

Ganymede: What's going on at the surface?, by Alex van der Wateren

On February 12, 2014, a detailed single view of Jupiter's moon Ganymede was published by the USGS Astrogeology Science Center (see image on opposite page for a detail) [1]. This view was assembled using data obtained with NASA's Voyager 1 and 2 and NASA's Galileo, where Galileo's imaging aimed to fill gaps of the Voyager coverage of Ganymede's surface, and to obtain high-resolution data of features and terrain type [2]. This single view complements the 'Global geological mapping of Ganymede', published in 2010 [2] which sheds light on the roles of cryovolcanic and tectonic processes in creating light materials. The authors recognized four fundamental types of material based on their visual appearance: dark-, light-, impact- and reticulate material, with further subdivisions of the first three material types. By the density of craters, the authors can suggest the sequence of formation of these types of materials, with older materials having a higher crater density (only craters with a diameter of 30 km or more are included in the map). In addition, they determined age of the craters. For this, the state of degradation of the crater rim has previously been used, but due to imaging issues, the authors were not confident this characteristic could be determined across Ganymede. Therefore, they focus on relative albedo ('reflection') contrast (with respect to surrounding materials) and presence/absence of rays and continuous ejecta deposits [2]. In this way, the authors state the history of Ganymede can be divided into three phases: before, during and after the formation of light materials. These phases are named the Nicholsonian -, Harpagian - and Gilgameshan Period [1]. Dark cratered material is recognised as the oldest geological unit on Ganymede's surface, whereas dark lineated material and light material units have a similar crater density. This supports the view that dark lineated material is a transition material; from dark material to light material by tectonization [3]. "This geological map provides a post-Galileo synthesis of the history of this important icy satellite that will be extremely useful as a frame of reference for the future exploration of the jovian system." [2].

[1] G. Collins et al. 2014, Scientific Investigations Map 3237

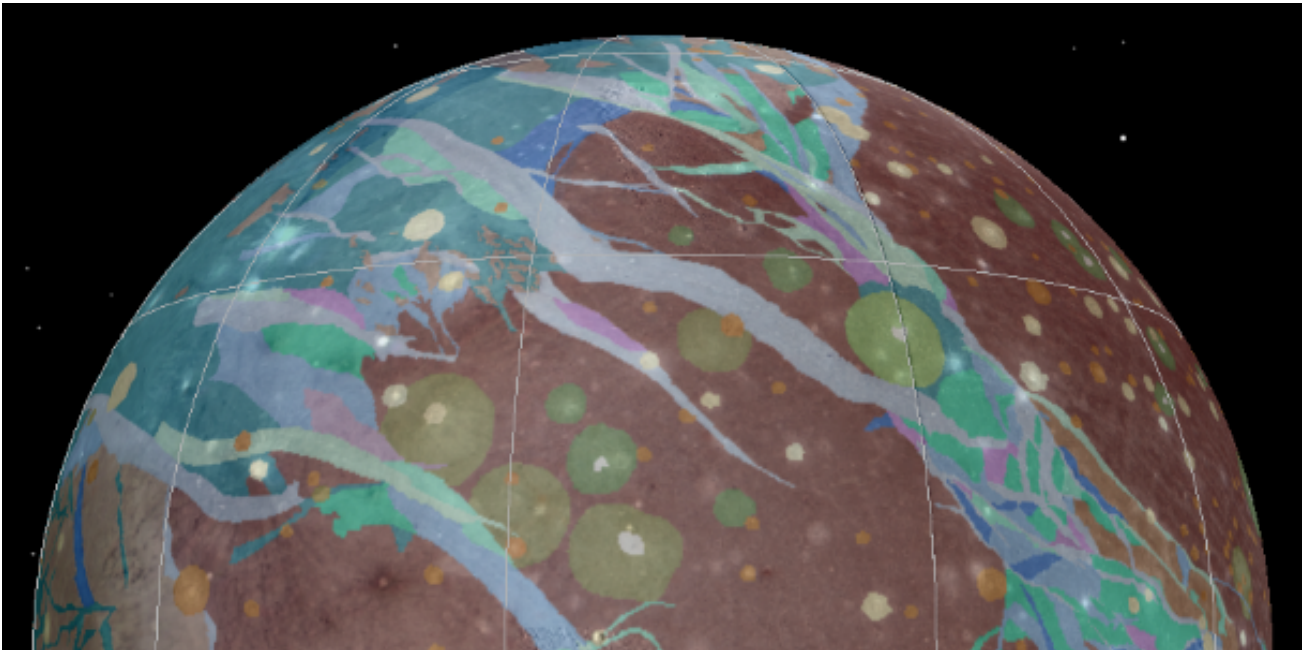
[2] G.W. Patterson et al. 2010, Icarus 207, p. 845-867

[3] R.T. Pappalardo et al. 2004, Jupiter, p. 363-396

Please visit these sites for more information, full images, and a rotating map:

<http://pubs.usgs.gov/sim3237/>

www.usgs.gov/newsroom/article.asp?ID=3802&from=rss_home#.UxXt4KUpHwJ



Selection from the single view map of Ganymede [1]: The colours indicate different types of material (blue/green is light material, red is basin material of Gilgamesh and yellow, crater material).