

**Table S1** - Taxonomic identification of the actinobacterial isolates retrieved from analysed the deep-sea sediments and corresponding GenBank accession number.

| Campaign                                   | Geographical locations | Isolate     | Closest identification*                  | Similarity (%)† | Sequence length (bp) | GenBank accession number |
|--------------------------------------------|------------------------|-------------|------------------------------------------|-----------------|----------------------|--------------------------|
| MarMine Arctic Mid-Ocean Ridge (AMOR) 2016 | Arctic Ocean           | 78.9        | <i>Micrococcus yunnanensis</i>           | 99.64           | 1375                 | OQ363622                 |
|                                            |                        | 78.10       | <i>Micrococcus yunnanensis</i>           | 99.78           | 1378                 | OQ363620                 |
|                                            |                        | 78.3        | <i>Brachybacterium paraconglomeratum</i> | 99.76           | 1269                 | OQ363621                 |
|                                            |                        | 79_1.6      | <i>Brachybacterium paraconglomeratum</i> | 99.35           | 1378                 | OQ363628                 |
|                                            |                        | 79_1.24     | <i>Brevibacterium antiquum</i>           | <b>98.61</b>    | 1323                 | OQ363625                 |
|                                            |                        | 79_1.25     | <i>Brevibacterium antiquum</i>           | <b>98.42</b>    | 1391                 | OQ363626                 |
|                                            |                        | 79_1.12     | <i>Brevibacterium antiquum</i>           | <b>98.61</b>    | 1373                 | OQ363623                 |
|                                            |                        | 79_1.12 (A) | <i>Brachybacterium paraconglomeratum</i> | 99.77           | 1327                 | OQ363624                 |
|                                            |                        | 79_1.4      | <i>Brachybacterium paraconglomeratum</i> | 99.62           | 1301                 | OQ363627                 |
|                                            |                        | 80_1.6      | <i>Brevibacterium antiquum</i>           | <b>98.49</b>    | 1392                 | OQ363630                 |
|                                            |                        | 80_1.4      | <i>Brachybacterium paraconglomeratum</i> | 99.73           | 1273                 | OQ363629                 |
|                                            |                        | 80_1.7      | <i>Brachybacterium paraconglomeratum</i> | 99.70           | 1326                 | OQ363631                 |
|                                            |                        | 81_2.5      | <i>Brevibacterium antiquum</i>           | <b>98.22</b>    | 1400                 | OQ363633                 |
|                                            |                        | 81_1.2      | <i>Streptomyces</i> sp.                  | 99.69           | 1290                 | OQ363632                 |
|                                            |                        | 82_2.6      | <i>Brevibacterium antiquum</i>           | <b>98.35</b>    | 1392                 | OQ363637                 |
|                                            |                        | 82_2.13     | <i>Streptomyces</i> sp.                  | 99.71           | 1379                 | OQ363636                 |
|                                            |                        | 82_1.3      | <i>Brachybacterium paraconglomeratum</i> | 99.83           | 1310                 | OQ363634                 |
|                                            |                        | 82_2.10     | <i>Brachybacterium paraconglomeratum</i> | 99.79           | 1288                 | OQ363635                 |
|                                            |                        | 82_2.8      | <i>Brachybacterium paraconglomeratum</i> | 99.79           | 1331                 | OQ363638                 |
|                                            |                        | 136.12      | <i>Actinotalea</i> sp.                   | <b>97.85</b>    | 1395                 | OQ363614                 |
|                                            |                        | 136.30      | <i>Brevibacterium antiquum</i>           | <b>98.54</b>    | 1367                 | OQ363619                 |
|                                            |                        | 136.19      | <i>Actinotalea ferrariae</i>             | <b>98.40</b>    | 1370                 | OQ363617                 |
|                                            |                        | 136.2       | <i>Dietzia psychrocaliphila</i>          | 100             | 1362                 | OQ363618                 |
|                                            |                        | 136.13      | <i>Actinotalea subterranea</i>           | <b>98.32</b>    | 1371                 | OQ363615                 |
|                                            |                        | 136.15      | <i>Brevibacterium antiquum</i>           | <b>98.21</b>    | 1389                 | OQ363616                 |

|                                                                                                                                                             |                |          |                                          |              |      |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|------------------------------------------|--------------|------|----------|
| IH mission SEDMAR 1/2017                                                                                                                                    | Madeira region | E147_1.1 | <i>Brevibacterium salitolerans</i>       | 98.99        | 1394 | OQ363651 |
|                                                                                                                                                             |                | E147_1.8 | <i>Brachybacterium paraconglomeratum</i> | 99.69        | 1303 | OQ363652 |
|                                                                                                                                                             |                | MA3_2.11 | <i>Brevibacterium sediminis</i>          | 99.93        | 1376 | OQ36365  |
|                                                                                                                                                             |                | MA3_2.14 | <i>Streptomyces resistomycificus</i>     | 100          | 1391 | OQ363656 |
|                                                                                                                                                             |                | MA3 2.13 | <i>Streptomyces</i> sp.                  | <b>97.37</b> | 1405 | OQ363655 |
|                                                                                                                                                             |                | MA3_1.18 | <i>Brachybacterium paraconglomeratum</i> | 99.79        | 1300 | OQ363653 |
|                                                                                                                                                             |                | MA3_2.6  | <i>Leucobacter komagatae</i>             | 100          | 1272 | OQ363657 |
| EMEPC/PEPC/LUSO/2016                                                                                                                                        | Azores region  | DS1_6    | <i>Microbacterium testaceum</i>          | 99.33        | 1352 | OQ363641 |
|                                                                                                                                                             |                | DS1_10.2 | <i>Microbacterium testaceum</i>          | 99.33        | 1352 | OQ363639 |
|                                                                                                                                                             |                | DS1_10.4 | <i>Microbacterium testaceum</i>          | 99.34        | 1365 | OQ363640 |
|                                                                                                                                                             |                | DS3_6.1  | <i>Microbacterium testaceum</i>          | 99.34        | 1368 | OQ363645 |
|                                                                                                                                                             |                | DS3_17.1 | <i>Microbacterium testaceum</i>          | 99.25        | 1206 | OQ363642 |
|                                                                                                                                                             |                | DS3_17.2 | <i>Microbacterium testaceum</i>          | 99.30        | 1285 | OQ363643 |
|                                                                                                                                                             |                | DS3_19.2 | <i>Microbacterium testaceum</i>          | 99.34        | 1369 | OQ363644 |
|                                                                                                                                                             |                | DS4_2.1  | <i>Microbacterium testaceum</i>          | 99.34        | 1365 | OQ363647 |
|                                                                                                                                                             |                | DS4_2.3  | <i>Microbacterium testaceum</i>          | 99.35        | 1375 | OQ363648 |
|                                                                                                                                                             |                | DS4_3    | <i>Rhodococcus</i> sp.                   | 100          | 1167 | OQ363650 |
|                                                                                                                                                             |                | DS4_18   | <i>Rhodococcus</i> sp.                   | 100          | 1190 | OQ363646 |
|                                                                                                                                                             |                | DS4_20   | <i>Rhodococcus yunnanensis</i>           | 99.83        | 1171 | OQ363649 |
| <p>*According to 16S ribosomal RNA (Bacteria and Archaea type strains) database from NCBI BLAST.</p> <p>†Values in bold indicate potential new species.</p> |                |          |                                          |              |      |          |