Did a 3800-year-old $M_w \sim 9.5$ earthquake trigger major social disruption in the Atacama Desert?

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Fig. S43. Scheme procedure for obtaining the altitude of reference with respect to sea level (e.g. see Zapatero site map, Fig. 4A in main text). PRIMS = prisma; LSM = Level Sea Medidium, SLM= Sea Level Reference of Tide Table.
Fig. S44. The image shows the four models that best represented the minimum tsunami run-ups estimated from tsunami-deposit altitudes measured on the field. The simulations depict $M_w9.2$ (models 1-2) and $M_w9.5$ (models 3-4) earthquakes. Model 4 best fits available evidence, which is equivalent to a 1000 km rupture that encompasses from Arica (18.5°S) to Isla Chañaral (28.9°S).
## Supplementary Tables

**Table S1.** Location and date details for 12 archaeological sites and their respective samples. The sites present sedimentary layers generated by the occurrence of earthquakes (uplifted littoral deposits) and/or tsunamis, which can be directly observed. From the total dates, 46 were obtained by previous works, whilst 61 are direct results of this research.

| Site (N-S) | Coordinates | Altitude (m above sea level) | Stratigraphic context | Material | Sample ID | Lab code | Conv. age (yr BP) | SD | δ13C (‰) | DR (yr) | SD (yr) | Calibrated Age (2 sigma cal yr BP) | Reference |
|------------|-------------|-----------------------------|-----------------------|----------|-----------|----------|------------------|----|-----------|---------|---------|-----------------------------|-----------|
| Pabellón de Pica | 20.88965 70.13702 | 5 | Reworked material within alluvium | Shell | CO1628 | UGAMS 31175 | 1,650 | 20 | 0.31 | 226 | 98 | 977 675 1268 | This work |
| | 20.88965 70.13702 | 5 | Reworked material from (younger) tsunami deposit | Shell | PPC14180 1 | D-AMS 032233 | 3,530 | 29 | 3.0 | 226 | 98 | 3,138 2,862 3,380 | |
| | 20.88965 70.13702 | 5 | Reworked material from tsunami deposit | Shell | CO1629 | UGAMS 31176 | 2,620 | 20 | 0.02 | 226 | 98 | 2,031 1,640 2,365 | |
| | 20.88965 70.13702 | 5 | Reworked material from tsunami deposit | Shell | PPC14180 4 | D-AMS 032332 | 3,786 | 30 | 2.2 | 226 | 98 | 3,454 3,190 3,706 | |
| | 20.88965 70.13702 | 5 | Uplifted littoral deposits | Shell | CO1630 | UGAMS 31178 | 3,866 | 30 | 4.7 | 226 | 98 | 3,548 3,318 3,823 | |
| 21.9129 70.17583 | 14 | Reworked material from tsunami deposit | Shell | CO1638 | UGAMS 31184 | 4,990 | 25 | 0.8 | 226 | 98 | 5,037 4,629 5,437 | |
| | 21.9129 70.17583 | 14 | Archaeological shell midden underlying tsunami deposit | Shell | CO1637 | UGAMS 31185 | 5,230 | 25 | -0.81 | 226 | 98 | 5,351 4,889 5,650 | |
| 22.71066 70.27876 | 6 | Uplifted littoral deposits | Shell | T16-08 | Beta-446343 | 6,620 | 30 | -0.5 | 226 | 98 | 6,874 6,499 7,234 | |
| | 22.71066 70.27876 | 6 | Uplifted littoral deposits | Shell | T16-09 | Beta-446343 | 6,070 | 30 | 1.1 | 226 | 98 | 6,258 5,907 6,595 | |
| 22.98375 70.32592 | 7 | Uplifted littoral deposits | Shell | C15-525 | LMC14 Saclay | 4,050 | 30 | 3.1 | 226 | 98 | 3,776 3,385 4,195 | |
| 23.47626 70.6083 | 3 | Reworked material within tsunami layer | Shell | CE-C1402A | D-AMS 032939 | 4,798 | 31 | 5.2 | 226 | 98 | 4,770 4,473 5,048 | |

