



Stratigraphy and age of the human footprints-bearing strata in Jeju Island, Korea: Controversies and new findings



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ABSTRACT

The age of the human footprints found on the bedding plane of a reworked volcanoclastic deposit on Jeju Island, Korea, has been a subject of controversies in Korea for more than a decade. Two researchers that discovered the footprints and their colleagues have argued that the footprints belong to Paleolithic 'hominids' that lived in the Late Pleistocene (c. 19,000–25,000 cal yrs BP). They made their argument on the basis of the pre-Holocene radiocarbon ages of humic and humin organic matter in bulk sediment, but have ignored Holocene radiocarbon ages of mollusk shells and other age data from the volcanoclastic deposit and adjacent geologic units. They also refused to correlate the deposit with any well-defined and well-dated stratigraphic units in the study area but correlated it with an imaginary stratigraphic unit which they named "unnamed strata". This study discusses the problems of their work published in a series of papers in the last decade by reviewing the stratigraphy and age of the geologic units in southwestern Jeju Island and presenting new sedimentologic and stratigraphic observations and new radiocarbon dating of mollusk shells. This study shows that the "unnamed strata" is the basal part of the Songaksan Tuff, which is the rimbeds of a coastal tuff ring that erupted c. 3700 yrs BP, and that the strata at the footprints site comprise the distal Songaksan Tuff at the base and a reworked volcanoclastic deposit (the Hamori Formation) above it. The human footprints, which are found in the topmost part of the Hamori Formation, should therefore postdate the eruption of the Songaksan volcano and belong to late Neolithic 'humans' who lived in the mid- to late Holocene.

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1. Introduction

In 2004 the Cultural Heritage Administration of Korea announced that human footprints were found on the bedding plane of a volcanoclastic deposit, named the Hamori Formation, at the southwestern coast of Jeju Island, Korea, together with diverse bird and mammal tracks (see media reports in: Cho, 2004; Huh, 2004). That announcement made a big sensation in Korea because the footprints were tentatively dated to be 50,000 years old and, if the age was correct, the discovery could open a new era of researching Paleolithic human's first movement and settlement on the Korean Peninsula. However, the age of the human footprints was immediately questioned by some geologists because the age was found to have been inferred from the K–Ar age (0.050 ± 0.023 Ma) of a trachybasalt lava inside the crater of a nearby volcano, named Songaksan (Korean Association for Conservation of Natural Heritages, 2002). The Cultural Heritage Administration of Korea thus commissioned a team of geologists and geochronologists in the Korea Institute of Geoscience and Mineral Resources (KIGAM) to investigate the absolute age of the footprints-bearing strata with all available dating techniques at that time. The KIGAM team obtained five ^{14}C

ages of mollusk shells that range between 3862 ± 35 and 2995 ± 35 yrs BP, seven ^{14}C ages of humic and humin organic materials within bulk sediment that range between 7318 ± 40 and $15,161 \pm 70$ yrs BP, and two OSL ages of quartz sand grains of 6.8 ± 0.3 and 7.6 ± 0.5 ka, all from the Hamori Formation (Cho et al., 2005). The KIGAM team discarded the pre-Holocene humic and humin organic carbon ages because of wide age variations and age reversal. More importantly, they discarded the pre-Holocene ages because the footprints-bearing strata formed apparently in a nearshore setting when the sea level was almost identical to that at present. It was not likely that the deposit was uplifted c. 100 m to near the present sea level since its deposition in the pre-Holocene glacial period. The KIGAM team also discarded the mid- to late Holocene mollusk shell ages because they thought that the shells could have been deposited after the formation of the human footprints. They thus chose the quartz OSL ages as the most reliable depositional age of the footprints-bearing strata.

