STRATIGRAPHICAL SCALE FOR GANYMEDE. L. I. Kamentsev[1], N. Baranov[2]
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Introduction: A direct investigation of planets and large satellites by space vehicles has made possible to compile stratigraphical scales for these bodies of the Solar system. Today we have reliable stratigraphical scales for the Moon [1] and the Mars [2]. Analogous scales are required for other large bodies - the Mercury and four Galilean satellites of the Jupiter. Two of the latter satellites which are closest to the Jupiter - Io and Europa - show very high velocities of surface alteration, so the evidence of rather ancient geological events could not be preserved there. On the other hand, the age of most of the surface of two of the other Galilean satellites of the Jupiter - the Ganymede and the Callisto is comparable to the age of the origin of the former bodies. Therefore, compilation of the stratigraphical scale is possible for these objects.

The subsequency revealed in the formation of morphological details at the surface of the Ganymede may be the basis for a stratigraphical scale to be compiled for this satellite of the Jupiter.

An ancient cratered area is the oldest structure at the Ganymede surface. The distribution of craters is far from being dense here. Even in older highly cratered areas it is three times less dense than on the Callisto, though large bodies collided with the Ganymede might have been more in quantity than those collided with the Callisto for the same time interval. A probable reason is the younger absolute age of the Ganymede surface. A tidal warming-up of surficial layers of this satellite of the Jupiter at early stages of its geological history probably caused very fast relaxation of the craters. It is not improbable that a future detailed survey of the surface level will reveal large negative structures formed at the final stage of the tidal warming-up. By analogy with relatively younger partly relaxed craters, we suggest a term *paleopalimpsest* for similar formations which are not noticeably manifested now in morphological aspect. Similar structures were found in 1994 at the surface of the Moon by an American automatic station *Klimentina.*

Cratering in ancient cratered areas was the next stage of the geological history of the Ganymede. The first cratering dates back to the age of about 4.2 billion years. Judging from the amount of craters, a grooved area began to form at the age of about 3.8 billion years. A surface appeared or being reworked between these dates is referred to the Galilean System. It consists of the upper and lower subsystems divided by the formation of a system of grooves in the area of Galilee and in the vicinity, caused by the fall of a large cosmic body in the center of the leading hemisphere of the Ganymede.

The next stage of the geological history of the satellite was responsible for the formation of a global system of grooves and ruts which occupies more than a half of the satellite surface. By the degree of superposed cratering, the formation of the grooved area dates back to the age of 3.8 to 3.1 billion years. Attention is drawn to the fact that periods of endogenic activity on the Ganymede and on the Moon completed nearly at the same time. Surfaces appeared between 3.8 and 3.1 billion years are to be of Misian age. This geological system is called after the largest Misia rut.

Summary: The formation of the groove system was followed by a longest and geologically stable development stage of the Ganymede. It began with the formation of large ring structures Gilgamesh and South Equatorial. Most of the large craters in grooved areas and all radial craters have formed since 3.1 billion years. The youngest are light-ray craters which date back to the age of 0.5 to 1.5 billion years. Dark-ray craters are of relatively older age. Deposits of no more than 3.1 billion years in age are referred to an Osirian System called after an Osiris Crater located at the opposite side of the Ganymede. The Osirian System could be divided in future into a number of subsystems with intermediate temporal boundaries corresponding to moments of the formation of the largest radial craters at the satellite surface.

References: [1] Willims, (1986) The geol. hist. of the Moon [2] Tanaka K. L.,. (1986) JGR 91 E139-E158