### Notes
- Med Prob: Median Probability
- Min age: Minimum Age
- Max age: Maximum Age
- DR: Delta Age
- SD: Standard Deviation
- Calibrated Age: Calibrated Age
- This work: Indicates results from this study.
| Caleta Errázuri z | 23.47626 | 70.6083 | 3 | Littoral deposit | Shell | CE-C1401 | D-AMS 032938 | 5,196 | 31 | 3.9 | 226 | 98 | 5,306 | 5,015 | 5,564 |
|-------------------|----------|----------|---|-----------------|-------|----------|---------------|--------|----|----|------|-----|-------|-------|-------|
| 24.9287          | 70.51668 | 9        | Disturbed human burial | Human bone | - | UGAMS 15978 | 1,280 | 25 | -12.0 | 226 | 98 | 626 | 474 | 815 |
| 24.9284          | 70.51592 | 4,5      | Anthropogenic hearth overlaying tsunami deposit | Marine mammal bone | - | D-AMS 014901 | 3,439 | 26 | -7.1 | 226 | 98 | 3,024 | 2,772 | 3,274 |
| 24.9287          | 70.51668 | 4        | Uplifted littoral deposit | Shell | T 1606 | Beta-446340 | 4,000 | 30 | 2.6 | 226 | 98 | 3,716 | 3,376 | 3,967 |
| 24.9284          | 70.51592 | 9        | Organic horizon overlaying tsunami deposit | Bulk organic matter | - | D-AMS 014907 | 4,309 | 29 | -28.2 | - | - | 4,842 | 4,809 | 4,881 |
| 24.9284          | 70.51592 | 8        | Hearth overlaying tsunami deposit | Charcoal | - | D-AMS 014905 | 3,388 | 35 | -19.7 | - | - | 3,583 | 3,543 | 3,643 |
| 24.9287          | 70.51668 | 8        | Uplifted littoral deposit or reworked material within tsunami layer? | Shell | TA 1719 | UGAMS 31199 | 4,180 | 20 | 5.49 | 226 | 98 | 3,951 | 3,560 | 4,378 |
| 24.9284          | 70.51592 | 7.5      | Reworked material on tsunami layer | Shell | TA 1714 | UGAMS 31196 | 4,470 | 25 | 1.13 | 226 | 98 | 4,342 | 3,923 | 4,788 |
|                  |          |          |                     |                | TA 1713 | UGAMS 31195 | 4,840 | 25 | 5.18 | 226 | 98 | 4,834 | 4,426 | 5,265 |
|                  |          |          |                     |                | TA 1717 | UGAMS 31198 | 5,410 | 25 | -0.47 | 226 | 98 | 5,539 | 5,204 | 5,897 |
| 24.9284          | 70.51642 | 7.5      | Uplifted littoral deposits | Shell | TA 1716 | UGAMS 31197 | 4,970 | 25 | 1.3 | 226 | 98 | 5,012 | 4,599 | 5,425 |
| 24.9286          | 70.51609 | 18       | Hearth overlaying collapsed structure | Charcoal | - | D-AMS 014900 | 3,846 | 29 | -13.3 | - | - | 4,192 | 4,083 | 4,299 |
| 24.9286          | 70.51609 | 18       | Hearth underlying structure (pre-collapse) | Charcoal | - | D-AMS 010133 | 4,947 | 40 | - | - | - | 5,589 | 5,436 | 5,747 |
| 24.9286          | 70.51609 | 17       | Shell midden overlaying collapsed structure | Shell | - | NAU1230 | 4,645 | 20 | - | 226 | 98 | 4,589 | 4,155 | 4,945 |
|                  |          |          |                     | Charcoal | - | D-AMS 010134 | 4,188 | 24 | -22.9 | - | - | 4,889 | 4,570 | 4,825 |
|                  |          |          |                     | Shell | - | NAU1228 | 5,685 | 20 | - | 226 | 98 | 5,829 | 5,524 | 6,195 |
|                  |          |          |                     | Charcoal | - | Beta-312879 | 5,780 | 30 | -24.0 | - | - | 6,534 | 6,441 | 6,638 |
| 24.9287          | 70.51668 | 18       | Shell | ZA1806 | D-AMS 032237 | 5,618 | 31 | 4.4 | 226 | 98 | 5,764 | 5,560 | 5,987 |
| Date          | Zone     | Event Description          | Material Type | ID/Code | Age (Cal BC) | Standard Deviation | Uncertainty | Height/Weight |
|--------------|----------|----------------------------|---------------|---------|--------------|-------------------|-------------|--------------|
| 25.3838      | 70.44168 | Layer overlying the crack  | Shell         | -       | 4,150        | 30                | -           | 3,910        |
|              |          |                            | TA 1725       | D-AMS   | 4,070        | 32                | 4.1          | 3,802        |
|              |          |                            |               | 032330  | 226          | 98                | 5,356        | 4,087        |
|              |          |                            | -             | -       | 3,776        | -                 | -           | 3,908        |
|              |          |                            | -             | D-AMS   | 3,692        | 28                | -           | 3,876        |
|              |          |                            |               | 008356  | 3,776        | -                 | -           | 4,064        |
|              |          |                            | -             | Beta-   | 4,124        | -                 | -           | 3,959        |
|              |          |                            |               | 261667  | 4,124        | -                 | -           | 4,200        |
|              |          |                            | -             | UGAMS   | 3,850        | 31                | -           | 4,198        |
|              |          |                            |               | 5439    | 3,850        | -                 | -           | 4,198        |
|              |          |                            | -             | UGAMS   | 3,850        | 31                | -           | 4,198        |
|              |          |                            |               | 5443    | 3,850        | 31                | -           | 4,200        |
|              |          |                            | -             | Beta-   | 4,198        | -                 | -           | 4,200        |
|              |          |                            |               | 312875  | 4,198        | -                 | -           | 4,432        |
|              |          |                            | -             | UGAMS5  | 4,198        | -                 | -           | 4,300        |
|              |          |                            |               | 40      | 4,198        | -                 | -           | 4,300        |

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| Los Bronces | 70.52271 | 6-7 | Reworked material within (younger) tsunami layer | Shell | T1635A | UGAMS3 1162 | 2,160 | 20 | 2.05 | 226 | 98 | 1,488 | 1,200 | 1,842 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Shell | T1635B | UGAMS3 1159 | 4,200 | 20 | 1.09 | 226 | 98 | 3,978 | 3,582 | 4,395 |
| Reworked material within (younger) tsunami layer | Shell | T1634 | UGAMS3 1155 | 3,930 | 25 | -21.9 | - | - | 4,328 | 4,152 | 4,435 |
| Shell | T1633 | UGAMS3 1160 | 4,190 | 20 | 0.44 | 226 | 98 | 3,964 | 3,571 | 4,386 |
| Archaeological material at the base of tsunami deposit | Charcoal | T1628 | UGAMS3 1161 | 3,880 | 25 | -18.0 | - | - | 4,244 | 4,139 | 4,416 |
| Uplifted littoral deposits | Shell | T1627 | UGAMS3 1154 | 4,260 | 20 | 2.91 | 226 | 98 | 4,059 | 3,635 | 4,449 |
| In-situ archaeological layers underlying tsunami deposits | Charcoal | T1629 | UGAMS3 1156 | 4,240 | 20 | 1.72 | 226 | 98 | 4,031 | 3,619 | 4,425 |

