



DYAMOND++

A high resolution Climate Model Setup

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STORYTELLING OF SCIENCE
IN DOME THEATRE FOR EXPLORANATION

WISDOME CONTEST

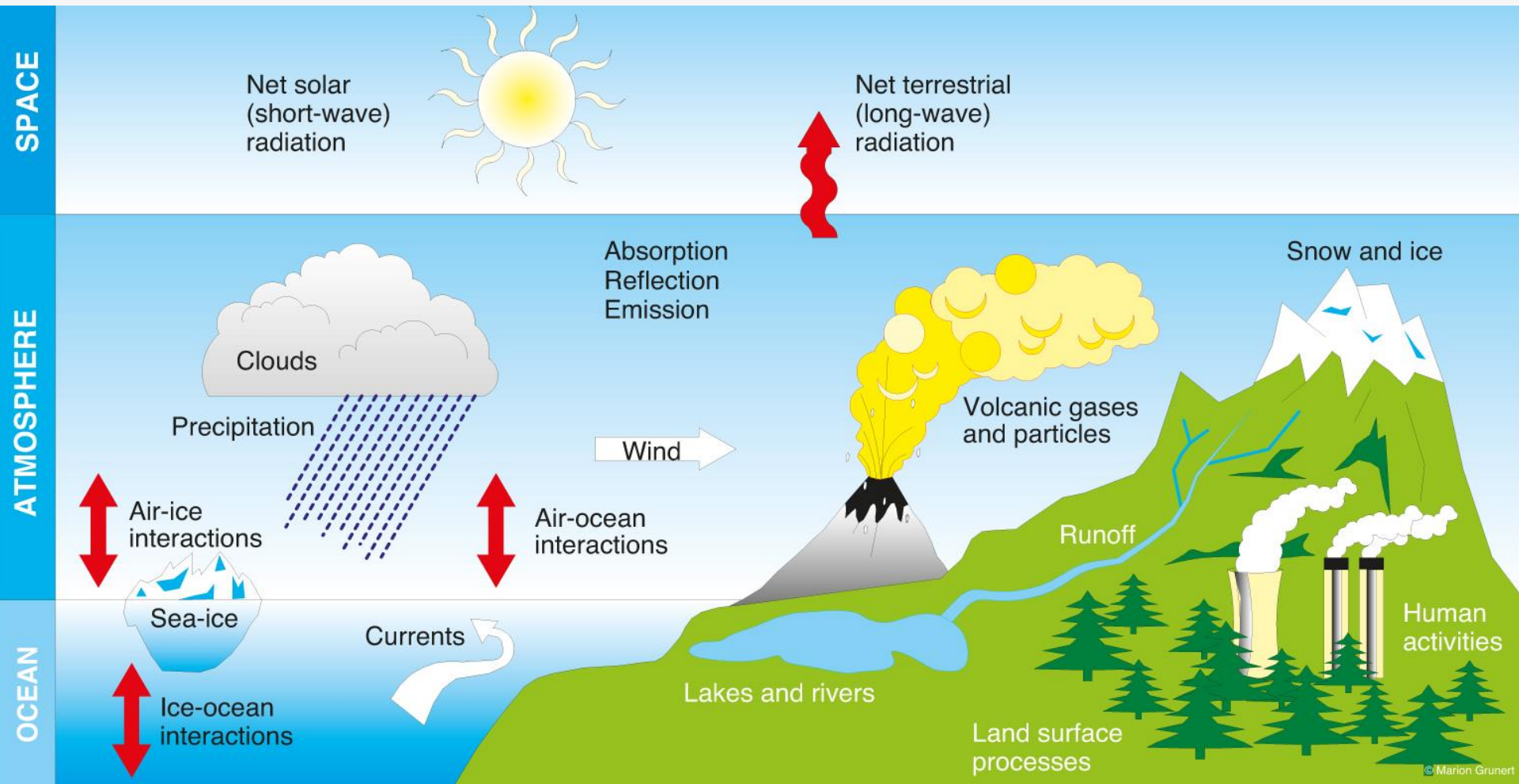
Eurographics

Eurovis

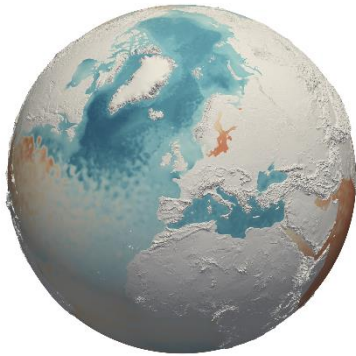
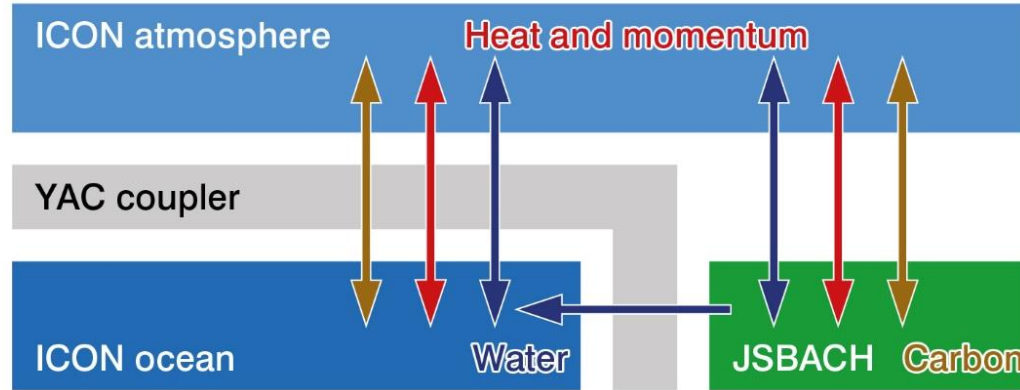
2020



