3D Display and Gesture Technology For Scientific Programming

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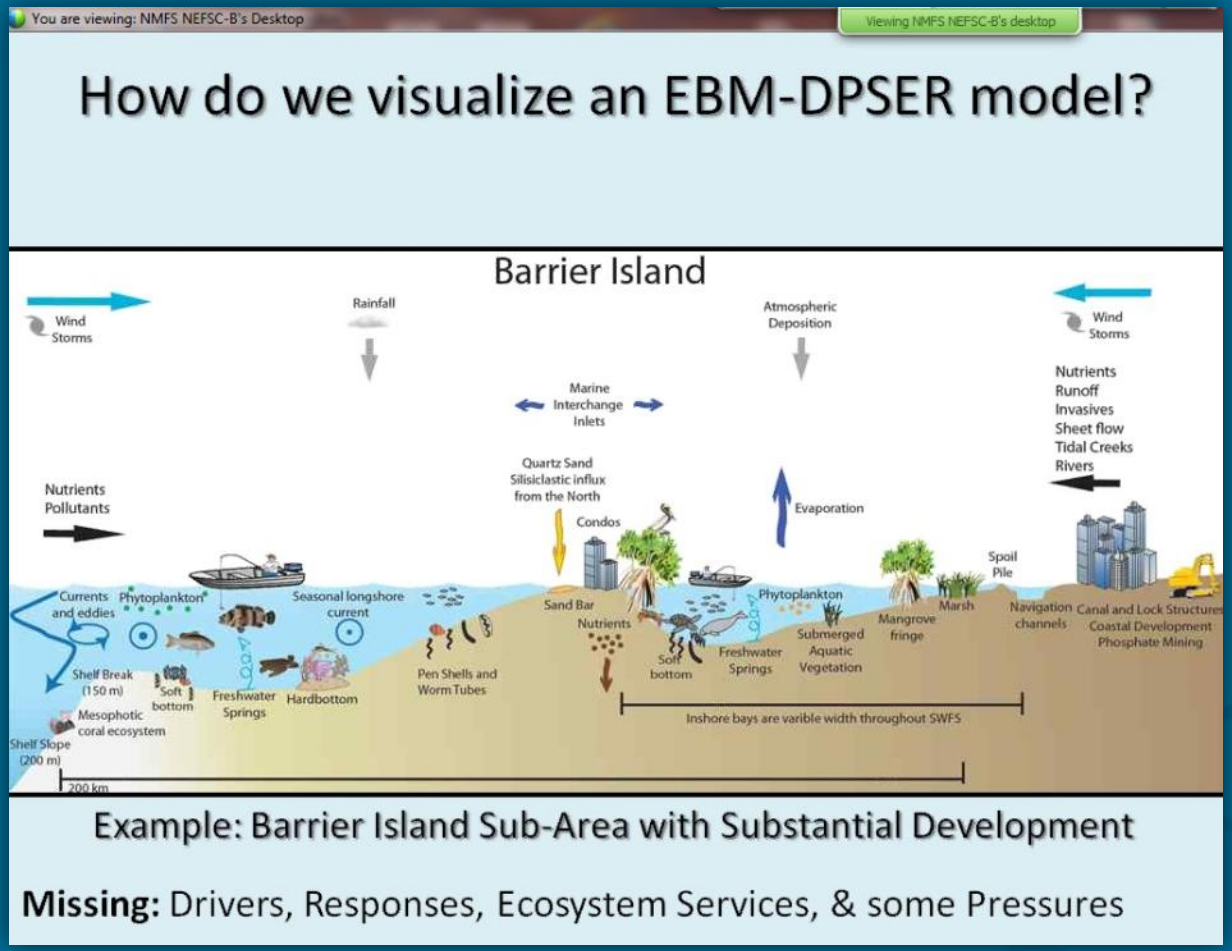
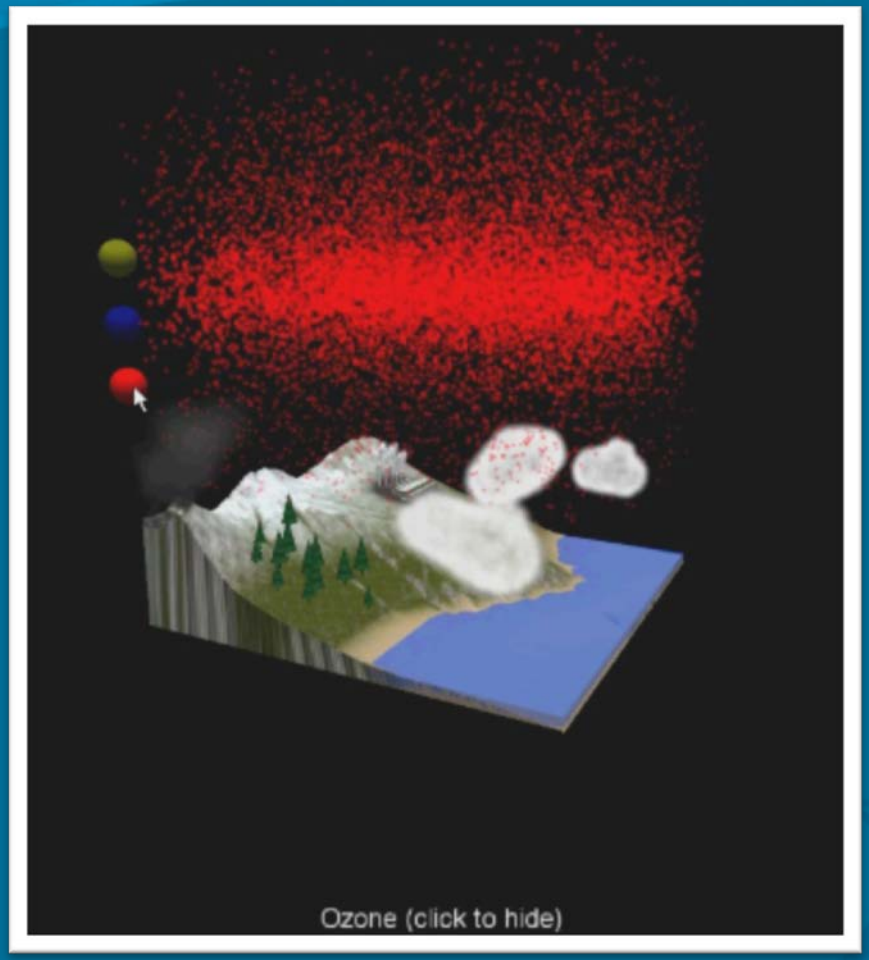
2D Visualization Of Ecosystem