| Hornos de Cal | 70.61572 | 10 | Antropic hearth overlying tsunami deposit | Charcoal | TA1710 A | UGAMS 31193 | 3,990 | 20 | -21.6 | - | - | 4,412 | 4,291 | 4,447 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Antropic hearth underlying tsunami deposit | Charcoal | T1630 | UGAMS3 1157 | 4,210 | 20 | -0.48 | 226 | 98 | 3,991 | 3,594 | 4,402 |
| Shell midden underlying tsunami deposit | Charcoal | T1629 | UGAMS3 1156 | 4,240 | 20 | 1.72 | 226 | 98 | 4,031 | 3,619 | 4,425 |

| Hornos de Cal | 70.61572 | 10 | Antropic hearth overlying tsunami deposit | Charcoal | - | D-AMS 024530 | 4,820 | 20 | 2.91 | 226 | 98 | 4,031 | 3,619 | 4,425 |

| Hornos de Cal | 70.61572 | 10 | Antropic hearth underlying tsunami deposit | Charcoal | - | D-AMS 024526 | 5,272 | 34 | - | - | - | 5,979 | 5,911 | 6,030 |

**Note:** The table entries include various types of material and their corresponding dates and locations. The numbers represent dates in cal BP, with the older dates on the left and the younger dates on the right.
| Site              | Latitude   | Longitude  | Quantity | Stratigraphic Unit | Material                  | Age (cal BP) | Radiocarbon Date | AMS Number         | Microscope Length (μm) | Microscope Width (μm) | This Work |
|------------------|------------|------------|----------|-------------------|---------------------------|--------------|------------------|----------------------|-------------------------|------------------------|-----------|
| Playa San Pedro  | 27.24970   | 70.62441   | 6        | Uplifted Litoral Deposits | Shell midden | T1604 | Beta-446337 | 3,710 | 30 | 1.0 | 226 98 3,361 | 2,942 3,748 | This work |
|                  |            |            |          | Uplifted Litoral Deposits | Shell midden | T1604B | Beta-588824 | 4,360 | 30 | 3.1 | 226 98 4,009 | 3,698 4,328 | This work |
| Bahía Cisne      | 27.24970   | 70.95620   | 16       | Shell within tsunami deposit | Shell (Scuria viridula) | BC3-2 | CNA4390, 1.1 | 4,350 | 30 | - | 226 98 4,183 | 3,884 4,447 | This work |
| Cobija           | 22.55272   | 70.26432   | 19       | Shell midden | Shell CO1602 | UCAMS31163 | 1,180 | 20 | 0.43 | 355 105 283 | 33 493 | This work |
|                  |            |            |          | Shell midden | Shell CO1606 | UCAMS31164 | 1,270 | 20 | 1.14 | 355 105 365 | 102 576 | This work |
|                  |            |            |          | Shell midden | Shell CO1610 | UCAMS31165 | 1,420 | 20 | 1.91 | 355 105 498 | 273 696 | This work |
|                  |            |            |          | Shell midden | Shell CO1611 | UCAMS31165 | 3,980 | 30 | 0.4 | 226 98 3,522 | 3,244 3,820 | This work |
|                  |            |            |          | Shell midden overlying tsunami deposit | Shell CO1612 | UCAMS31165 | 3,830 | 30 | -0.1 | 226 98 3,336 | 3,041 3,627 | This work |
|                  |            |            |          | Shell midden overlying tsunami deposit | Shell CO1613 | UCAMS31165 | 4,570 | 30 | -0.6 | 226 98 4,285 | 3,966 4,596 | This work |
|                  |            |            |          | Shell midden overlying tsunami deposit | Shell CO1615B 1 | UCAMS31165 | 5,520 | 25 | 1.16 | 226 98 5,465 | 5,206 5,734 | This work |
|                  |            |            |          | Shell midden overlying tsunami deposit | Shell CO1615B 2 | UCAMS31165 | 7,700 | 30 | -1.8 | 511 278 7483 | 6871 8048 | This work |

Information not available is indicated with a (-) symbol.

**Table S2.** Quantifications of the echinoid radioles (both basal and longitudinal sections) and fragments of calcareous algae (red algae) on the thin sections and bulk sediment samples collected from the micromorphology blocks. The depth values correspond to the upper and lower boundary of the micromorphology block.
### Thin section quantification

| Micromorphology sample | Exc.* | Wall | Depth (cm) | Echinoid radioles | Red algae | Bulk sample | Weight (g) | Spicules | Spicules per gram | Spicules per AF** |
|------------------------|-------|------|------------|------------------|-----------|-------------|------------|----------|------------------|------------------|
| ZA-15-6                | 1     | East | 30-40      | 68               | 29        | 6a          | 3          | 19       | 6.33             | 10.6             |
| ZA-15-5                | 1     | East | 45-55      | 32               | 17        | 6b          | 4          | 55       | 13.75            |                  |
| ZA-15-4                | 1     | East | 85-98      | 8                | 0         | 5a          | 5          | 7        | 1.4              | 4.38             |
| ZA-15-3                | 1     | East | 128-141    | 8                | 0         | 5b          | 3          | 28       | 9.33             |                  |
| ZA-15-2                | 1     | East | 135-145    | 1                | 0         | 4           | 6          | 23       | 3.83             | 3.83             |
| ZA-15-1                | 1     | East | 180-190    | 0                | 0         | 3a          | 3          | 10       | 3.33             | 3.33             |

*Exc. = excavation unit.