The Climate System



ICON Earth System Model & DYAMOND++ Setup



Ocean

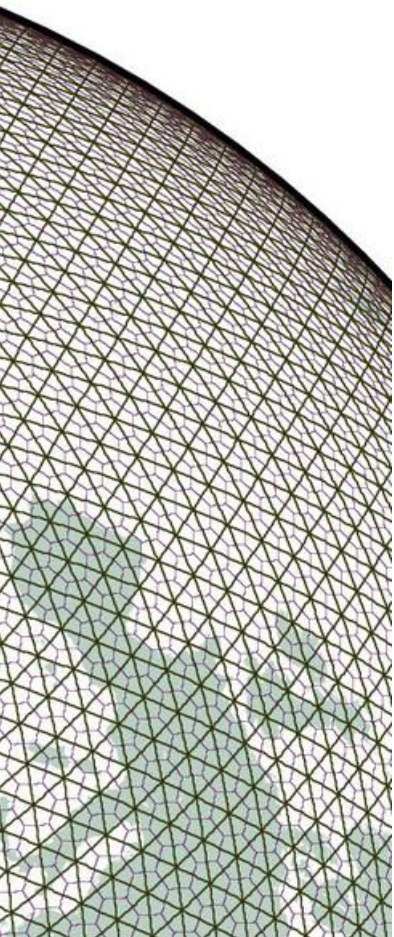


Land

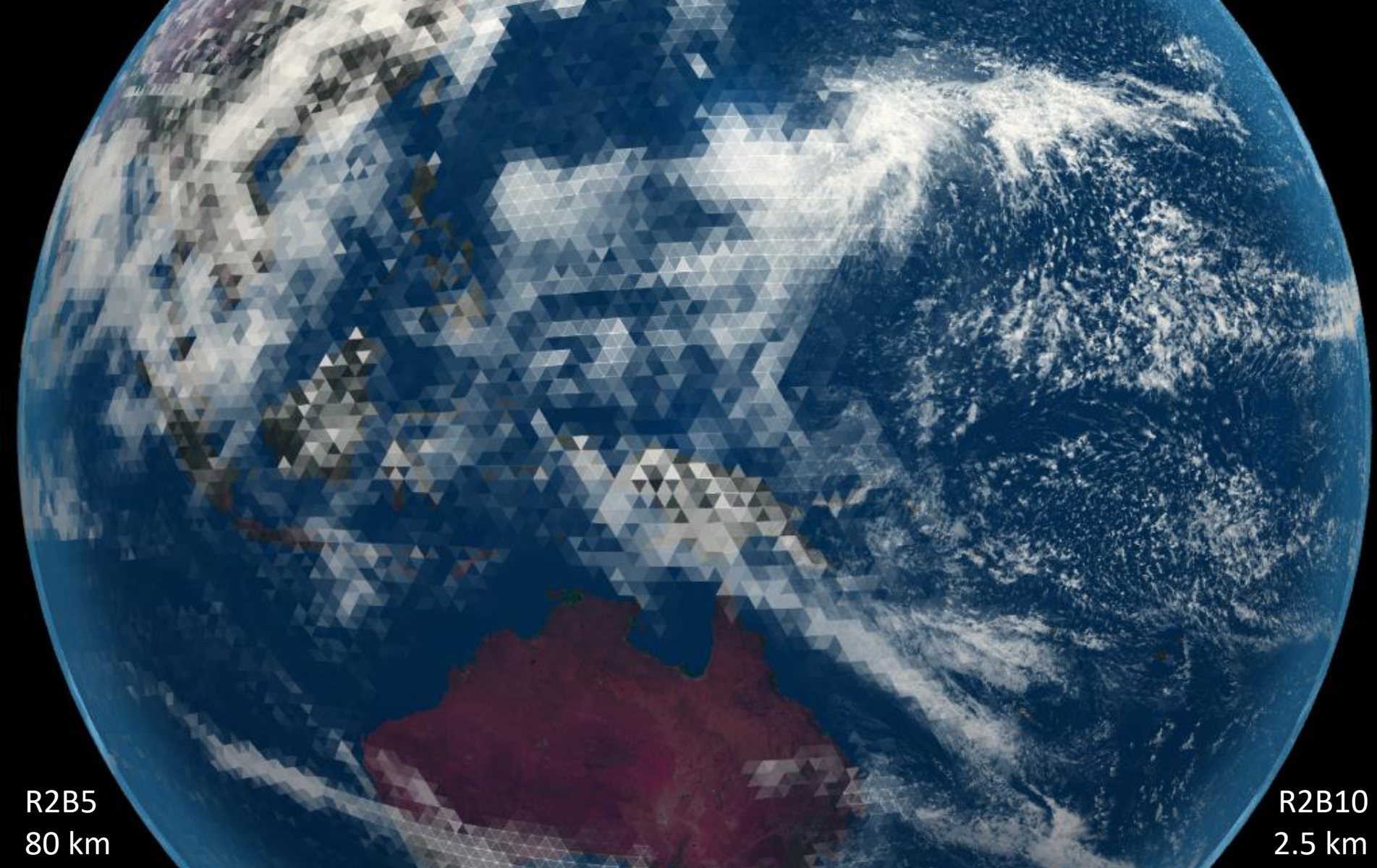


Atmosphere

Data Progression

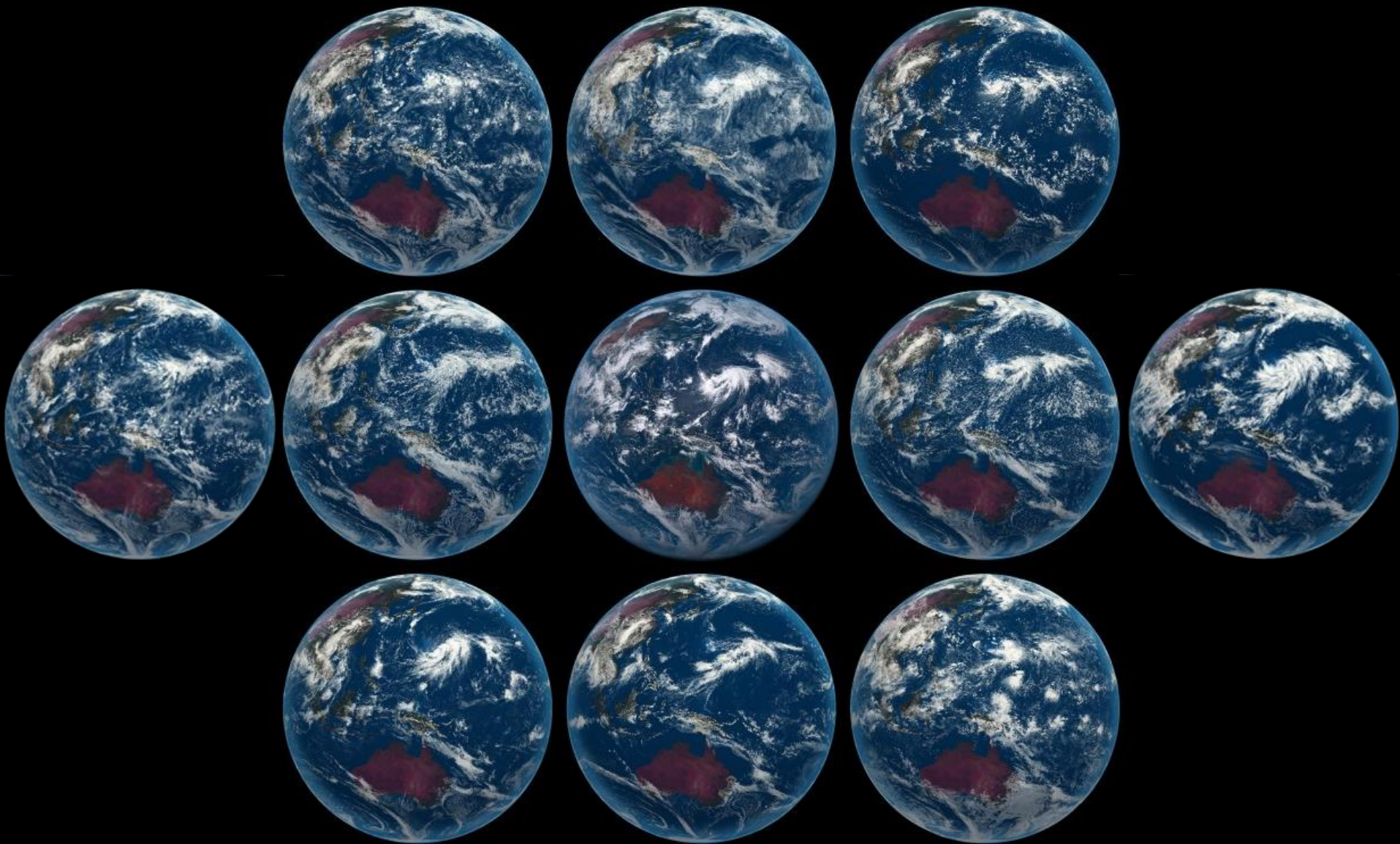


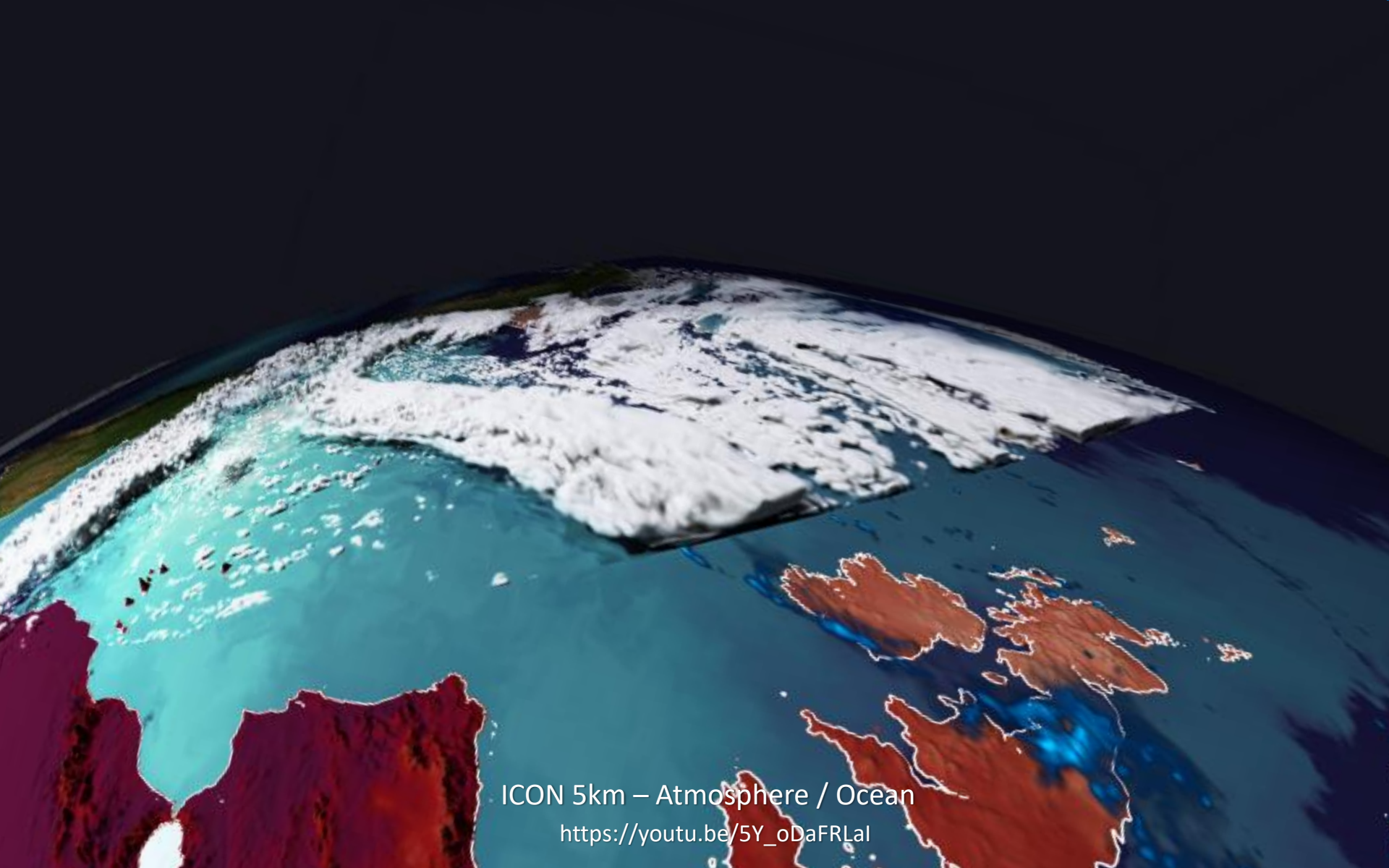
- **DYAMOND++**
 - Global, Atmosphere/Ocean/Land, 5km
 - 21M/3.3B 2D/3D Cells
 - One simulated day ~ **25 TB**
- **DYAMOND**
 - Global, Atmosphere, 2.5km
 - 85M/**13B** 2D/3D Cells
 - One simulated day ~ **52 TB**
- **ESiWACE2**
 - Global, Atmosphere, 1.25km
 - **340M / 52B** 2D/3D Cells
 - One simulated day ~ **210 TB**



