Supplementary Information Item 6 (S6): Outcrop photos

Outcrop photos, described by map unit name (Figs. 3 and 4), sample name (Table 1) and geochemistry (Item S1). For Santa Rosalía north, these are described by geographic areas, because these areas are separated by (1) sedimentary cover of the Santa Rosalía basin, or (2) the Curuglu fault, with unknown slip history (Fig. 2, 3). No strata are continuous between these areas. The Santa Rosalía south area is one continguous outcrop with no major faults (Fig. 4). Geographic areas on the Santa Rosalía north map are generally described from oldest to youngest, except for units of unknown stratigraphic position, described first. This follows the order shown in Table 1A. Then the Santa Rosalía South map area is described, from oldest to youngest rocks (following Table 1B). Hb = hornblende, cpx = clinopyroxene.

(A) Mina Caopas Gypsum Mine: (1) Hb cpx plag porphyry basaltic andesite lava beneath the ~200 meter thick Miocene gypsum deposit in the northern part of the Santa Rosalía sedimentary basin (sample SR 10-1, Fig. 2, Table 1A). (2) Lateral to the flow lobe is a block-and-ash-flow tuff with the same mineralogy.

(B) West of Curuglu fault, stratigraphic position unknown: Hematized cpx hb basaltic andesite lavas (sunglasses for scale).

(C) Mina Santa Teresa**:** (1) Hb cpx trachyandesite lava dome at the base of the Mina Santa Teresa section, mantled with monolithic blocks up to 1 m in size. The lava dome passes gradationally upward into (2) hb cpx andesite block-and-ash-flow tuff.

(D) Mina Victoria: (1) Hb cpx andesite peperite intrusion (sample PEP, Table 1A) at the base of the Mina Victoria section. Blocks with jig-saw clast texture dispersed in tan volcaniclastic sandstone (daypack for scale). (2) Closeup of peperite intrusion, showing sandstone injection into cracks of widely varying orientations (sunglasses for scale). (3) Black peperite intrusion locally forms variably disrupted sills within the sedimentary rock host. (4) Stony (devitrified) gray-green hb cpx trachyandesite intrusion dominated by strong flow jointing. Sample SR 09-4 (Table 1A) was taken from the least jointed outcrop. (5) Hb cpx trachyandesite lava dome breccia, a monolithic breccia with blocks up to 1 m. The blocks in the breccia are gray-green and flow-banded, like the hypabyssal

intrusion that lies downsection. (6) ~80 m thick section of the thick andesite lavas. This consists of coherent lava interiors (~10 m m thick, forming resistant layers), alternating with poorly-vesiculated flow breccias (1-7 m thick, forming recessive layers), with lesser tan lenses of volcanic lithic fluvial sandstone and pebbly sandstone. (7) Closeup of flow-top breccia on thick andesite lavas. Flow-top breccias are inflitrated by massive sand and low areas on the flow tops are covered by crudely stratified pebbly sandstone layers ≤2 m thick. Blocks are poorly vesiculated. Note the lack of jig-saw fit blocks or sediment injections within the blocks, in contrast with the peperite intrusion at the base of the Mina Victoria section. (8) Thin scoriaceous hb basaltic trachyandesite lavas (sample SR 12-6), formed of 1-2 m thick vesicular coherent interiors alternating with 1-3 m thick deposits of scoria lapilli and small blocks. (9) Closeup of scoria lapilli and small blocks that intervene between coherent interiors (1974 UC Berkeley map case for scale).

(E) East of Curuglu fault: basaltic andesite to andesite tuff of Curuglu: the base of this ignimbrite is truncated by the Curuglu fault. It is divided into three flow units, 8-10 m thick but internally massive: (1) Flow unit 1 is a massive pink scoria lithic lapilli tuff with angular blocks of black to dark gray aphyric andesite. (2) Flow unit 2 lacks lithics and has density grading of scoria. Shown are the scoria blocks, overlain by a 35 cm thick fluvially-reworked lapillistone. (3) Channel locally cut into the top of the tuff of Curuglu, filled with crudely stratified volcanic lithic breccia-conglomerate and pebbly sandstone. (4) Basal coarse-grained flow breccia of the hb cpx andesite lava.