**AF = archaeofacies.

### Bulk Sample Quantification

| Sample | Voids | Microstructure | c/f ratio* | c/f rel. distr.** | Coarse fraction | Fine fraction | Pedofeatures |
|--------|-------|----------------|------------|-------------------|-----------------|---------------|--------------|
|        |       |                |            |                   | Bones | Rocks | Quartz | Shell | Red algae | Echinoid spine | Charcoal |               |
| 1      | 30%   | Integrain microaggregate | 80/20     | Enaulic           | 70% | 10% | 5% | - | - | - | 2% | Phosphates and gypsum with organic matter and microcharcoal inclusions | Lenticular gypsum crystals and micritic gypsum nodules |
| 2      | 20%   | Integrain microaggregate | 60/40     | Enaulic           | 50% | 2% | 5% | 3% | - | - | <1% | Gypsum with organic matter and microcharcoal inclusions | Lenticular gypsum crystals and nodules |

**Table S3.** Summary of the micromorphological descriptions of six undisturbed blocks from Zapatero.
| 3 | 20% | Integrain microaggregate | 70/30 | Enaulic | 68% | 2% | <1% | - | - | <1% | Gypsum organic matter and microcharcoal inclusions | Micritic gypsum nodules and lenticular gypsum crystals |
|---|---|------------------------|------|--------|-----|----|-----|---|---|-----|---------------------------------|--------------------------------------------------|
| 4 | 15% | Integrain microaggregate | 15/75 | Enaulic | 7% | <1% | - | 3% | - | - | 5% | 1) Ashes with microcharcoal; 2) Phosphates | Lenticular gypsum |
| 5 | 20% | Integrain microaggregate | 30/70 | Enaulic | 22% | 1% | - | 3% | 2% | 1% | 1% | 1) Phosphates; 2) Clay with gypsum crystals | Lenticular and micritic gypsum nodules and crystals |
| 6 | 50% | Integrain microaggregate | 40/60 | Enaulic | 25% | 1% | - | 10% | 1% | 2% | <1% | Clay with organic matter and microcharcoal inclusions | Lenticular gypsum |

*c/f = coarse/fine; **c/f rel. distr. = c/f related distribution.

Table S4. Synthesis of the historical trajectories of hunting-gathering-fishing communities in the Antofagasta Region coast modified after (26, 78).

| Geologic timescale | Early Holocene (12,000-8,200 BP) | Middle Holocene (8,200-4,200 BP) | Late Holocene (4,200 BP-to the present) |
|-------------------|----------------------------------|----------------------------------|---------------------------------------|
| Period            | Archaic I (12-10 cal ka BP)      | Archaic II (8.5-7.5 cal ka BP)   | Archaic III (7.5-5.7 cal ka BP)       |
|                   | Archaic IV (5.7-4.0 cal ka BP)   | Archaic V (4.0-2.7 cal ka BP)    | Archaic VI (2.7-1.3 cal ka BP)        |
| Base camp settlement | Rockshelters and open air-sites (?) | Open-air sites | Open-air sites | Open air-sites, stone-built architecture and rockshelters | Open-air sites | Open-air sites and rockshelters |
| Subsistence activities | Broad-spectrum economy; shellfish harvesting and inshore fishing; also, mammals and birds exploitation. | Greater orientation towards marine resources; inshore and offshore fishing, with a moderate dominance of pelagic fishes (i.e., jack mackerel); also, mammals and birds exploitation. | Littoral and maritime specialization; shellfish harvesting; inshore and offshore fishing; intensification on pelagic fishes (i.e., jack mackerel) and exploitation of oceanic fishes (i.e., swordfish and striped marlin); also, mammals and birds exploitation. | Littoral and maritime specialization; shellfish harvesting; inshore and offshore fishing (moderate predominance of jack mackerel, presence of oceanic species); also, mammals and birds exploitation. | Littoral and maritime specialization; shellfish harvesting and inshore fishing; also, mammals and birds exploitation. | Littoral and maritime specialization; shellfish harvesting and inshore fishing; also, mammals and birds exploitation. |
| Technology         | Diversified technology: formal and informal lithic tools; few bone and shell artifacts linked to coastal-maritime exploitation activities. | Diversified technology: formal and informal lithic tools; few bone and shell artifacts linked to coastal-maritime exploitation activities. | Specialized technology: lithic, bone, shell and archaeobotanical tools associated with coastal-maritime hunting, gathering and fishing, including craft technology; also, informal and formal lithic artifacts. Special artifacts, i.e., large bifacial knives ("hojas Taltaloides"); shell, bone and lithic beads; figurines, pigments, exotic items, among others. | Specialized technology: informal and formal lithic tools; few bone tools associated with coastal-maritime hunting and fishing activities. | Specialized technology: lithic, bone, archaeobotanical and a few metal artifacts associated with coastal-maritime hunting, gathering and fishing; also, informal and formal lithic artifacts; large bifacial knives; shell, bone and lithic beads; widespread of non-local items (ceramics, metal, exotic minerals and stones, among others). |
| **Mobility, sociality and territoriality patterns** | Low demography at local and regional scale; high residential mobility; small base camps; social aggregation sites at the regional scale; multiple burials in open-air sites. | Low demography (?) at local and regional scale; high residential mobility; small base camps (?); no burials have been identified. | High demography at local and regional scale; high residential mobility linked to social dispersion and settlement diversification; small base camps and social aggregation sites; individual and multiple burials inside stone-built structures, and individual burials in rockshelters and open-air sites. | Low demography (?); high residential mobility; small base camps; individual burials in rockshelters and open-air sites, and multiple burials in mounded cemeteries ("túmulos") at local and regional scale. |
|---|---|---|---|---|
| **Social networks** | Atacama Desert coast, coastal Cordillera and interior desert; Semiarid North coast of Chile | Atacama Desert coast, coastal Cordillera and interior desert (?) | Atacama Desert coast, coastal Cordillera and interior desert; valley and highland communities of Atacama Desert; Semiarid North of Chile | Atacama Desert coast, coastal Cordillera and interior desert; valley and highland communities of Atacama Desert; Semiarid North of Chile. |
Table S5. Frequency of known sites for Archaic IV, Archaic V and Archaic VI periods from the Taltal-Paposo area.

