**Supplementary Figure Legends:**

Suppl. Figure 1: Maxima for surface temperature (°C) and for 1-day precipitation (mm), based on 2008 simulation.

Suppl. Figure 2: Comparison of 2008 and 1990 simulations: Mean surface temperature in °C at the K/P boundary based on (a) 1990 and (b) 2008 simulation. Mean daily precipitation in mm at the K/P boundary based on (c) 1990 and (d) 2008 simulation.

Suppl. Figure 3: Madagascar’s modern topography. The contour interval is 500 m for the height field.

**Supplementary Table Legends:**

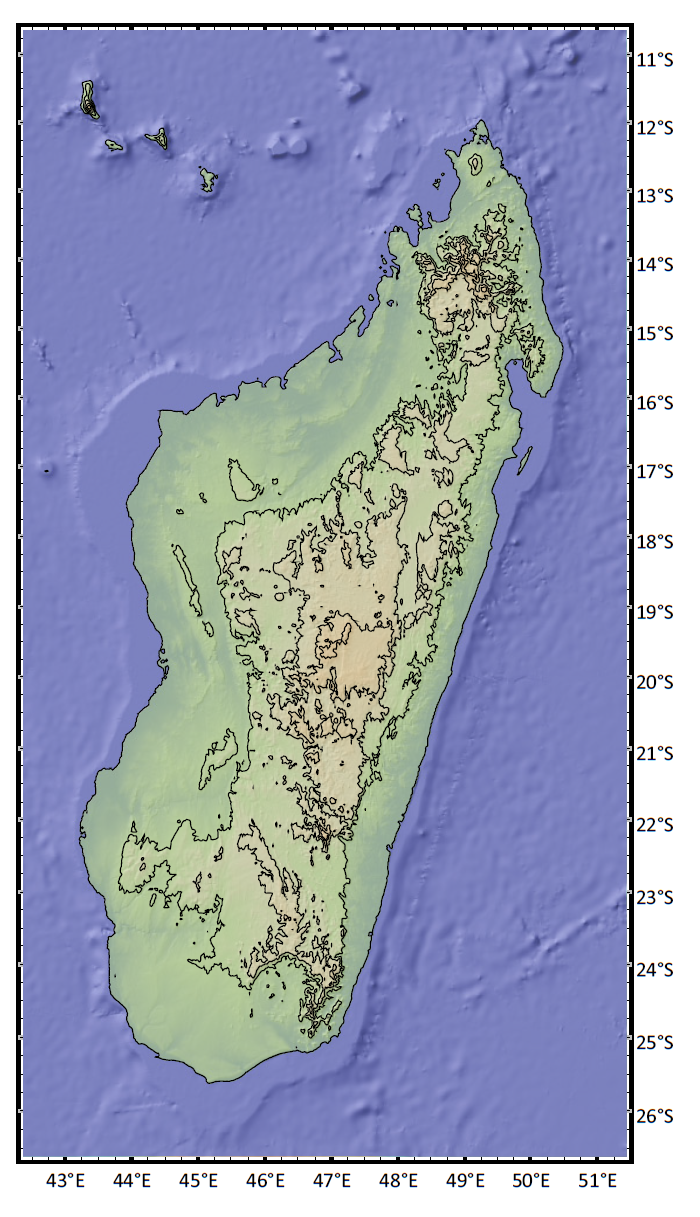
Suppl. Table 1: Vertebrate fossil taxa represented in Late Cretaceous deposits (Maevarano Formation).

Suppl. Table 2: Vertebrate clades inferred to be present in Madagascar during the Early Paleogene.\*

**Supplementary Figure 1**

**MACHDD:Users:karensamonds:Documents:Manuscripts:2015:Past Climate:Figsup1_maxNEW.pdf**

**MACHDD:Users:karensamonds:Documents:Manuscripts:2015:Past Climate:Figsup2a_comp_1990vs2008_pre_creNEW.pdfSupplementary Figure 2**

**Supplementary Figure 3**

**Table S1:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Taxon** | **Malagasy Genera** | **Class** | **References** |
| Lepisosteidae | *Lepisosteus* | Osteichthyes | (1) |
| Phyllodontidae | cf. *Egertonia* sp. | Osteichthyes | (1) |
| Pycnodontidae | cf. *Coelodus* sp. | Osteichthyes | (2) |
| Ceratophryinae | *Beelzebufo* | Amphibia | (3) |
| Bothremydidae | *Kinkonychelys* | Reptilia | (4) |
| Podocnemidae | *Erymnochelys,* | Reptilia | (5) |
| Podocnemidae | *Sokatra* | Reptilia | (6) |
| Mahajangasuchidae | *Mahajangasuchus* | Reptilia | (7, 8) |
| Notosuchia | *Araripesuchus* | Reptilia | (9) |
| Notosuchia | *Simosuchus* | Reptilia | (10, 11) |
| Trematochampsidae | *Miadanasuchus* | Reptilia | (12) |
| ?Cordylidae | *Konkasaurus* | Reptilia | (13) |
| Dromaeosauridae | *Rahonavis* | Reptilia | (14, 15) |
| Madtsoiidae | *Madtsoia* | Reptilia | (16) |
| Madtsoiidae | *Menarana* | Reptilia | (17) |
| Nigerophiidae | *Kelyophis* | Reptilia | (17) |
| Abelisauridae | *Majungasaurus* | Reptilia | (18) |
| Noasauridae | *Masiakasaurus* | Reptilia | (19) |
| Nemegtosauridae | *Rapetosaurus* | Reptilia | (20) |
| Ornithurae | *Vorona* | Aves | (21) |
| Marsupialia | Genus indet. | Mammalia | (22) |
| Multituberculata | Genus indet. | Mammalia | (23) |
| Sudamericidae | *Lavanify* | Mammalia | (24) |