Example: Barrier Island Sub-Area with Substantial Development

Missing: Drivers, Responses, Ecosystem Services, & some Pressures

3D Visualization Of Ecosystem



http://www.youtube.com/watch?v=HCZu1kJV0KQ

3D Visualization Of Ecosystem

http://www.youtube.com/watch?v=Ukaln8_ai3c

About Unity -1

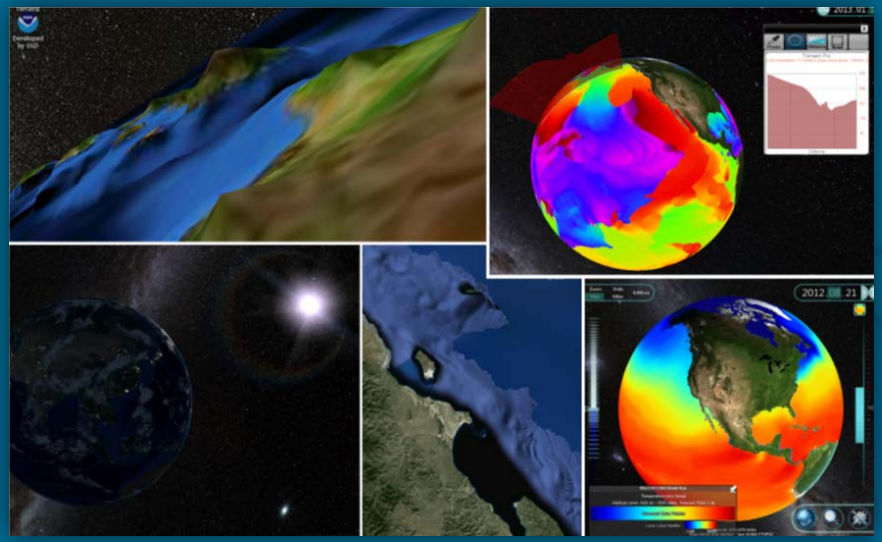
- Unity is a commercial game engine that excels at rendering 3D (and 2D) scenes
- Unity applications can be deployed to Windows, Mac, iOS, Xbox, Wii, and the web (through the Unity web player)
- >800,000 registered developers
- Good community support and documentation, tutorials