R2B5
80 km

R2B10
2.5 km



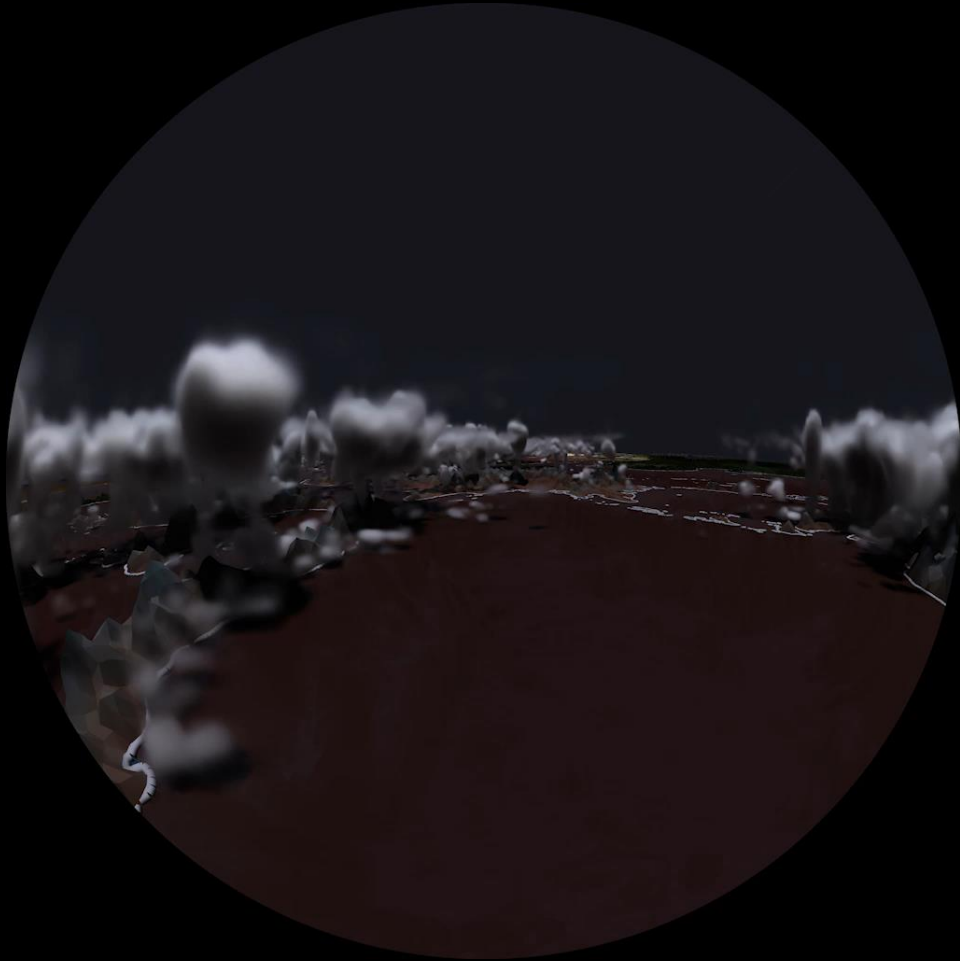
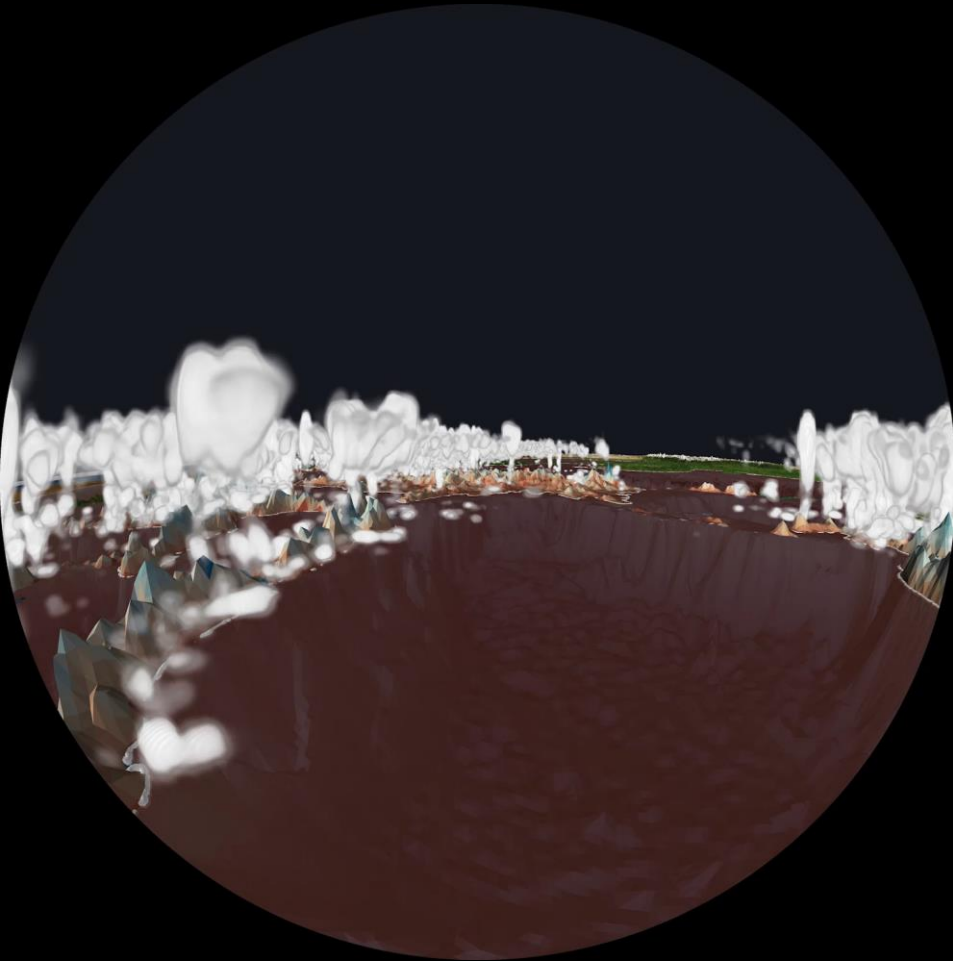