**Table S2:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Family** | **Descendant Genera** | **Class** | **Humid (including degraded)** | **Dry (mostly west and northwest including degraded)** | **Spiny (including degraded)** | **References / notes** |
| Aplocheilidae | *Pachypanchax* | Osteichthyes | 1 | 1 | 0 | (25) |
| Bedotiidae | *Bedotia*, *Rheocles* | Osteichthyes | 1 | 0 | 0 | (26) |
| Cichlidae | *Oxylapia, Paratilapia, Paretroplus, Ptychochromis, Ptychochromoides* | Osteichthyes | 1 | 1 | 1 | (27, 28) |
| Clupeidae | *Sauvagella, Spratellomorpha* | Osteichthyes | 1 | 1 | 0 | (29) |
| Milyeringidae | *Typhleotris* | Osteichthyes | 0 | 0 | 1 | (30) |
| Mugilidae | *Agonostomus, Liza, Mugil* | Osteichthyes | 1 | 1 | 1 | (31) |
| Microhylidae | Cophylinae + Scaphiophryninae | Amphibia | 1 | 1 | 1 | (32) |
| Microhylidae | Dyscophinae | Amphibia | 1 | 1 | 1 | (32) |
| Mantellidae | *Aglyptodactylus*, *Blommersia*, *Boehmantis*, *Boophis*, *Gephyromantis*, *Guibemantis*, *Laliostoma*, *Mantella*, *Mantidactylus*, *Spinomantis*, *Tsingymantis*, *Wakea* | Amphibia | 1 | 1 | 1 | (32)There is only one mantellid species in the SW: *Laliostoma labrosum*. |
| Chamaeleonidae | *Brookesia*, *Calumma*, *Furcifer* | Reptilia | 1 | 1 | 1 | (32) |
| Gerrhosauridae | *Zonosaurus, Tracheloptychus* | Reptilia | 1 | 1 | 1 | (33, 34) |
| Opluridae | *Chalarodon, Oplurus* | Reptilia | 1 | 1 | 1 | (34) |
| Gekkonidae | *Blaesodactylus, Lygodactylus, Phelsuma, Paroedura, Uroplatus* | Reptilia | 1 | 1 | 1 | (32) |
| Scincidae | *Amphiglossus, Androngo, Madascincus, Paracontias, Pseudoacontias, Pygomeles, Sirenoscincus, Voeltzkowia* | Reptilia | 1 | 1 | 1 | (32) |
| Boidae | *Acrantophis*, *Sanzinia*, *Calabaria* | Reptilia | 1 | 1 | 1 | (32) |
| Typhlopidae (Madatyphopidae) | *Typhlops (Madatyphlops)* | Reptilia | 1 | 1 | 1 | (32) |
| Xenotyphlopidae | *Xenotyphlops* | Reptilia | 0 | 1 | 0 | (32) |
| Aepyornithidae | *Aepyornis, Mullerornis* | Aves |  | 1 | 1 | (35) Known from Quaternary deposits only, so no knowledge of east. |
| Eurylaimidae | *Neodrepanis, Philepitta* | Aves | 1 | 1 | 0 | (36) |
| Mesitornithidae | *Mesitornis, Monias* | Aves | 1 | 1 | 1 | (36) |
| Psittacidae | *Agapornis* | Aves | 1 | 1 | 1 | (36) |
| Psittacidae | *Coracopsis* | Aves | 1 | 1 | 1 | (36) |
| Bibymalagasia | *Plesiorycteropus* | Mammalia |  | 1 | 1 | (37, 38) Known from Quaternary deposits only, so no knowledge of east. |
| Lemuroidea and Daubentonioidea | *Allocebus*, *Avahi*, *Cheirogaleus*, *Daubentonia*, *Eulemur*, *Hapalemur*, *Indri*, *Lemur*, *Lepilemur*, *Microcebus*, *Mirza, Phaner*, *Prolemur*, *Propithecus, Varecia* | Mammalia | 1 | 1 | 1 | (39) |

\*0 = absent, 1 = present, blank = unknown.

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