Supplementary Material A and Fig. S1

Geological and chronological context

The Casablanca hinterland shows a vast system of longitudinal dune ridges parallel to modern coast, composed of marine and aeolian calcarenites. It records an exceptional succession of palaeoshorelines since the end of the Miocene.

In the South-West of Casablanca, four Formations associated with four raised platforms and including several Members have been defined from the late Early to the Late Pleistocene: the *Oulad Hamida Formation* (late Early Pleistocene), the *Anfa* and the *Kef Haroun Formations* (Middle Pleistocene), and the *Dar Bou Azza Formation* (Late Pleistocene) (Fig. S1) (Lefèvre et al. 1994; Lefèvre 2000; Lefèvre and Raynal 2002; Lefèvre et al. 2021; Rhodes et al. 2006; Texier et al. 1994, 2002).

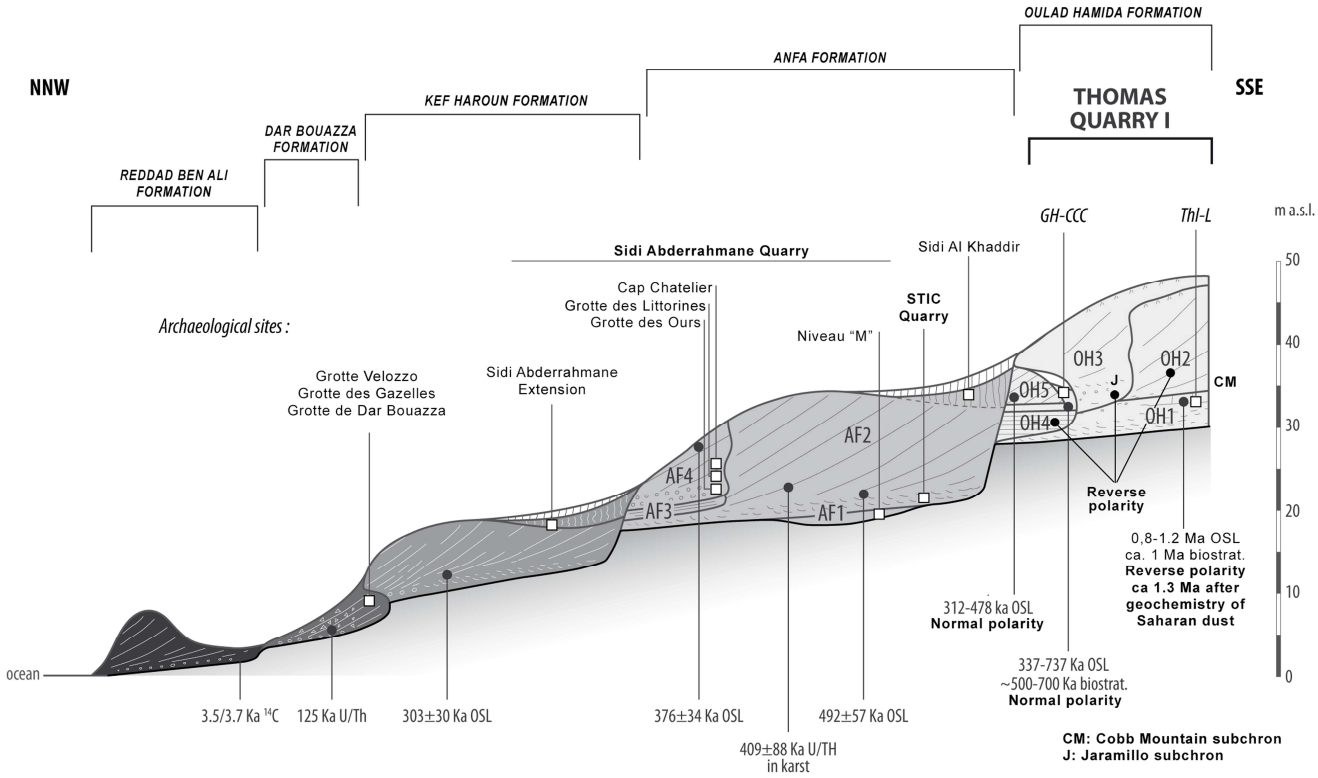

Figure S1. Chronostratigraphy of the late Early Pleistocene, Middle Pleistocene and Late Pleistocene formations in the sector of Sidi Abderrahmane Quarries and Thomas Quarry I, southwest of Casablanca, Morocco. OSL and ESR ages, biochronological and paleomagnetical data. OHF archaeological sites: GH = Grotte à Hominidés; ThI-L = Thomas Quarry I – Unit L (D. Lefèvre et J.-P. Raynal 2021; CAD T. Salel et J.-P. Raynal).