|                  | 5,700-4,000 cal yr BP | 4,000-2,700 cal yr BP | 2,700-1,500 cal yr BP |
|------------------|-----------------------|-----------------------|-----------------------|
| Total Number of Sites | 29                    | 10                    | 28                    |
| Agglutinated cemeteries | 12                    | 0                     | 7                     |
| Isolated burials    | 2                     | 3                     | 4                     |

Table S6. List of all known sites for Archaic IV, Archaic V and Archaic VI periods in the Tarapacá, Antofagasta and northern Atacama region coastline.

| Chronology (cal yr BP) | Archaeological site    | Region           |
|------------------------|------------------------|------------------|
|                        | Pisagua Viejo 4        | Tarapacá         |
|                        | Cañamo 1               | Tarapacá         |
|                        | Patache J              | Tarapacá         |
|                        | Patache E              | Tarapacá         |
|                        | Caramucho 3            | Tarapacá         |
|                        | Chipana                | Tarapacá         |
|                        | Los Canastos 3         | Tarapacá         |
|                        | Caleta Huelén 42       | Tarapacá         |
|                        | Caleta Huelén 75       | Tarapacá         |
|                        | Zapatero               | Antofagasta      |
|                        | San Ramon 15           | Antofagasta      |
|                        | Punta Negra 1a         | Antofagasta      |
|                        | Hornos de Cal          | Antofagasta      |
|                        | Alero 228/230          | Antofagasta      |
|                        | Caleta Bandurrias      | Antofagasta      |
|                        | Los Bronces 1          | Antofagasta      |
|                        | Paso Malo Arcaico      | Antofagasta      |
|                        | Paposo Norte 9          | Antofagasta      |
|                        | Pta Salitre J4         | Antofagasta      |
|                        | Mantos de la Luna      | Antofagasta      |
| Depth Range | Locality                        | Region   |
|------------|---------------------------------|----------|
| 5,700 to 4,000 | Cobija S1                        | Antofagasta |
|            | Copaca 1                        | Antofagasta |
|            | Chacaya 2                        | Antofagasta |
|            | Punta Blanca                     | Antofagasta |
|            | Punta Guasilla 1                 | Antofagasta |
|            | Gualagual 4                      | Antofagasta |
|            | Cobija 13                        | Antofagasta |
|            | Paquica                          | Antofagasta |
|            | Abtao 1                          | Antofagasta |
|            | Abtao 2                          | Antofagasta |
|            | Los Bronces Trinchera            | Antofagasta |
|            | Alero 224A                       | Antofagasta |
|            | Poza Bahamondes 4                | Antofagasta |
|            | Los Bronces 5                    | Antofagasta |
|            | San Pedro Alto 2                 | Antofagasta |
|            | Alero Oliva                      | Antofagasta |
|            | Punta Morada                     | Antofagasta |
|            | Guasilla P28                     | Antofagasta |
|            | Conchal Aguada                   | Antofagasta |
|            | Quebrada agua de cascabeles      | Antofagasta |
|            | Atacama 1                        | Antofagasta |
|            | San Pedro                        | Antofagasta |
|            | Punta Guanillo                   | Antofagasta |
|            | Rocas Negras                     | Antofagasta |
|            | Punta Grande                     | Antofagasta |
|            | Aguada de Morro Moreno           | Antofagasta |
|            | Manto Verde                      | Atacama   |
| 4,000 to 2,700 | Cánamo 1                        | Tarapacá  |
|            | Patache P                        | Tarapacá  |
|            | Punta Pichalo                    | Tarapacá  |
|            | Zapatero                         | Antofagasta |
|            | Paposo Norte 9                   | Antofagasta |
|            | Paso Malo Arcaico                | Antofagasta |
|            | Morro Colorado                   | Antofagasta |
|            | Poza Bahamondes 4                | Antofagasta |
| Location                      | Region       |
|-------------------------------|--------------|
| Punta Morada                  | Antofagasta  |
| Sitio 183                     | Antofagasta  |
| San Ramon 7                   | Antofagasta  |
| Punta Guanillo                | Antofagasta  |
| Punta Totoralillo             | Copiapó      |
| Abtao 1                       | Antofagasta  |
| San Lorenzo 1 (Agua Dulce)    | Antofagasta  |
| San Ramon 15                  | Antofagasta  |
| Mamilla 7                     | Antofagasta  |
| Los Médanos 2                 | Copiapó      |
| Pisagua 7                     | Tarapacá     |
| Patache N                     | Tarapacá     |
| Patache G                     | Tarapacá     |
| Patache A                     | Tarapacá     |
| Caleta Huelén Alto            | Tarapacá     |
| Patache M                     | Tarapacá     |
| Patache P                     | Tarapacá     |
| Chipana                       | Tarapacá     |
| Caleta Huelén 7               | Tarapacá     |
| Caleta Huelén 10              | Tarapacá     |
| Caleta Huelén 43              | Tarapacá     |
| Caleta Huelén 10A             | Tarapacá     |
| Caleta Huelén 20              | Tarapacá     |
| Alero 224A                    | Antofagasta  |
| El Hueso                      | Antofagasta  |
| Punta Cañas Norte             | Antofagasta  |
| Paposo Norte 9                | Antofagasta  |
| El Gaucho                     | Antofagasta  |
| PDLLDLM                       | Antofagasta  |
| Plaza de Indios Norte         | Antofagasta  |
| San Lorenzo 3                 | Antofagasta  |
| Portezuelo Choluto 4          | Antofagasta  |
| Las Tórtolas                  | Antofagasta  |
| Michilla 4                    | Antofagasta  |
| Caleta Abtao 5                | Antofagasta  |
| Cobija 10                     | Antofagasta  |