About Unity -2

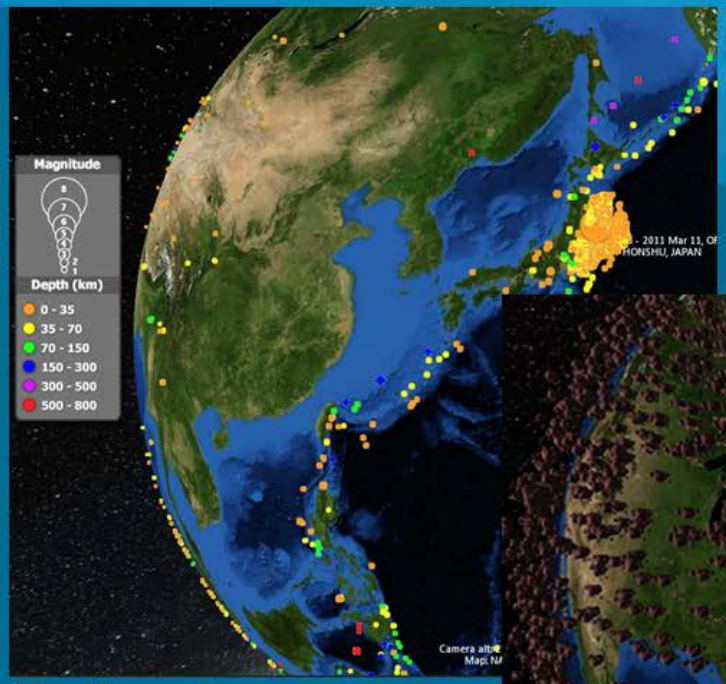
- Visualizing 3D data is an ideal task for game engines like Unity because they have been optimized over many years to leverage GPU video cards
- With this blindingly fast performance, game engines can just as easily visualize millions of environmental data points as display the millions of polygons that comprise a scene in a game like Call Of Duty.
- When we display global G9 (30 km) model data (FIM) in TerraViz, we can display 2.6 million polygons and rotate the globe with no delays
  - As a comparison, Google Earth chokes at around 10,000 polygons (KML)

What is TerraViz?

- 3D visualization tool for Earth datasets
- Uses Unity, a popular 3D game engine
- Leverages the power of GPUs (graphical processing units)

