Consumer-Grade Virtual Reality as a Tool and Methodology for Mars and Other Off-World 3D Immersive Experiential and Scientific Exploratory Research

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In this off-world research environment construction “proof of concept” demonstration, lower-cost consumer-grade Oculus Quest virtual reality (VR) hardware employing affordable Spatial metaverse 3D space creator software is used to display a gallery of 10 Structure from Motion (SfM)-created Mars landscape and rock-outcrop 3D spatial data models – providing layperson citizen-scientists through professional researchers with an economically accessible tool and methodology for preliminary Mars and other off-world scientific exploratory research. Each Mars 3D spatial data model was digitally constructed by the researcher from large multiple-image Mars 2020 Perseverance Rover Mastcam-Z, Navcam, and Front Hazcam image datasets using Agisoft Metashape photogrammetric processing software – for loading and aligning images; creating depth maps, masks, and mesh; and for generating dense point cloud and texture blending maps – followed by using Blender, a free and open-source 3D creation suite software, to rotate and crop each 3D spatial data model and to select model export format(s). The finished spatial data models are then uploaded to Sketchfab, a leading platform to publicly archive, view, and distribute 3D/VR models on the internet, followed by a final upload of the finished models from Sketchfab to a functional Spatial 3D room for positioning and display – where laypeople, students, citizen-scientists, educators, technical professionals, engineers, scientific researchers, and others can then economically access, engage, and study these robust image-accurate Mars (or other off-world) 3D spatial data models in an immersive 3D/VR exploratory research environment.

Awards Won: