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Stratigraphy of Ganymede's light terrain: a case study at Mummu and Sippar Sulci

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The formation of Ganymede's light or bright tectonically resurfaced terrain and its possible interaction with a subsurface ocean has been made one of the top goals of the upcoming JUICE mission [1]. We therefore investigate the currently available Voyager and Galileo imaging data covering Ganymede's light terrain with sufficient spatial resolution. Our focus lies on (1) the definition and characterization of the tectonic subunits/cells of the light terrain including its contact to the neighboring dark terrain and (2) their stratigraphic relationship to each other. Our goal is to study the local formation processes, to identify any changes in tectonic style through time across Ganymede, and also to compare possible differences and similarities of light terrain at different locations. We specifically focus on Mummu and Sippar Sulci which complement our studies of 1) Byblus and Nippur Sulcus (39°N/160°E and 49°N/157°E), 2) Arbela Sulcus (15°S/13°E), 3) Harpagia Sulcus (16°S/50°E) as presented in [2]. We use the geologic mapping procedure defined in previous studies [3, 4] and crater counting techniques for relative geologic age estimation [5,6]. Based on the principle of cross-cutting relationships, the light terrain units (light grooved terrain, light subdued terrain, light irregular terrain and an undivided region) are classified into 3 main categories: (i) Category 1 (lg_1, ls_1 and li_1) contains light terrain units, which are crosscut by all other light terrain units, (ii) Category 2 (lg_2, ls_2 and li_2) contains those light terrain units, which crosscut the Category 1 terrain units and are crosscut by Category 3 units, (iii) Category 3 (lg_3, ls_3 and li_3) contains those light terrain units, which crosscut all adjacent light terrains. The narrow NE-SW striking band that bifurcates in the western part (ls_3) crosscuts all other geological units and is consequently mapped as the youngest terrain followed by pateras, which are being crosscut by ls_3. This, however, contradicts the theory that the light subdued terrains were formed in the early stage of the light terrain formation [3, 4]. On the contrary, according to our crater counting results, ls_3 shows an age similar or slightly older than the adjacent crosscutting terrains like lg_2(3) and lg_1. The effects of secondary impacts, size and geographic location of the study area onto the crater density results are still under evaluation. REFERENCES:
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