**2,700 to 1,300**
| Location          | Region    |
|-------------------|-----------|
| Hornitos 1        | Antofagasta |
| Caleta Urcu 1     | Antofagasta |
| Gualaguala 1      | Antofagasta |
| A299              | Antofagasta |
| Michilla 2        | Antofagasta |
| Guaque 2          | Antofagasta |
| Gualaguala 4      | Antofagasta |
| Punta Guanillo    | Antofagasta |
| Punta Blanca      | Antofagasta |
| ENAEX             | Antofagasta |
| Guasilla 29       | Antofagasta |
| Koppers 1         | Antofagasta |
| TGN-1             | Antofagasta |
| Punta Morada      | Antofagasta |
| Morro Colorado    | Antofagasta |
| Caleta Indigena   | Antofagasta |
| Guanillo del Sur  | Antofagasta |
| Bandurria         | Antofagasta |
| Punta Grande      | Antofagasta |
| Punta Guasilla    | Antofagasta |
| Punta Chungungo   | Antofagasta |
| Punta Yayes       | Antofagasta |
| Las Loberas       | Antofagasta |
| Morro Moreno      | Antofagasta |
| Hueso Parado      | Antofagasta |
| Los Bronces 2     | Antofagasta |
| El Gritón         | Antofagasta |
| Las Guaneras      | Antofagasta |
| Cifuncho          | Antofagasta |
| Ballenita Sur     | Antofagasta |
| Ballena           | Antofagasta |
| Esmeralda         | Antofagasta |
| Pan de Azucar     | Atacama    |
| Obispito          | Atacama    |
Table S7. NISP, MNI and density values for shell remains from Archaic IV, Archaic V and Archaic VI periods at Zapatero.

| Periods     | Excavated Units                      | Vol (m$^3$) | Shell                      |        |        |        |        |
|-------------|--------------------------------------|-------------|----------------------------|--------|--------|--------|--------|
|             |                                      |             | NISP | MNI | MNI/m$^3$ | Time Span (ka) | NISP/Time Span | MNI/Time Span |
| Archaic III-IV | Structure 2: Units 1-2-3-4            | 2.17         | 15159 | 1202 | 24040.0  | 1.7           | 8917.1        | 707.1         |
|             | Column sample Structure 2 Subtotal   | 0.05, 2.22   |        |     |           |               |               |               |
|             |                                      | Subtotal    | 2.22  |     |           |               |               |               |
| Archaic V   | Unit 2: A1-A2-B1-B2-C1-C2            | 1.5          | 7251  | 530  | 3840.6   | 1.3           | 5577.7        | 407.7         |
|             | Column sample Unit 2 Subtotal        | 0.14, 1.64   |        |     |           |               |               |               |
|             |                                      | Subtotal    | 1.64  |     |           |               |               |               |
| Archaic VI  | Unit 2: A1-A2-B1-B2                  | 1.40         | 9428  | 783  | 12428.6  | 1.4           | 6734.3        | 559.3         |
|             | Column sample Unit 2 Subtotal        | 0.063, 1.46  |        |     |           |               |               |               |
|             |                                      | Subtotal    | 1.46  |     |           |               |               |               |

Table S8. NISP, MNI and density values for fish remains from Archaic IV, Archaic V and Archaic VI periods at Zapatero.

| Periods     | Excavated Units                      | Vol (m$^3$) | Fish                      |        |        |        |        |
|-------------|--------------------------------------|-------------|---------------------------|--------|--------|--------|--------|
|             |                                      |             | NISP | MNI | MNI/m$^3$ | Time Span (ka) | NISP/Time Span | MNI/Time Span |
| Archaic III-IV | Structure 2: Units 1-2-3-4            | 2.17         | 273  | 36  | 16.6    | 1.7           | 160.6         | 21.2          |
|             | Column sample Structure 2 Subtotal   | 0.05, 2.22   |        |     |           |               |               |               |
|             |                                      | Subtotal    | 2.22  |     |           |               |               |               |
| Archaic V   | Unit 2: A1-A2-B1-B2-C1-C2            | 1.5          | 99   | 23  | 15.3    | 1.3           | 76.2          | 17.7          |
Table S9. NISP, MNI and density values for tetrapod remains from Archaic IV, Archaic V and Archaic VI periods at Zapatero.

