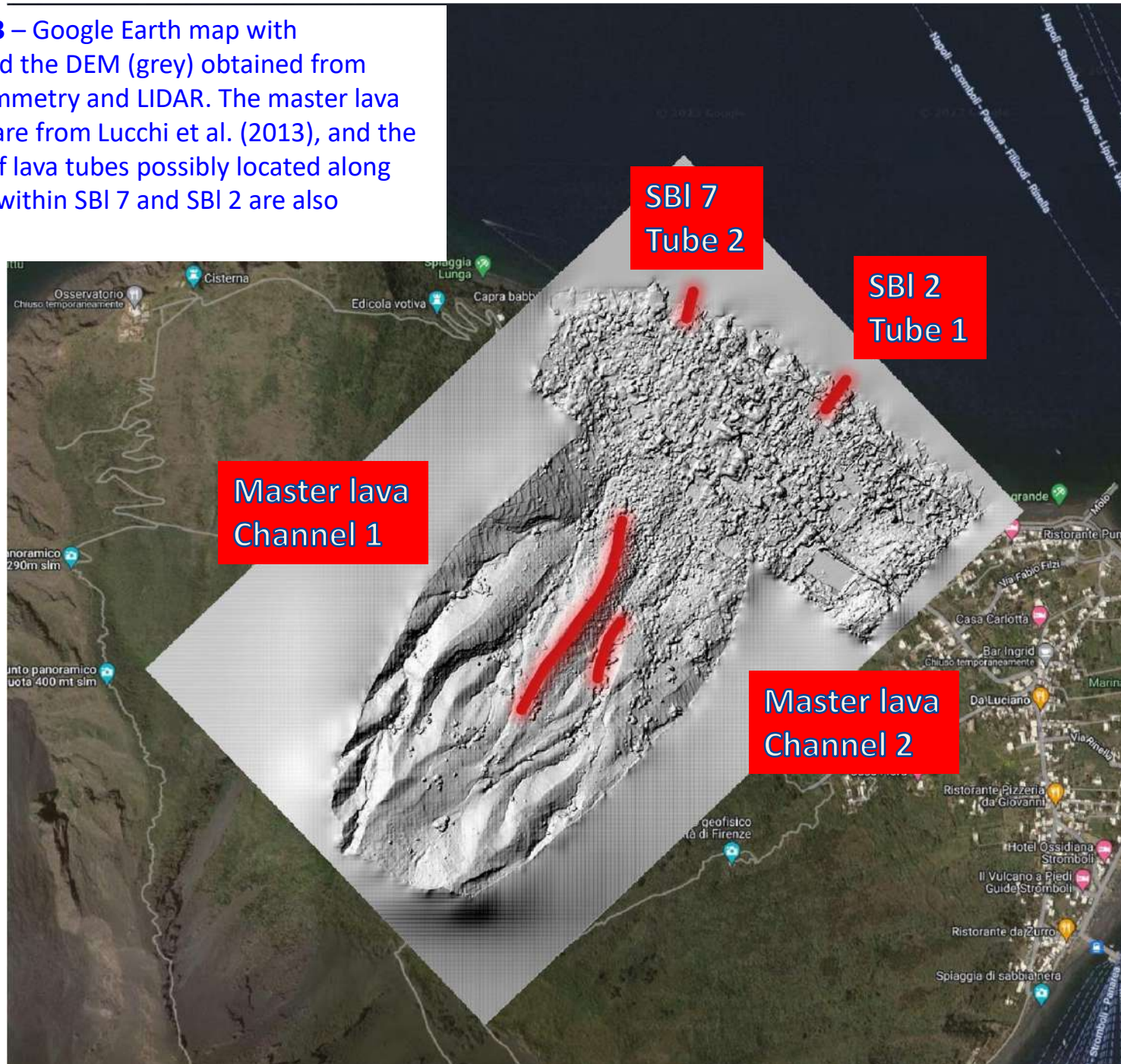


Figure 113 – Google Earth map with overlapped the DEM (grey) obtained from photogrammetry and LIDAR. The master lava channels are from Lucchi et al. (2013), and the position of lava tubes possibly located along the coast within SBI 7 and SBI 2 are also displayed.