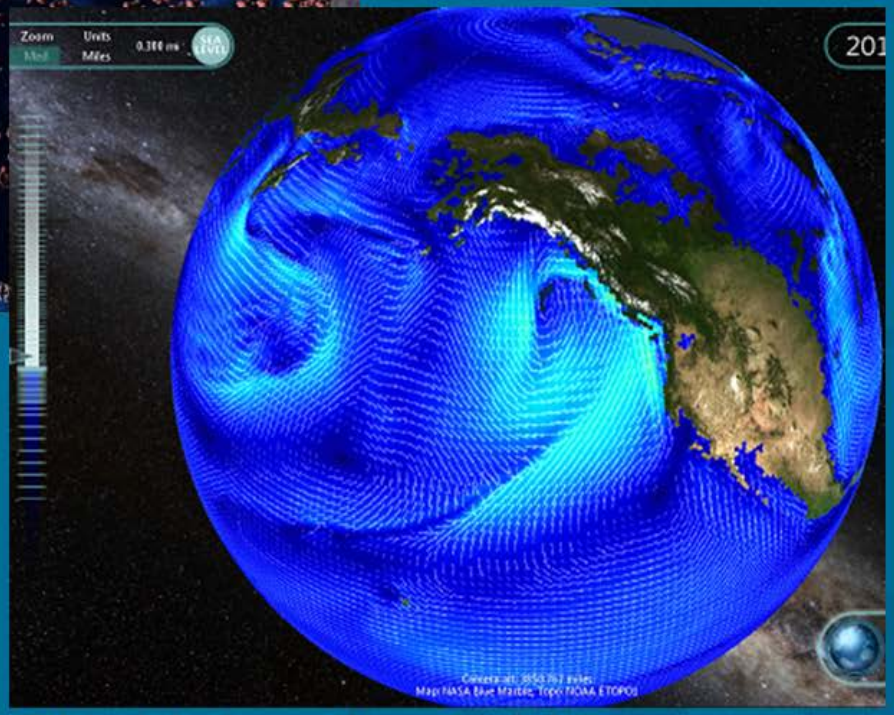


TerraViz Datasets

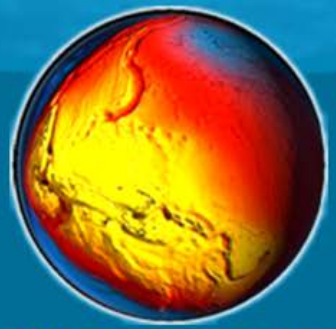


Earthquakes

NORAD satellites



FIM global weather model



GOCE gravimetry

Developing in Unity -1

- As a software engineer, migrating from more conventional software development in Java, C, Fortran, or Python to 3D development in Unity, involves a major mental paradigm shift.
- As a developer, you think in terms of concepts such as game objects that have 3D transforms, colliders, meshes, materials, textures, and shaders.
- You add lighting to illuminate your scene, add cameras at advantageous locations which can be moved by the user in real-time (by mouse, keyboard, or multi-touch), and then let the game engine render the scene at run-time.

Developing in Unity -2

- The Unity API follows an object oriented model that is well documented on the Unity website.
- C# is easy for Java developers to learn and made the transition for our development team as painless as possible.
- Unity's advantage over other game engines include price (there is a free version and the professional version that we use is $1500 which sounds like a lot until you compare it to some other game engines with $100,000+ price tags) and the online development forums that can be "Googled" to find answers to many common questions.

Visualization Hardware

zSpace

http://www.youtube.com/watch?v=gPrH4kS9N5c

Leap Motion Controller

http://www.youtube.com/watch?v=_d6KuiuteIA

Leap Motion Controller

GAMING REPORT

25 COMMENTS

NASA remotely controls Athlete rover with Leap Motion: 'let's bring a billion human beings into a holodeck'

"You are the space invaders"

By T.C. Sottek on March 27, 2013 11:30 pm Email @LaughingStoic

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"Just for you guys today we're going to do something special, something that's never been done before" said Victor Luo, NASA human interface engineer. "We're going to drive this robot, on stage at GDC, with a Leap Motion device."

