## **Supplementary A**:

Geomorphic surfaces, the associated codes and the number of Samples taken from each category

| Landscape | Landform | Lithology | Geomorphic surfaces | Code | Area | Samples |
|---|---|---|---|---|---|---|
| Mountain | Dissected ridge | Marly limestone (K4, K2) and shale | Rock outcrops | Mo 111 | 515 | 0 |
| | | Marly limestone (K4, K2) and shale | Rock outcrops | Mo 121 | 5500 | 0 |
| | Rock pediment | Marly limestone (K4, K2) | Scarp slope | Mo 211 | 174 | 0 |
| Hills | Dissected ridge | Eroded calcareous shale and dark grey shale | Rolling apex | Hi 111 | 320 | 3 |
| | Eroded ridge | Basal conglomerate (OMC) | Rock outcrops with braided stream | Hi 211 | 324 | 1 |
| | Rocky high hill | Dissected dark grey shale | Braided hill | Hi 311 | 4742 | 1 |
| Piedmont | Pediment | Remnant of shale (J) | Apical part, rocky | Pi 111 | 1217 | 1 |
| | Fan delta | Quaternary alluvium | Outwash sediment finer and white | Pi 211 | 214 | 1 |
| | | | Outwash sediment (coarser) | Pi 212 | 174 | 1 |
| | Alluvial fan | Alluvium of OM, OMC | Apical part | Pi 311 | 202 | 1 |
| | | Alluvium of dark grey shale | Apical part with complex slope | Pi 321 | 3560 | 7 |
| | | Alluvium of marly limestone | Slightly dissected foot slope | Pi 331 | 18878 | 25 |
| | | | Moderately flat, cultivated | Pi 332 | 410 | 2 |
| | | Alluvium of limestone | Active fan | Pi 341 | 683 | 2 |
| | Bajada | Alluvium of OM, OMC, Ev | Middle part | Pi 411 | 2200 | 0 |
| | | Alluvium of andesite, granodiorite | Apical part | Pi 421 | 17917 | 4 |
| | | | Apical part (extremely braided drainage) | Pi 422 | 1964 | 1 |
| | | Alluvium of foraminifera limestone | Apical part, with dense drainage network | Pi 431 | 5250 | 2 |
| | | | Middle part | Pi 432 | 2570 | 2 |
| | | | Distal part, with dense drainage network | Pi 433 | 1726 | 2 |
| | | | Distal part with dense drainage network, finer | Pi 434 | 746 | 0 |
| | | | Distal part calcareous | Pi 435 | 181 | 0 |
| | | | Distal part, salt crusted, gypsiferous | Pi 436 | 1075 | 1 |
| | | Alluvium of K4, K2, Tn | Middle part with parallel drainage pattern | Pi 441 | 523 | 0 |
| | | | Middle part with less drainage | Pi 442 | 3403 | 8 |
| | | | Distal part with dense drainage network | Pi 443 | 5478 | 5 |
| | Dissected old bajada | Alluvium of foraminifera limestone | Palaeoterrace, undulating plateau | Pi 511 | 6393 | 3 |
| | | | Palaeoterrace, with braided intense network | Pi 512 | 17065 | 8 |
| | Old bajada | Fine marly gypsiferous sediments | Piedmontal terrace, flat, saline fine alluviums | Pi 611 | 3761 | 1 |
| | | Fine marly alluvium | Piedmontal terrace, distal part, fine alluviums | Pi 621 | 687 | 1 |
| | Rolling old bajada | Coarse, gypsiferous alluvium | Palaeoterrace, gypsic plateau | Pi 711 | 5365 | 3 |
| Alluvial plain | Alluvial flat, river terraces | Zayandeh-rud river alluviums | Cultivated terraces | Ap 111 | 65935 | 26 |
| | | | Playa or river terraces, cultivated, saline | Ap 112 | 6210 | 3 |
| | | Old river sediments | Meandering complex facet | Ap 121 | 5915 | 7 |
| | | | Cultivated old river terrace | Ap 122 | 2945 | 5 |
| Flood plain | Lowest river terrace | Recent alluviums | Channel margin alluvium, cultivated | Fp 111 | 1443 | 7 |
| | | | Channel margin alluvium, cultivated, saline | Fp 112 | 228 | 0 |
| | Seasonal drain systems | Recent alluviums | Salty gleyed fine alluviums | Fp 211 | 1963 | 5 |
| River | River sediments | Recent gravelly alluviums | Channel sediments | Ri 111 | 1571 | 1 |
| Playa | Segzi basin | Alluvio-lagoonary fine sediments | Wet zone, flat, saline, cultivated | Pl 111 | 1370 | 6 |
| | | | Wet zone, flat, very saline | Pl 112 | 24128 | 13 |
| | | | Soft clay flat, with drained ground water | Pl 113 | 20573 | 11 |
| | | | Soft clay flat, gypsiferous, extremely saline | Pl 114 | 14409 | 7 |
| | Borkhar basin | Alluvial fine sediments, slightly saline | Soft clay flat, cultivated | Pl 211 | 36209 | 12 |
| | Margh basin | Alluvio-lagoonary fine sediments | Puffy ground, lagoonary, gypsiferous | Pl 311 | 1616 | 4 |
| | Jarghuye basin | Alluvial fine sediments, saline | Soft clay flat, cultivated | Pl 411 | 659 | 1 |

OMC, basal oligo-miocene conglomerates; OM, oligo-miocene alluvium of foraminiferal limestone; Ev, tuff breccia and andesitic volcanics of Eocene period; Tn, dark grey shale with intercalations of lenticular limestone (containing corals and Heterstridium) and sandstone (Nayband formation) of Upper Triassic period; Areas are multiplied by 1000 ha.