Title: Development of an Extended Reality (XR) tool for Earth Science visualization

In this presentation, we will discuss our work in adapting the NASA open source XR software, the Mixed Reality Exploration Toolkit (MRET), to an earth science domain. MRET is a NASA open source XR software for rapidly building extended reality (XR) environments for NASA domain problems, e.g., pulling in CAD models of thermal vac chamber and Roman Space Telescope to do fit checks. Primarily used for hardware integration & test, we have been adapting and extending MRET for science problems.

Traditionally, scientists view and analyze the result of calculated or measured observables with static 1-D, 2-D or 3-D plots. It can be difficult to identify, track and understand the evolution of key features due to poor viewing angles and the nature of flat computer screens. Additionally, numerical models, such as the NASA GEOS climate model, are almost exclusively formulated and analyzed on Eulerian grids with points fixed in space and time. However, atmospheric phenomena such as convective clouds, hurricanes and wildfire smoke plumes move with the 3-D flow field, and it is often difficult and unnatural to understand these phenomena in an Eulerian reference frame as opposed to the Lagrangian reference frame in which nature operates. As part of an Earth Science Technology Office (ESTO) proposal, we have been adapting MRET to be a scientific exploration and analysis XR tool with integrated Lagrangian Dynamics (LD) for the Goddard Earth Observing System (GEOS) numerical weather prediction model. We believe this will help scientists identify, track, and understand the evolution of Earth Science phenomena. This presentation will discuss current results in our work in developing this XR tool for Earth Science.