ICON 5km – Atmosphere / Ocean

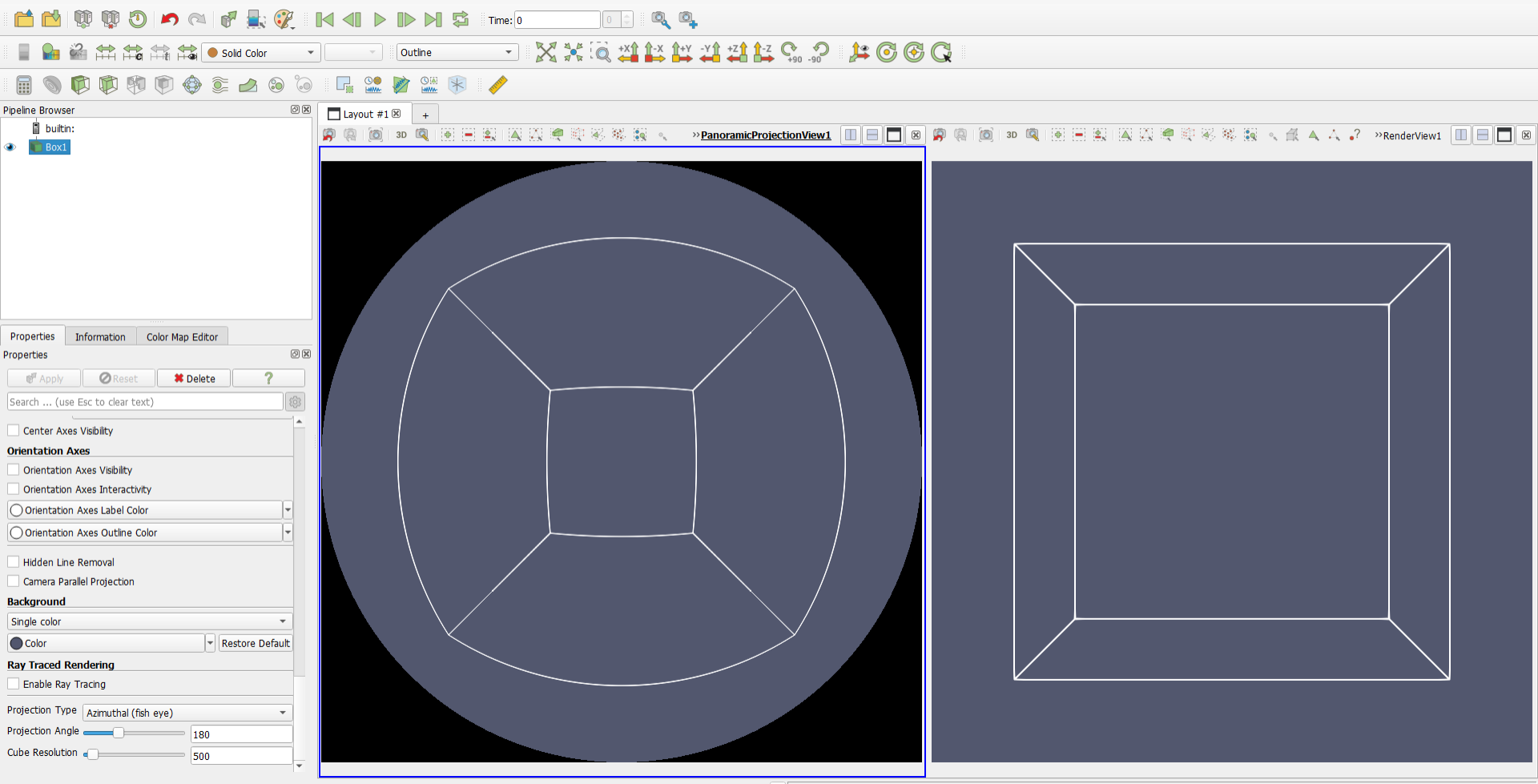
https://youtu.be/5Y_oDaFRLal

OpenGL

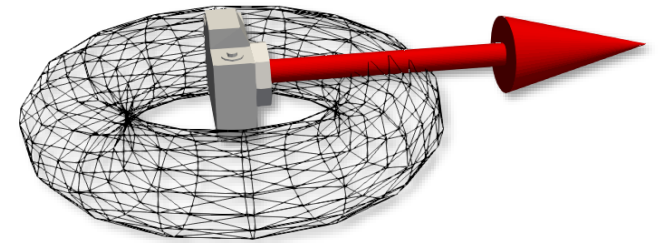
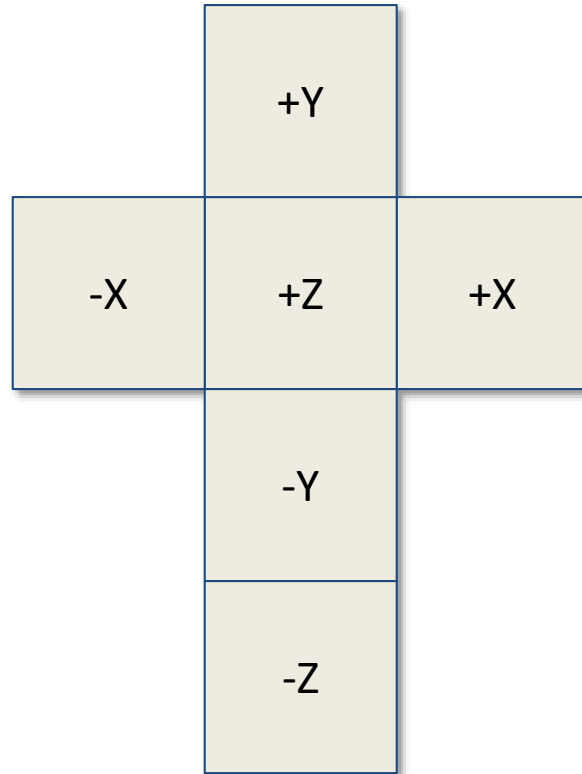
OSPRay



ParaView Panoramic Projection Plugin



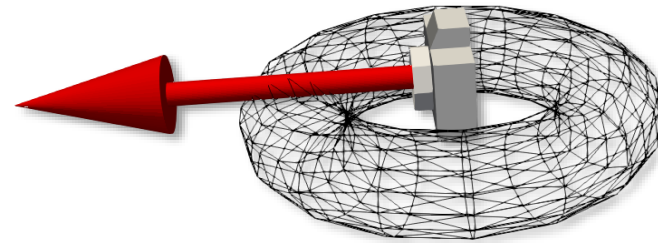