The sedimentary formations of Thomas Quarry I were succinctly described by Biberson (1961) and considered as an extension of the Sidi Abderrahmane formations even if their altitude was higher. The stratigraphic revision carried out in relation to the excavation of the *Grotte à Hominidés* (GH) and Thomas

Quarry I-Unit L (ThI-L) archaeological sites showed that these deposits could not be continuous with those of the Sidi Abderahmane Quarries and belonged to an earlier morphostratigraphic unit that we have called the *Oulad Hamida Formation* (*OHF*) (Fig. S1).

OHF sits on a major unconformity formed at an altitude of ~28 m above sea level (asl) at the expense of the Cretaceous and Palaeozoic substratum, ~10 m above the platform of the *Anfa Formation* (*AF)* in the Sidi Abderrahmane quarries.
OHF includes four Members – *OH1* to *OH4* from bottom to top (Fig. S1). *OH1 to OH4 Members* are allostratigraphic units defined by a sedimentary sequence characterized by a succession of genetically related deposits - intertidal, supratidal and aeolian/continental depositional environments - and bounded at its base and top by unconformities. This sequence records a sea-level highstand associated with the formation of a shoreline marked by a cliff in the case of OH3 and OH4. The unconformities or sequence boundaries mark the regression of the shoreline due to sea-level fall and the continentalisation of the coast. Thus, *OH1* to *OH4* deposits are correlative to sea-levels highstands of the main global glacio-eustatic cycles as inferred from the marine isotope stage (MIS) record and are preserved at positive elevations due to the regional tectonic uplift affecting Atlantic Morocco (Lefèvre, 2000; Lefevre and Raynal, 2002; Texier et al., 2002; Chabli et al., 2005; Lefevre et al., 2016, Lefèvre et al. 2021).

OH1 Member:
Bed 1 is composed of a coarse calcirudite at the base and a stratified coarse-grained biocalcarenite.
Bed 2 – Unit L. The lower part of *Bed* 2 (Subunit L1 to L4) is a 2-3 m succession of fine to coarse locally trough cross-bedded sands and calcareous mudstone. These beds form sequences into little inset channels. In the upper part of each micro-sequence, features due to hydratation-desiccation alternations (platy structure levels), to exundation (thin laminar calcareous crusts), to drying phenomena (fissural polygonal network emphasized by ferric oxides) and to bioturbation (rootlets marks associated to ferric coatings) occur. These deposits are interpreted as evidence of intermittently flowing braided streams in a nearshore fluviolacustrine hydrosystem (Texier et al., 2002, Gallotti et al., 2021). Bioclastic sands more or less bioturbated, partially decarbonated and cemented form the upper part (Subunit L5) of *Bed 2*. They represent aeolian deposits which accumulated in damp vegetated depressions with evidence of pedogenesis during warm episodes of subaerial exposure.

Subunit L1 at the bottom and L5 at the top contain early Acheulean lithic artefacts. The mammalian assemblage comprises the genus hippopotamus (Geraads 2010; Geraads et al. 2010, Geraads et al. 2022) bovids (ovin and gazelle, a medium-size alcelaphine, and a medium-size *Kobus* sp.), an *Equus sp.*, a rhinoceros and an Elephantidae. The most significant components are the suid *Kolpochoerus* sp.. Among the microfauna, there are reptiles, amphibians and rodents, predominantly the *Praomys*; *Paraethomys*; *Meriones* and the *Gerbillus* species.

The *Bed 2* limestone deposits was dated to c. 0.99 ± 0.21 million years ago (Ma) using Optically Stimulated Luminescence (OSL) method (Rhodes et al. 2006). This date is in agreement with the faunal data. *Bed 2* record a reverse polarity of the pre-Jaramillo Matuyama Chron, and is at least older than MIS 37 (Gallotti et al. 2021). Elements representative of saharian dust inputs (Si, Ti, Zr) link L1 to Marine Isotope Stage (MIS) 43 or 39, and subunit L5 to MIS 41 or early MIS 37 (Gallotti et al. 2021).