| Periods    | Excavated Units            | Vol (m³) | Tetrapod NISP | Tetrapod MNI/m³ | Time Span (ka) | NISP/Time Span | MNI/Time Span |
|------------|-----------------------------|----------|---------------|-----------------|----------------|----------------|---------------|
| Archaic III-IV | Structure 2: Units 1-2-3-4 | 2,17     | 406           | 9,2             | 1,7            | 238,8          | 11,8          |
|             | Column sample Structure 2 Subtotal | 0,05     | 20            | 2,22            |                |                |               |
| Archaic V   | Unit 2: A1-A2-B1-B2-C1-C2 | 1,5      | 46            | 8,0             | 1,3            | 35,4           | 9,2           |
|             | Column sample Unit 2 Subtotal | 0,14     | 12            | 1,64            |                |                |               |
| Archaic VI  | Unit 2: A1-A2-B1-B2         | 1,40     | 42            | 11,4            | 1,4            | 30,0           | 11,4          |
|             | Column sample Unit 2 Subtotal | 0,063    | 16            | 1,46            |                |                |               |

Table S10. Lithic frequencies and density from Archaic IV, V and VI periods at the Zapatero site. Lithic remains from the column samples are not included.

| Period | Vol (m³) | Lithic debitage | Lithic tools | Total lithics | Lithic density (LVD) | Standardized density |
|--------|----------|-----------------|--------------|---------------|----------------------|----------------------|
Table S11. Comparison between density of artifacts and ecofacts in Archaic IV, Archaic V and Archaic VI residential occupations of the Taltal/Paposo area (modified from 20).

| Residential Site /Period | Density of lithic instruments | Density of marine mammals | Density of fish | Density of terrestrial mammals |
|--------------------------|-------------------------------|---------------------------|----------------|--------------------------------|
| Pta. Morada (Archaic IV) | 14.3                          | 33.7                      | 92             | 1.1                            |
| 228/230 (Archaic IV)     | 25.6                          | 27.3                      | 13.3           | 9.3                            |
| 183 (Archaic V)          | 5                             | 1.2                       | 15             | 0                              |
| Paso Malo Alfarero       |                               |                           | 26.7           | 7.5                            |
| (Archaic VI)             |                               |                           |                |                                |
| Pza. Indios Norte        |                               |                           | 117.2          | 5.8                            |
| (Archaic VI)             |                               |                           |                |                                |

Table S12. A random sample of agglutinated cemeteries from the Archaic IV and Archaic VI periods from the Antofagasta region, showing altitude and distance from the shore. Altitude in meters above mean sea level.
| Site                  | Period  | Latitude  | Archaic IV altitude (m.a.s.l.) | m a.s.l. for min. | m a.s.l. for max. | Archaic VI altitude (m a.s.l.) | +/- | Archaic IV distance from shore (m) | Archaic VI distance from shore (m) |
|-----------------------|---------|-----------|--------------------------------|------------------|------------------|--------------------------------|-----|-----------------------------------|----------------------------------|
| Pisagua Viejo         | Archaic IV | 19.559550 | 23                             |                  |                  |                                |     | 88                               |                                  |
| Punta Chipana         | Archaic IV | 21.338230 | 15                             |                  |                  |                                |     | 110                              |                                  |
| Chipana 3             | Formative (Archaic VI) | 21.339920 | 24                             | 28               | 26               | 2                              |     | 570                              |                                  |
| Chipana 5b            | Formative (Archaic VI) | 21.343830 | 25                             | 27               | 26               | 1                              |     | 392                              |                                  |
| Chipana 5a            | Formative (Archaic VI) | 21.344430 | 21                             | 26               | 23.5             | 2.5                           |     | 275                              |                                  |
| Caleta Huelén 20      | Formative (Archaic VI) | 21.468380 | 21                             | 24               | 22.5             | 1.5                           |     | 670                              |                                  |
| Caleta Urcu           | Formative (Archaic VI) | 21.760680 | 16                             | 21               | 18.5             | 2.5                           |     | 463                              |                                  |
| Punta Guanillos       | Archaic IV | 21.973020 | 19                             |                  |                  |                                |     |                                  | 70                               |
| Copaca 1              | Archaic IV | 22.335850 | 11                             |                  |                  |                                |     | 160                              |                                  |
| Guanillos del Sur     | Formative (Archaic VI) | 22.340860 | 37                             | 39               | 38               | 1                             |     | 510                              |                                  |
| Camping Indígena      | Formative (Archaic VI) | 22.350670 | 26                             | 31               | 28.5             | 2.5                           |     | 492                              |                                  |
| Bandurrias 1A         | Formative (Archaic VI) | 22.409520 | 18                             | 19               | 18.5             | 0.5                           |     | 235                              |                                  |
| Bandurrias 1B         | Formative (Archaic VI) | 22.410490 | 28                             | 29               | 28.5             | 0.5                           |     | 303                              |                                  |
| Bandurrias Arcaico    | Archaic IV | 22.413770 | 21                             |                  |                  |                                |     | 120                              |                                  |
| Cobija 13             | Archaic IV | 22.552450 | 15                             |                  |                  |                                |     | 80                               |                                  |
| Site Name                         | Phase       | Coordinates | Duration (Yrs) | Depth (m) | Volume (m³) |
|----------------------------------|-------------|-------------|----------------|----------|-------------|
| Cobija 10                        | Formative (Archaic VI) | 22.556540   | 31 36 33.5 | 2.5 | 488         |
| Punta Guasilla 1                 | Archaic IV  | 22.571520   | 13            |        | 26          |
| Caleta El Fierro 1 Alero 1       | Formative (Archaic VI) | 22.645270 | 21 21 |       | 177         |
| Caleta El Fierro 4b              | Formative (Archaic VI) | 22.646680 | 29 33 31 | 2 | 359         |
| Michilla 11                      | Formative (Archaic VI) | 22.739230 | 25 30 27.5 | 2.5 | 185         |
| Punta Yayes 108b                 |             | 22.753680   | 11 13 12    | 1 | 141         |
| Hornitos 1                       | Formative (Archaic VI) | 22.922490 | 32 38 35 | 3 | 467         |
| Punta Chacaya 2                  | Archaic IV  | 22.961030   | 15            |        | 245         |
| Punta Negra                      | Archaic IV  | 25.043875   | 13            |        | 109         |
| Caleta Bandurrias                | Archaic IV  | 25.204567   | 21 21        |        | 263         |
| Punta Morada                     | Archaic IV  | 25.374921   | 23            |        | 131         |
| Morro Colorado                   | Archaic IV  | 25.387016   | 3             |        | 50          |
| Los Bronces 2                    | Formative (Archaic VI) | 25.458783 | 27 29 28 | 1 | 304         |
| Los Bronces 5                    | Formative (Archaic VI) | 25.462875 | 36 36 |       | 332         |
| Los Bronces Túmulo Norte         | Formative (Archaic VI) | 25.462991 | 33 34 33.5 | 0.5 | 330         |
| Los Bronces 1                    | Archaic IV  | 25.464623   | 14            |        | 174         |
| Aguada de Los Perros 1           | Formative (Archaic VI) | 25.487616 | 45 47 46 | 1 | 371         |
| Site               | Time Period          | Latitude   | Longitude | 16 | 20 | 18 | 2 | 142 |
|-------------------|----------------------|------------|-----------|----|----|----|---|-----|
| El Gritón 3?      | Formative (Archaic VI) | 25.504539  |           | 16 | 20 | 18 | 2 | 142 |
| El Gritón 2       | Archaic IV           | 25.507258  |           |    |    |    |   | 154 |
| San Pedro 2       | Archaic IV           | 25.509125  |           |    |    |    |   | 150 |
| El Gritón 1?      | Formative (Archaic VI) | 25.509144  | 30        | 35 | 32.5 | 2.5 |   | 313 |
| San Pedro Alto 2  | Formative (Archaic VI) | 25.510148  | 45        | 47 | 46  | 1   |   | 262 |
| San Pedro Alto 1  | Formative (Archaic VI) | 25.510392  | 48        | 50 | 49  | 1   |   | 277 |
Table S13. Corrections by secondary ports (Pub. 3009 SHOA).

