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GEOLOGICAL EVIDENCES OF A CLIMATIC CHANGE (*GREENHOUSE-ICEHOUSE*) OF WESTERN ANTARCTICA DURING THE EOCENE-OLIGOCENE TRANSITION

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During the Eocene and Oligocene (55 – 23 Ma) the Earth was undergoing a period of great climatic changes. Geological records, reinforced by climate models indicate that global climate during this period went from a stage in which the Earth was virtually free of polar ice caps to a stage close to what we find today in Antarctica. Most of these records are indirect, taken from the deep-sea cores or fossil material. Clear terrestrial evidence of climate change (greenhouse-icehouse) for the Eocene-Oligocene transition is found in Wesele Cove, King George Island, West Antarctica. This evidence includes a succession of at least thirteen, few meters thick, basaltic lava flows overlain disconformably by diamictite and sandstone. The basaltic section is correlated with the Mazurek Point/Hennequin Formation, radiometric dated as Eocene, and the diamictite and sandstone correspond to the Krakowiak Glacier Member of the Polonez Cove Formation, dated as Early Oligocene, on paleontological and radiometric basis. Each tholeiitic basalt layer exhibits a lower, thicker (1 to few meters) fresh zone, transitionally followed up by a zone of saprolith, varying from decimeters to 1-1.5 m in thickness. The entire basalt package of around 60 m, is tilted 25° to the east. The succession has been recently exposed due to fast retreat of the present Wyspianski Glacier. The initial field evidence suggests that the succession represents the geological record of paleoclimatic variation from mild to glacial conditions, that could correlate with the change from the late Eocene optimum climatic (greenhouse) to icehouse conditions in the Oligocene, as recorded on the Cenozoic paleotemperature curve established by $\delta^{18}O$ determinations on calcareous foram tests. This study had focus on the stratigraphy and geochemistry analysis of the occurrence, in order to interpret the succession of palaeoclimatic events documented in outcrop and analyze them in the context of paleoclimatic history of Antarctica. Data obtained consistently showed that the supposed transition from unaltered to altered zones observed in each basalt layer may in fact be assigned to the moderated action of weathering processes on top of each flow. They also demonstrate a glacial, in partly subglacial with marine contribution, origin for the overlying diamictites, which has features such clasts of diverse lithologies and sizes, faceted and striated clasts, bullet shaped clasts, clasts broken by freezing and thaw, intraformational striae and marine fossils found in the matrix of the diamictite. The mild paleoclimatic conditions responsible for weathering of the basalt lasted until the emplacement of the highest lava horizon, followed by tectonic movement that tilted the package. These events indicate a relatively long paleoclimatic mild conditions during the Eocene, preceding the establishment and displacement of the Oligocene ice-sheet in this part of Antarctica.