(F) El Moro – Tuff of El Morro and instratified basaltic trachyandesite lavas : (1) Pink nonwelded lithic rhyolite to trachydacite ignimbrite, showing its massive character, resting on flow-top breccias of one of the two interstratified basaltic trachyandesite lavas. White trachydacite pumices are admixed with, and overlie, the uppermost part of the flow-top breccia on the lava. (2) Closeup of white pumice desposit shown in (1). (3) Contact between a pink nonwelded lithic rhyolite to trachydacite ignimbrite and overlying purple densely welded rhyolite ignimbrite (both included in Tuff of El Morro; students are on the purple ignimbrite). The top of the pink nonwelded ignimbrite is whiter than usual (compare with 1), perhaps because it was deposited at lower temperature. It is overlain in sharp contact by a 1 m thick white trachydacite pumice lapillistone (sample

SR 15-5, Table 1A), which may represent Plinian fall. The upper ~half of the pumice lapillistone has orange coloration that increases in intensity upward toward the base of the overlying purple ignimbrite (mapped separately, Fig. 3), which is welded to the base. Therefore, it may be a baking effect. (4) Closeup of purple welded rhyolite ignimbrite, showing flattened fiamme 2-4 cm long (sample SR 15-4, Table 1A), densely welded. This represents a variety of the pink nonwelded ignimbrite that is strongly welded because it lacks lithics. (5) Blocky injection structures in the pink nonwelded lithic ignimbrite; photo taken from Highway 1 toward the cliffs on the south side of Santa Agueda lagoon, with a telephoto lens. A minor down-to-the west (to the right) normal fault offsets the injection structure. The injection structures are sharp-sided, like clastic dikes, but many of them are at least partly sill-like, like the one shown here (the ignimbrite dips 20 degrees to the left here). The thinner blocky layer dipping to the left below the thick injection structure was injected subparallel to this, but it cuts upsection to join the major injection structure. (6) Closeup of part of the boulder injection structure shown in (5). The injection structure is filled with blocks of purple welded ignimbrite up to 70 cm in diameter, encased in a massive tuff/tuffaceous sandstone matrix. The thinner, lower injection structure (clastic sill) shown in (5) cuts upsection (clastic dike) to nearly connect with the thicker injection structure (clastic sill); they likely connect out of the plane of view. (7) Pink nonwelded lithic ignimbrite at El Moro, overlain in erosional unconformity by dark gray limestone of the Santa Rosalía sedimentary basin. A lense of boulders of pink nonwelded ignimbrite is visible within the ignimbrite, above the daypack. (8) Pink nonwelded ignimbrite at El Moro, with abundant lithic fragments of the purple welded ignimbrite, as well as weakly compacted pumices. Finger for scale. (9) Closeup of one of the lenses of cannibalized ignimbrite within the pink nonwelded lithic ignimbrite at El Moro. Boulders and blocks include purple welded ignimbrite as well as pink nonwelded ignimbrite with clasts of purple welded ignimbrite.

(G) Cerro Juanita: (1) Base of the 30 m thick phenocryst-poor basalt lava, resting on bedded tuff and lapilli tuff. This is overlain by (2) Vesiculated base and basal flow breccia on the >100 m thick basaltic andesite lava that caps Cerro Juanita. Sunglasses for scale.

(H) Cerro Sombrero Montado: (1) View of Sombrero Montado from the quarry at the top of Cerro Juanita, showing the > 80 m thick (top eroded) phenocryst-poor andesite lava that dips about 25° east toward the Gulf of California (in distance). The recessive weathering deposit below the Sombrero Montado lava is a hornblende lithic pumice lapilli tuff that is only exposed for ~10 m directly beneath the lava (sample SR 14-4, Table 1A).

(I) Santa Rosalía South (Cerro San Lucas, Fig. 4, Table 1B): (1) Calcalkaline dacite block-and-ash-flow tuff within the section of andesite lavas (sample SL 12-3). (2) Flow breccia from the section of high-magnesian trachyandesite lavas that overlie the calcalkaline andesite lavas on the east flank of Cerro San Lucas. (3) High magnesian trachyandesite intrusion that cross-cuts the calcalkline andesite lavas and forms the top of Cerro San Lucas (samples SL 08-2, SL 08-1). This photo shows miarolitic cavities of irregular shape with crystals projecting into the cavities, partially filling them.