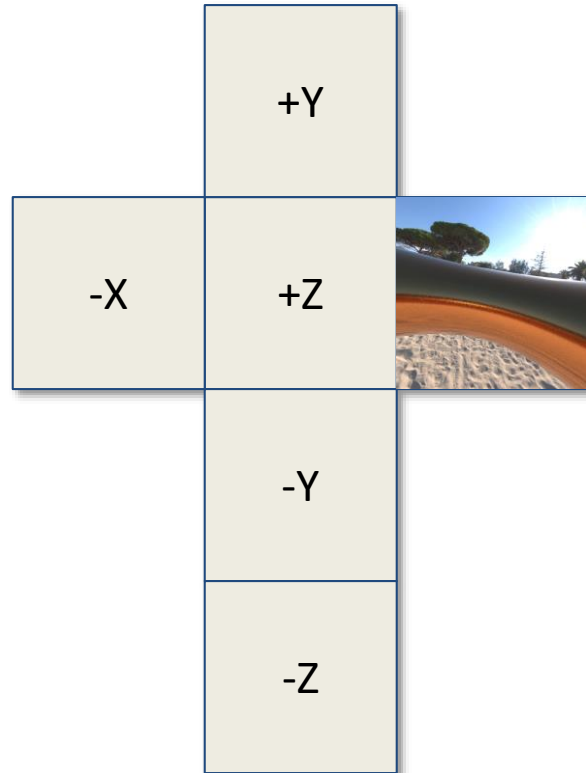
Panoramic View Rendering



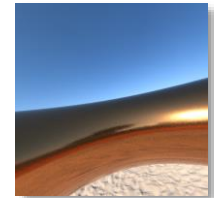
Render direction +X



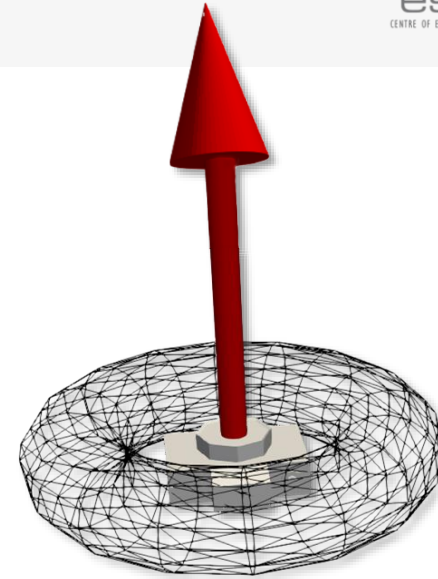
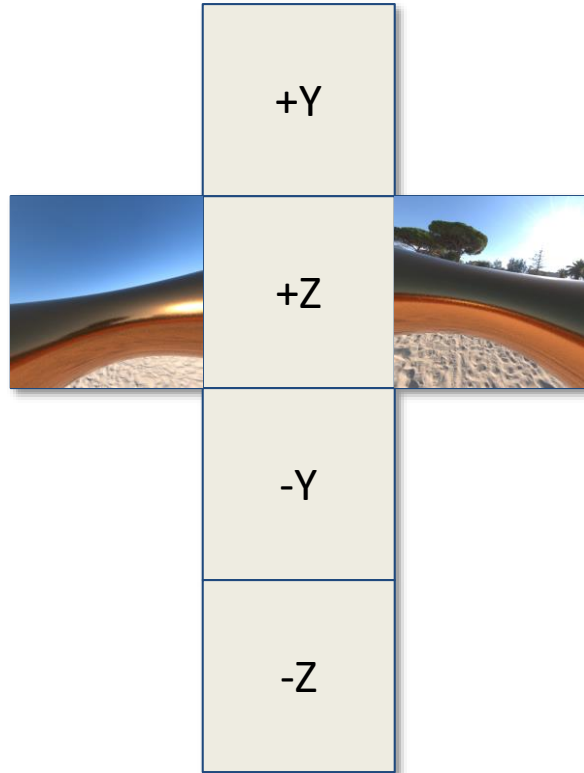
Panoramic View Rendering