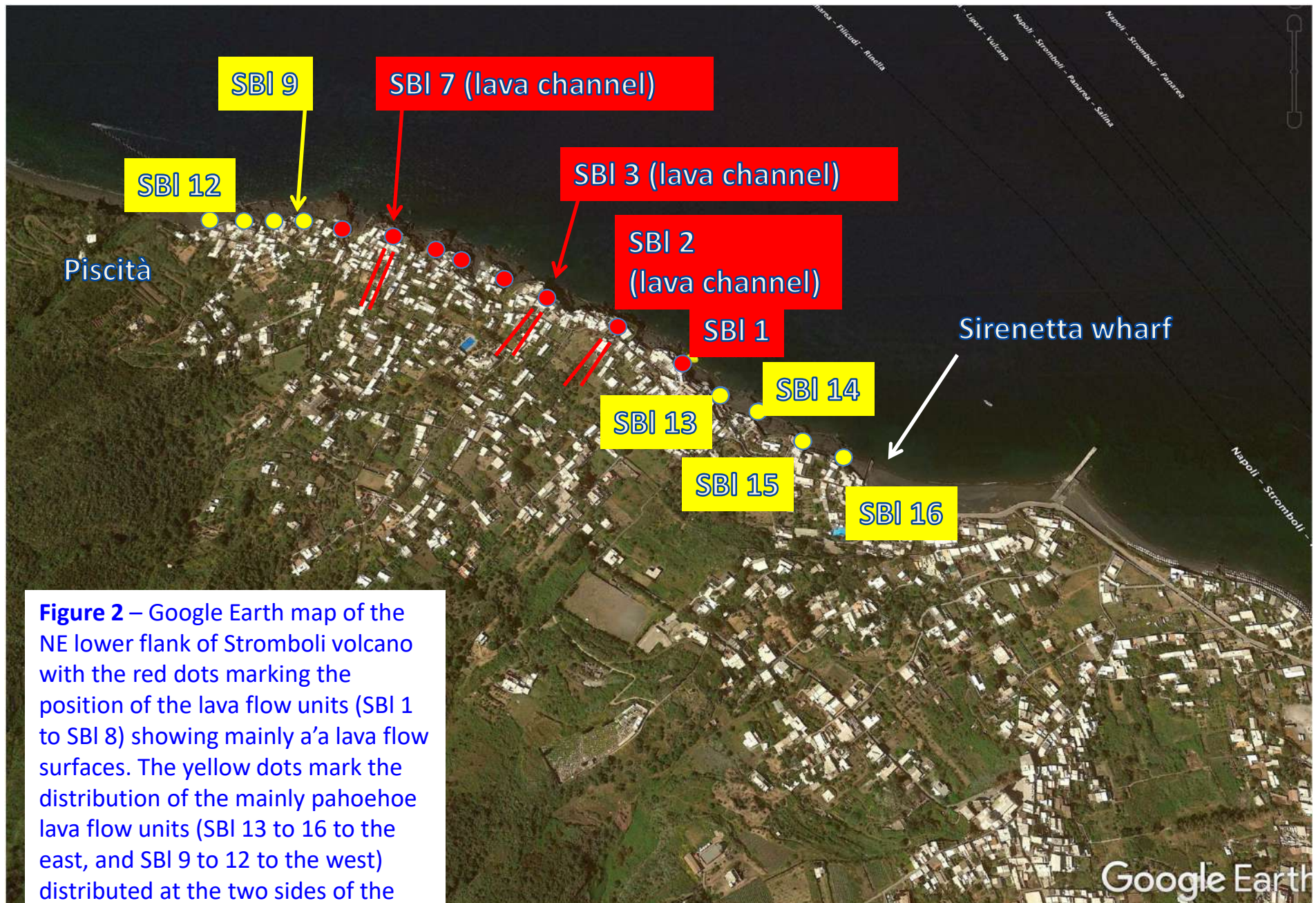


Figure 2 – Google Earth map of the NE lower flank of Stromboli volcano with the red dots marking the position of the lava flow units (SBI 1 to SBI 8) showing mainly a’a lava flow surfaces. The yellow dots mark the distribution of the mainly pahoehoe lava flow units (SBI 13 to 16 to the east, and SBI 9 to 12 to the west) distributed at the two sides of the San Bartolo lava flow field.

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