S6A-1

S6A-2

S6B

S6C-1

S6C-2

S6D-1

S6D-2

S6D-3

S6D-4

S6D-5

S6D-6

S6D-7

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S6E-1

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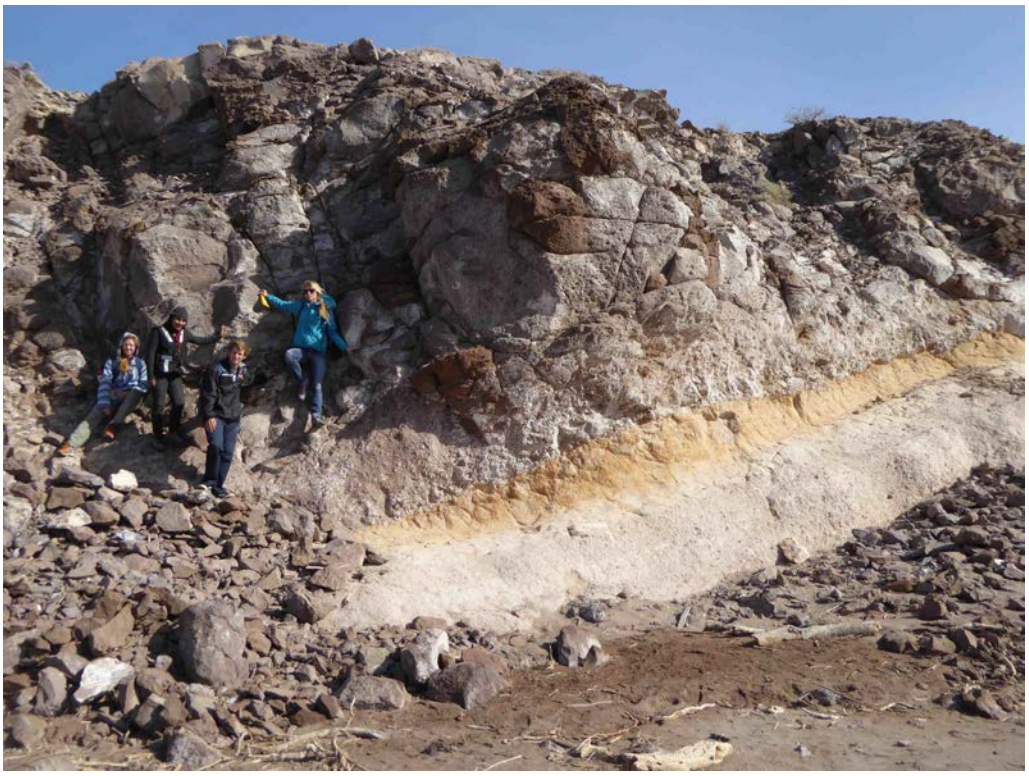
S6E-3