Render direction -X



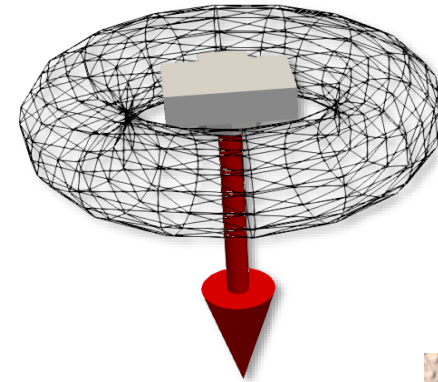
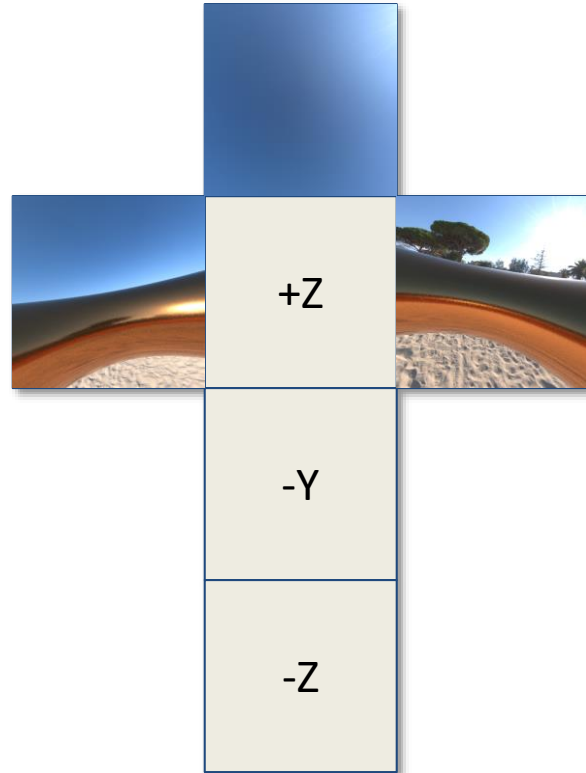
Panoramic View Rendering



Render direction +Y



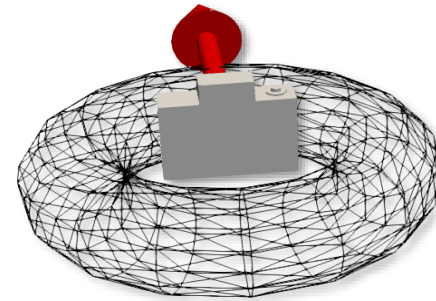
Panoramic View Rendering



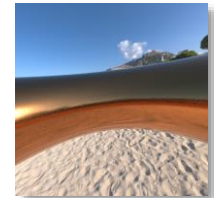
Render direction -Y



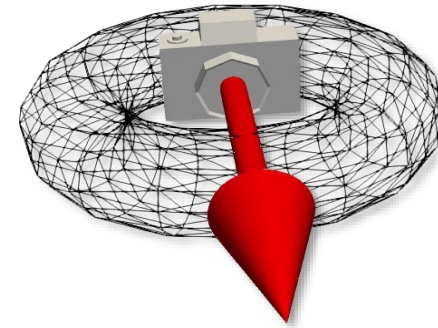
Panoramic View Rendering



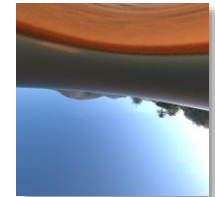
Render direction +Z



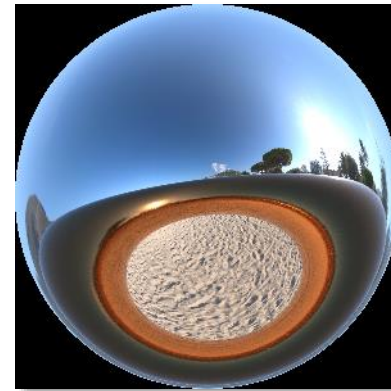
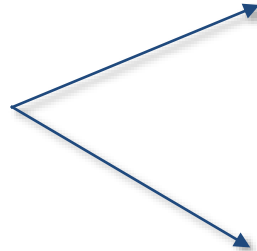
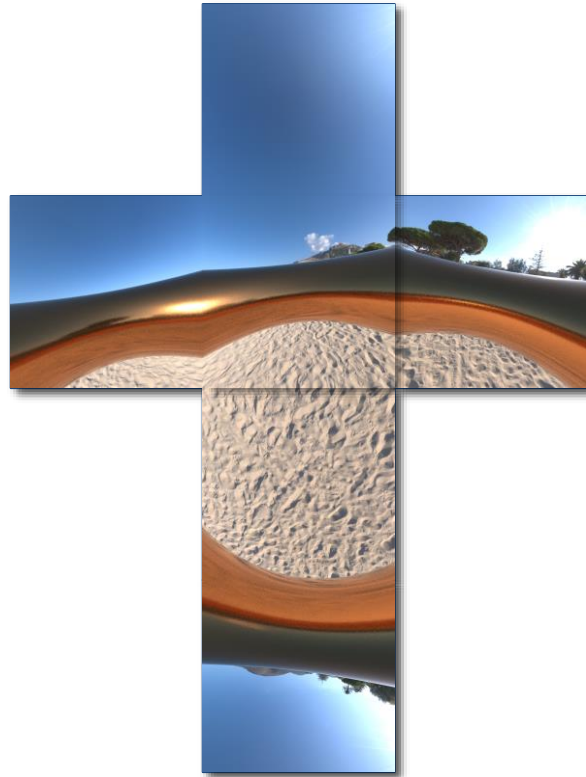
Panoramic View Rendering