In an unexpected demonstration at the 2013 Game Developers Conference in San

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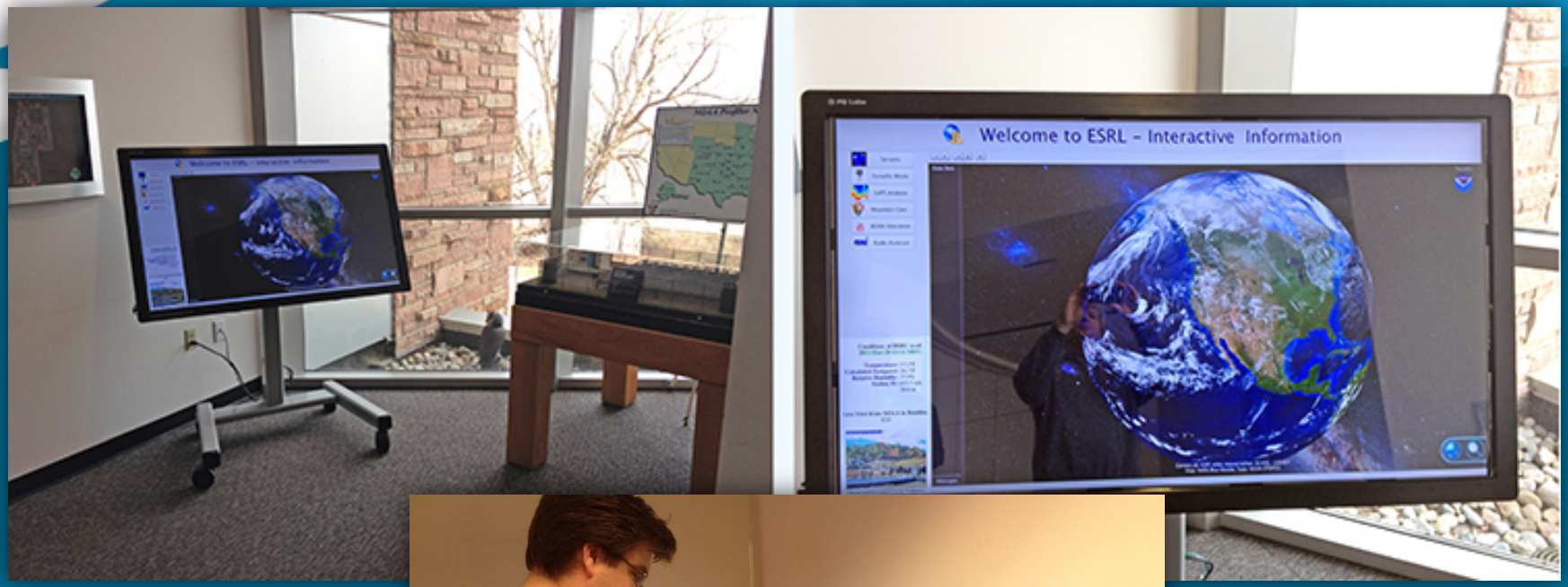
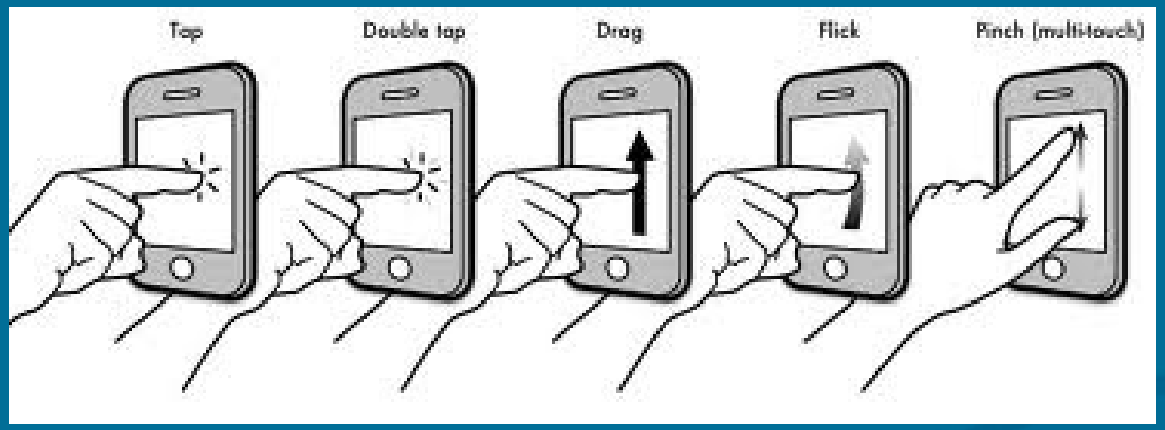
Touch Screen Development



Touch Screen Development

- Instead of mouse events, code responds to gesture events:
  - tap
  - double-tap
  - drag
  - flick
  - pinch (resize)
  - Etc.



- In our Unity development, we’ve found it a bit tricky to know whether the user is tapping or dragging, for example

Check out the Demonstration
(*in the DSRC/ESRL lobby*)

Oculus Rift VR Goggles
(developer kit $300, consumer version $200-$300)

www.youtube.com/watch?v=DhcOMOWRMnA

Questions?

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