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Establishing the first continuous Holocene tephrostratigraphy on Kerguelen Archipelago, subantarctic Indian Ocean

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Here we present the first Holocene-long continuous chronology of volcanic eruptions on Kerguelen archipelago, where no evidence of Holocene volcanic activity has been published so far. Our chronicle is based upon sedimentological, chronological and geochemical data from two sediment cores, taken in two different depocenters of a large lake, Lake Armor, located ca. 70 km away from the archipelago's potentially active volcanic area. This allowed us to confidently attribute the origin of pumice-rich or ash-rich layers to contemporaneous volcanic eruptions. Altogether eight main eruptions, as well as three secondary ones, were here documented and dated, among which the youngest occurred during the Middle Age, between 890 and 980 AD. The oldest eruption is also by far the strongest one and deposited more than 1.2m of up-to 3cm large pumices, 70 km away from the volcanic edifice. It occurred at the very beginning of the Holocene (11 ka cal. BP), suggesting a climatic control after glacial retreat upon volcanic activity. Additional evidences from lake sediment and geological outcrops, both close to Lake Armor and in remote areas over Kerguelen mainland, open the future possibility of a better reconstruction of major eruptions deposit spreading and thus an assessment of their intensity. This established chronostratigraphy will be useful to synchronise paleoenvironment record at least at the scale of the archipelago as well as in surrounding marine areas where Holocene climate reconstructions are particularly sparse.