S6E-4

S6F-1

S6F-2



S6F-3

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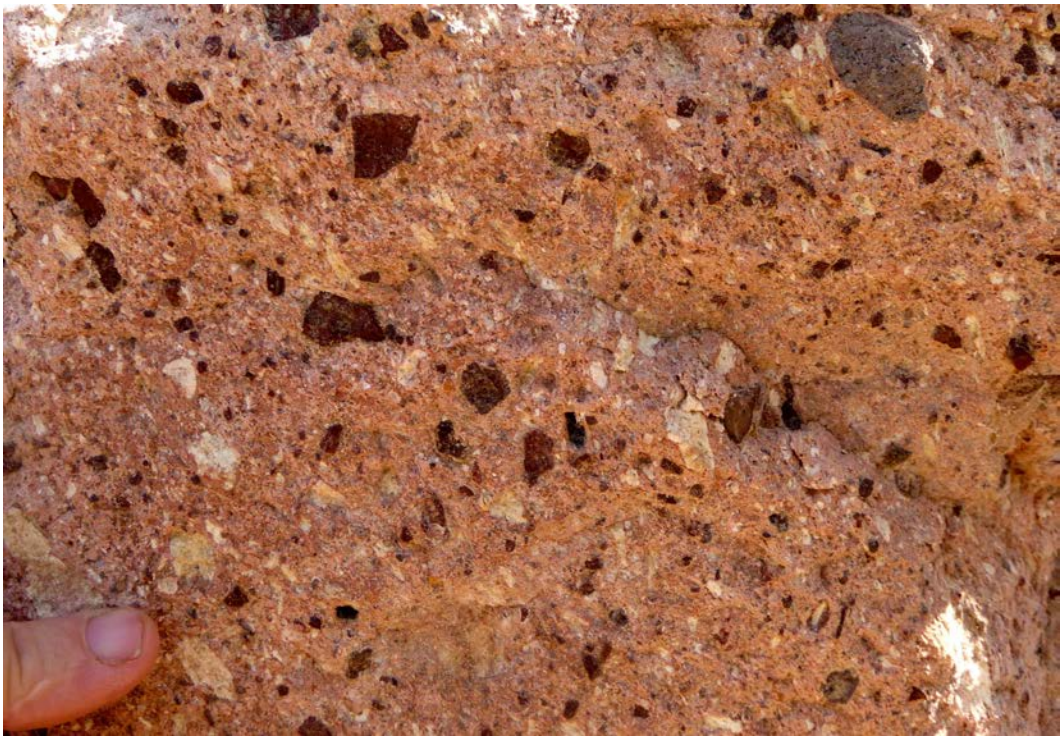
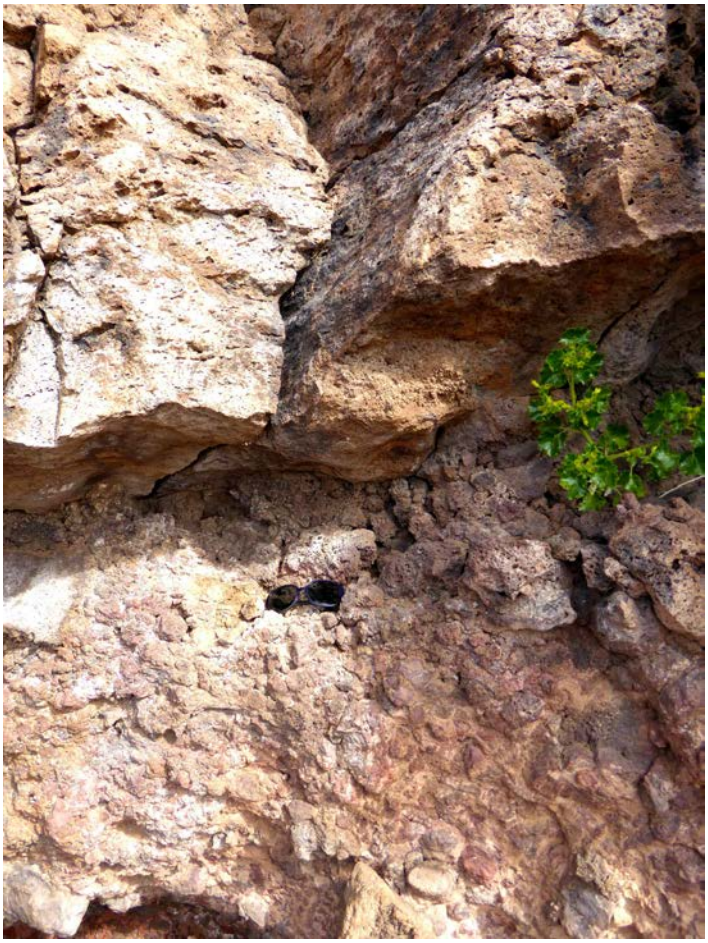


S6F-8

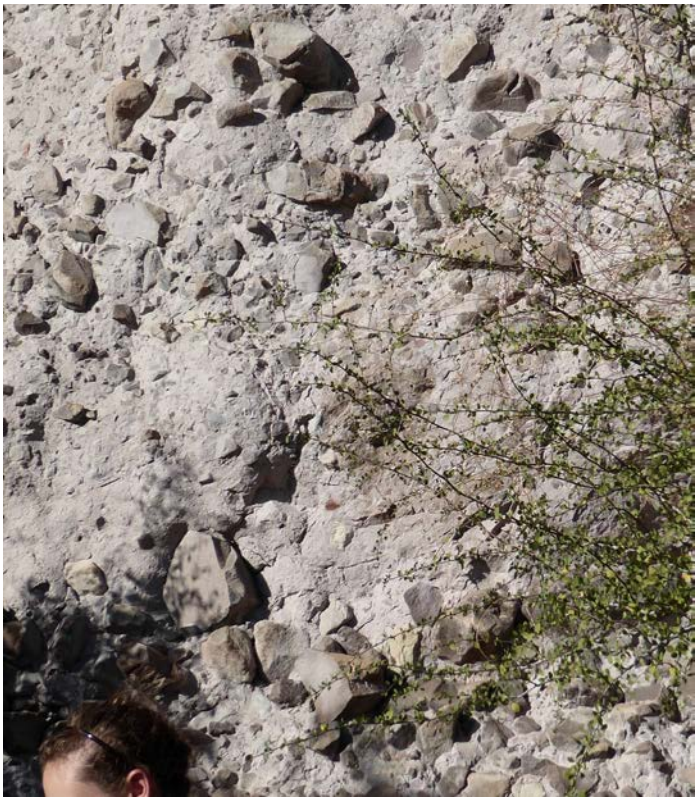
S6F-9

S6G-1



S6G-2

S6H



S6I-1

S6I-2

S6I-3