OH2 Member:
Overlying an erosional surface above the *OH1 Member* deposits, there is a succession from bottom to top of 1) coarse biocalcarenites with a curved cross-bedding, 2) finer inclined planar-bedding biocalcarenites formed within intertidal depositional environments, 3) massive coarse bioclastic aeolianites about ten or so meters thick with their upper banks affected by ferrosol pedogenesis. *OH2* presents a reverse polarity and

its bottom part has recorded a brief normal paleomagnetic event, possibly related to the Cobb Mountain Subchron (1.221–1.186 or 1.215–1.178 Ma, MIS 37/36–35) (Gallotti et al. 2021). Thus, the *OH2* intertidal deposits record a sea-level highstand which can be correlated with MIS 35.

OH3 Member is associated with a shoreline marked by a basal erosion platform and a cliff carved into *OH1* and *OH2* deposits, whose base is at an altitude of 37 m NGM. The *OH3* deposits are composed from bottom to top of 1) blocs and pebbles from *OH1* and *OH2* calcarenite and limestone, 2) coarse and/or coquinoid biocalcarenites with inclined planar bedding, 3) aeolian calcarenites. *OH3* presents at the bottom and the top a reverse magnetic polarity and belongs to the Matuyama Chron. Its middle part records a normal polarity indicating the Jaramillo Subchron (1.07 Ma) (Gallotti et al. 2021). Therefore, *OH3* intertidal deposits record a sea-level highstand which can be undoubtedly correlated with MIS 31.

OH4 Member is associated with a palaeoshoreline marked with cliff and deep cavities cut into *OH1* and *OH3* deposits. In the cavities, *OH4* deposits are composed of a calcirudite with a coarse coquinoid matrix and plurimetric collapsed blocks of calcarenites and calcirudite coming from earlier formations, associated with a well-defined notch at an altitude of about 34 m asl. This chaos of blocks, whose surfaces are smoothed, is drowned out by a fine, planar-bedding calcarenite which is well developed laterally; upwards, these sands become more massive. The magnetic polarity of *OH4* deposits is reverse and record the Matuyama Chron (Gallotti et al., 2021).
A *Continental Cave Complex* is developed in the *Grotte à Hominidés* (GH-CCC) above *OH4 Member*. It can be subdivided in two parts, lower units 4-3 and upper units 2 to 0 separated by *OH5* unit. Its stratigraphy is as follows from bottom to top:
Without any apparent disconformity with *OH4*, *GH-CCC* lower units 4-3 deposits are composed of bioclastic and quartzose sands, probably edified in several episodes, containing lithic objects, macrofauna, microfauna and hominin fossils (Raynal et al. 2010, Daujeard et al. 2016). Biostratigraphic data suggested an early Middle Pleistocene age (Geraads 2002, Geraads et al. 2010, Geraads et al. 2022). OSL analyzes on GH-CCC-unit 4 yielded ages from 391±32 ka to 420±34. A hominin tooth provided a laser abrasion ICP-MS age of 501 +89/-66 ka (Raynal et al. 2010). At the entrance of the cavity, the wide cross-bedding "gray" sands of an aeolianite (*OH5 unit*) are intercalated between the lower (3-4) and the upper units (1-2). *OH5* sands were dated at 440 ± 38 ka and 370 ± 58 ka (Rhodes et al. 2006). The magnetic polarity of *GH-CCC unit 4* and *OH5* unit is normal and record the Brunhes Chron (Gallotti et al. 2021). The upper units of *GH-CCC* are composed from bottom to top of a multilayer dripstone interbedded with loose red sands (*GH-CCC-unit 2*) which laterally links up with a speleothem, overlying by massive bedded, rubefied sands rich in microfauna and fragments of gasteropods shells, originating from reworked superficials red soils (*GH-CCC-unit 1*).
Considering biochronology, OSL dating and the normal (Brunhes) magnetic polarity, *GH-CCC* unit 4 is of early Middle Pleistocene age, the Brunhes–Matuyama boundary is placed at the boundary with underlying *OH4,* while *OH4* may have deposited during the high-stand of MIS 19 and possibly also MIS 21 (Gallotti et al. 2021).

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