| Nº  | Locality                  | Position | Tide variations | E. P. (hr min) | Tidal range in Syzygias (m) |
|-----|---------------------------|----------|----------------|----------------|-----------------------------|
|     |                           | Latitude (°S) | Longitude (°W) | High tide | Low tide | High tide | Low tide |             |               |
| 210 | Rada de Arica             | 18.29    | 70.19          | -         | 8 32     | 1.40      |          |             |               |
| 215 | Caleta Vitor              | 18.45    | 70.21          | (-)0 08   | (-)0 08  | (-)0.23   | (-)0.44  | 8 29        | 1.20          |
| 220 | Caleta Chica              | 19.21    | 70.17          | (-)0 09   | (-)0 09  | (-)0.08   | (-)0.03  | 8 17        | 1.20          |
| 225 | Bahía de Pisagua          | 19.36    | 70.16          | (-)0 10   | (-)0 10  | (+)0.02   | (-)0.02  | 8 42        | 1.42          |
| 230 | Caleta Junín              | 19.39    | 70.11          | (-)0 20   | (-)0 20  | (-)0.12   | (-)0.24  | 8 30        | 1.22          |
| 235 | Bahía de Iquique          | 20.13    | 70.10          | -         |          |           |          | 8 55        | 1.50          |
| 240 | Caleta Molle              | 20.17    | 70.08          | (-)0 11   | (-)0 11  | (-)0.13   | (-)0.06  | 8 20        | 1.31          |
| 241 | Caleta Patillos           | 20.44    | 70.11          | (-)0 18   | (-)0 18  | (-)0.06   | (-)0.08  | 8 40        | 1.31          |
| 245 | Caleta Lobos              | 21.01    | 70.10          | (-)0 25   | (-)0 25  | (+)0.12   | (-)0.03  | 9 13        | 1.20          |
| 250 | Puerto Tocopilla          | 22.06    | 70.14          | (-)0 03   | (-)0 03  | (-)0.21   | (-)0.14  | 8 21        | 1.20          |
| 255 | Rada de Cobija            | 22.34    | 70.18          | (-)0 05   | (-)0 05  | (-)0.12   | (-)0.24  | -           | 1.20          |
| 260 | Bahía Mejillones del Sur  | 23.06    | 70.28          | (-)0 07   | (-)0 07  | (-)0.03   | (-)0.03  | 8 43        | 1.60          |
| 265 | Rada de Antofagasta       | 23.39    | 70.25          | -         |          |           |          | 8 46        | 1.60          |
| 270 | Caleta Blanco Encalada    | 24.22    | 70.32          | (+)0 35   | (+)0 35  | (-)0.27   | (-)0.30  | -           | 1.00          |
| 275 | Rada Paposo               | 25.02    | 70.28          | (+)0 40   | (+)0 40  | (+)0.12   | (-)0.24  | 9 24        | 1.52          |
| 280 | Puerto Taltal             | 25.25    | 70.29          | (+)0 30   | (+)0 30  | (+)0.12   | (-)0.24  | 9 07        | 1.18          |
| 281 | Caleta Cifuncho           | 25.39    | 70.39          | (+)0 12   | (+)0 12  | (+)0.01   | (-)0.04  | 9 00        | 1.40          |
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