Despite the study of the KIGAM team (Cho et al., 2005) and other earlier and later studies (Kim et al., 1999; Sohn et al., 2002; Cheong et al., 2006; Cheong et al., 2007), which strongly indicate that the deposition of the footprints-bearing strata occurred during the Holocene, a

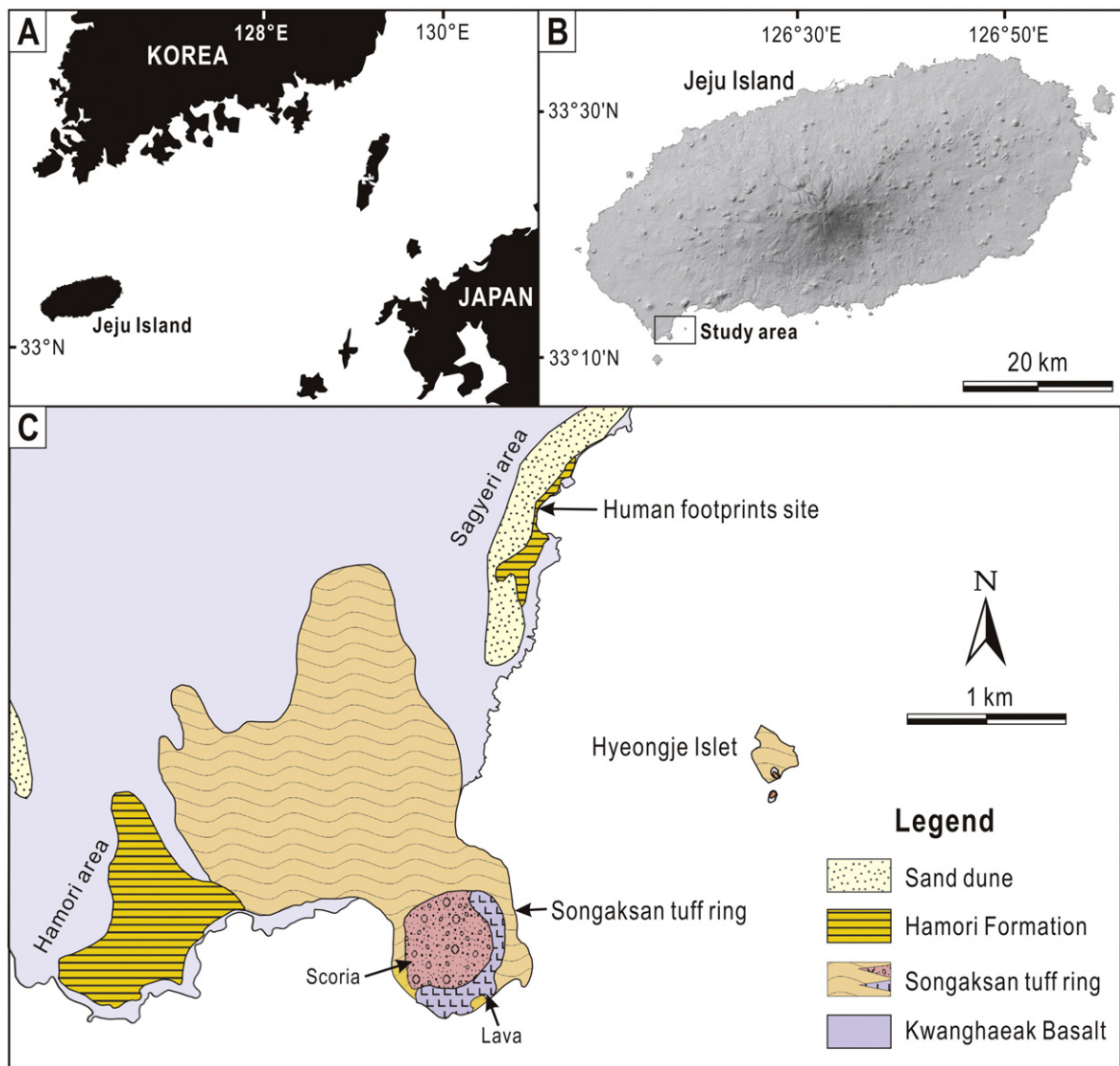


Fig. 1. Location map (A) and digital elevation model (B) of Jeju Island, and the geology (C) of the southwestern part of Jeju Island. After Park et al. (2000).

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