Render direction -Z



Panoramic View Rendering

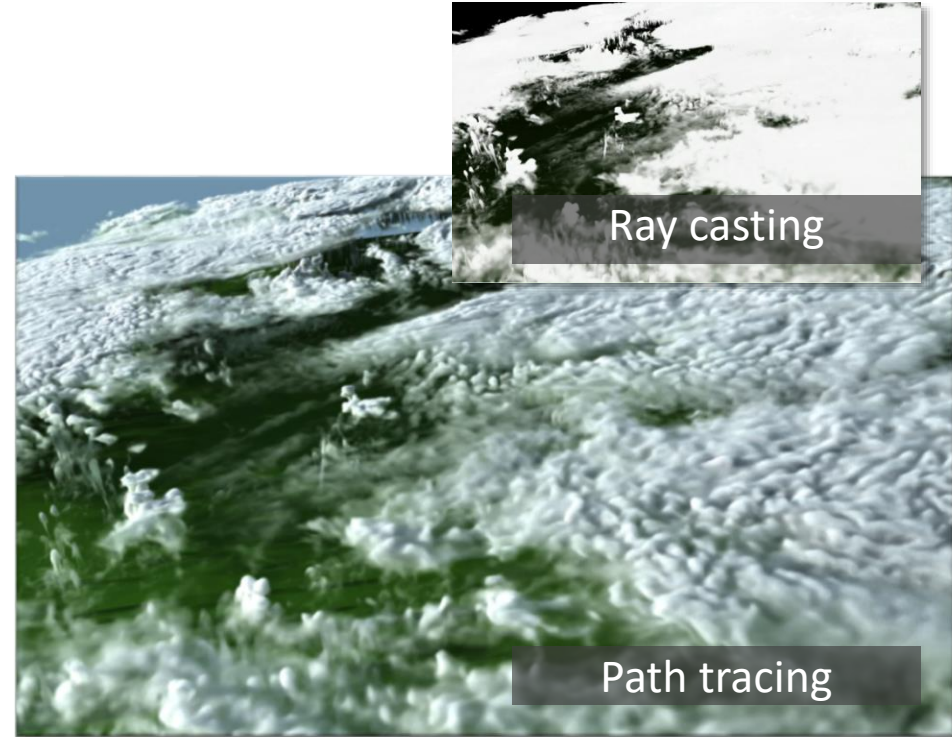
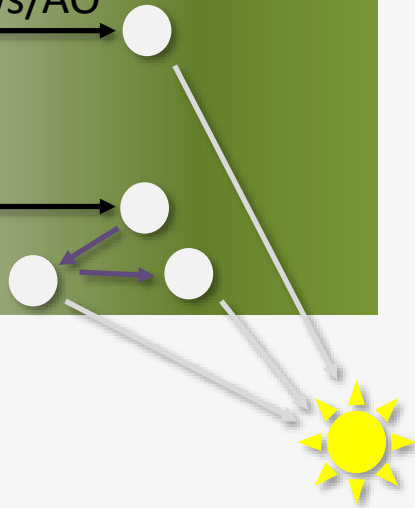


Volumetric Path Tracing with Intel® OSPRay

Ray casting

Ray casting + shadows/AO

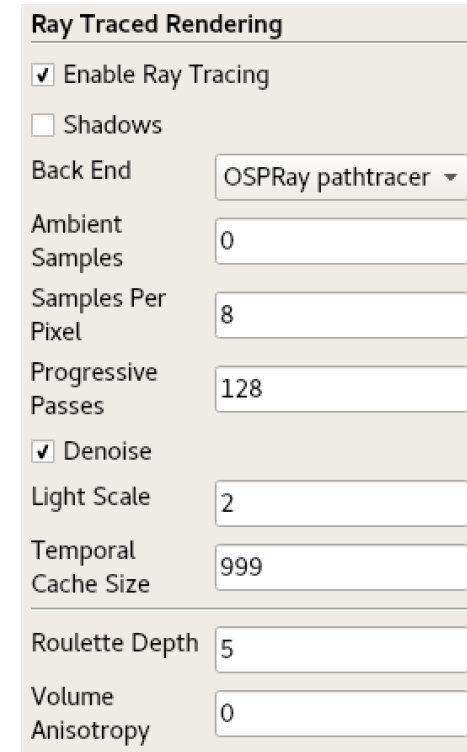
Path tracing



ParaView Integration

- Multiple scattering
- Interactive
- CPU (+ future GPU support)
- Delta tracking
- Intel® VKL volumetric kernels
- Intel® Open Image Denoise

Available in ParaView 5.9



Ray Traced Rendering	
<input checked="" type="checkbox"/> Enable Ray Tracing	
<input type="checkbox"/> Shadows	
Back End	OSPRay pathtracer ▾
Ambient Samples	0
Samples Per Pixel	8
Progressive Passes	128
<input checked="" type="checkbox"/> Denoise	
Light Scale	2
Temporal Cache Size	999
Roulette Depth	5
Volume Anisotropy	0

HLRE3 – Mistral



- > 3000 Bullx DLC 720 (> 100.000 cores, 240 TB memory, 54 PB disk)
- 3.6 PetaFLOPS, Infiniband FDR (Setup: 2015, Top500: 93 (06/2020))

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AND CLIMATE IN EUROPE



The project ESIWACE2 has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 823988.

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