MOD Meeting

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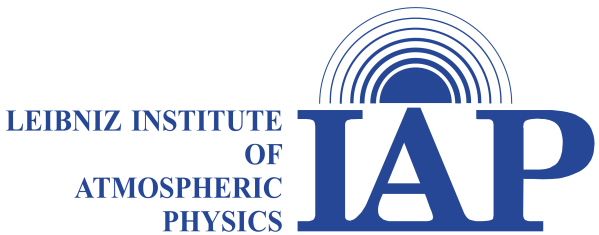

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OmniGlobe: What is it?

- *Spherical Display System:* OmniGlobe is a high-resolution spherical projection display that visually represents global data on a physical globe
- *Interactive and Customizable:* Supports dynamic and real-time content playback, **including user-created datasets and animations**, enabling interactive presentations and tailored visual storytelling.

Figure 1: OmniGlobe at KIT.

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OmniSuite: How do I preview "stories" for OmniGlobe?

Figure 2: Example OmniSuite view of a stock "story". A story encapsulates assets (e.g., zonal wind animations) and metainformation (e.g., description) about the assets. Can also have multilayer assets (e.g., for vertical levels).

Components of OmniSuite: What About Custom Stories?

- *Controller:* View "stories" (assets).
- *Catalog:* Download pre-made stories.
- **Material Editor:** Upload images to create the base images/animations for stories. Images can be created with Python package `omnisuite-viz`.
- **Story Editor:** Load in materials and add metainformation (descriptions, etc.).
- *Story Exporter:* Export pre-rendered stories.

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omnisuite-viz: Pypkg for Making OmniSuite Compatible Assets

- Provide generic interfaces for plotting arbitrary data on the globe.
- Ensure plots are compatible with format expected by OmniSuite.
- Produce animations of temporal geospatial data for diagnostic visualization independent of OmniSuite.
- github/omnisuite-viz

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OmniSuite: Zonal Wind from Open Source Spectral Model

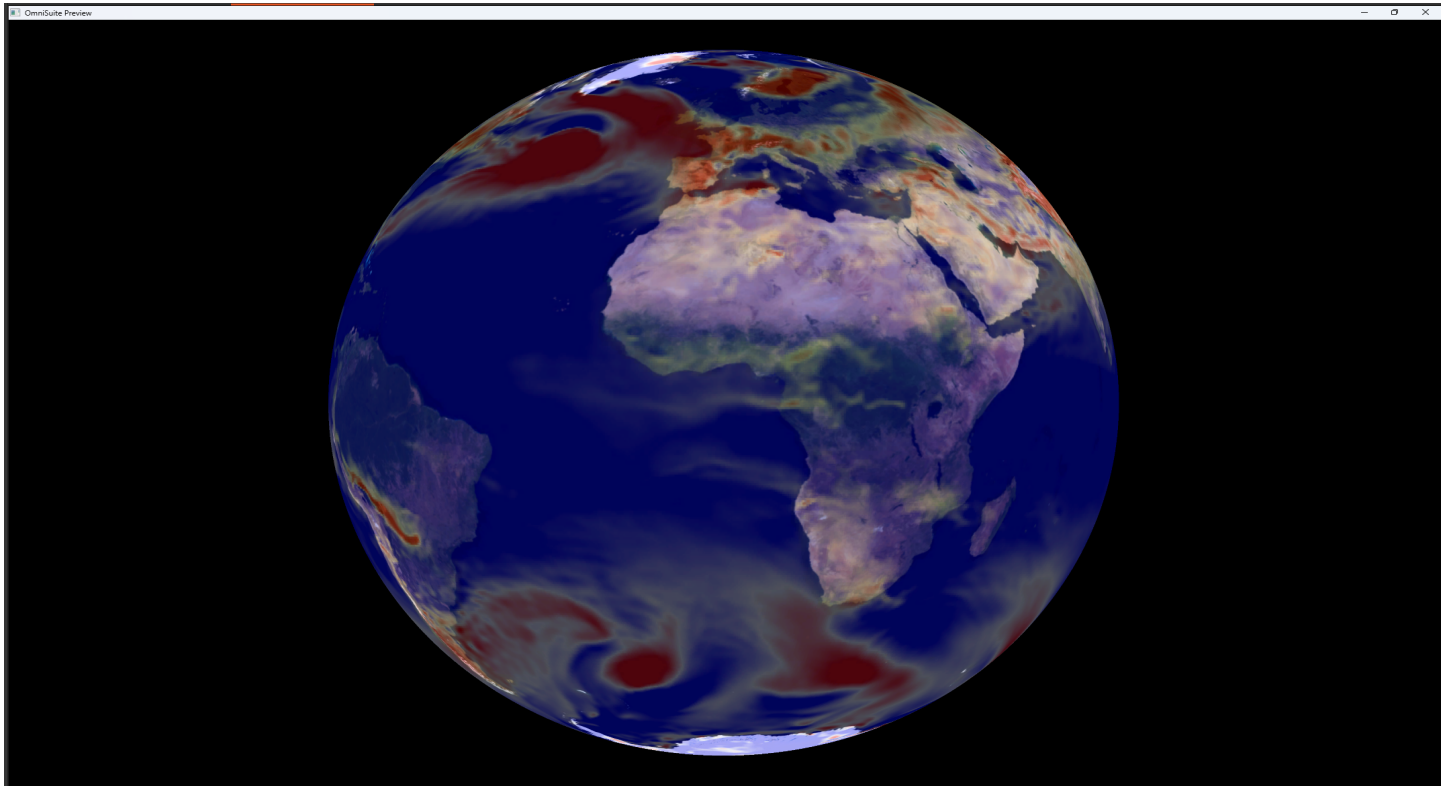

Figure 3: Preview of evolution of zonal wind data from 3D primitive equation model in `SpeedyWeather.jl`. Live demo after!

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Raw Animation: Zonal Wind from Open Source Spectral Model

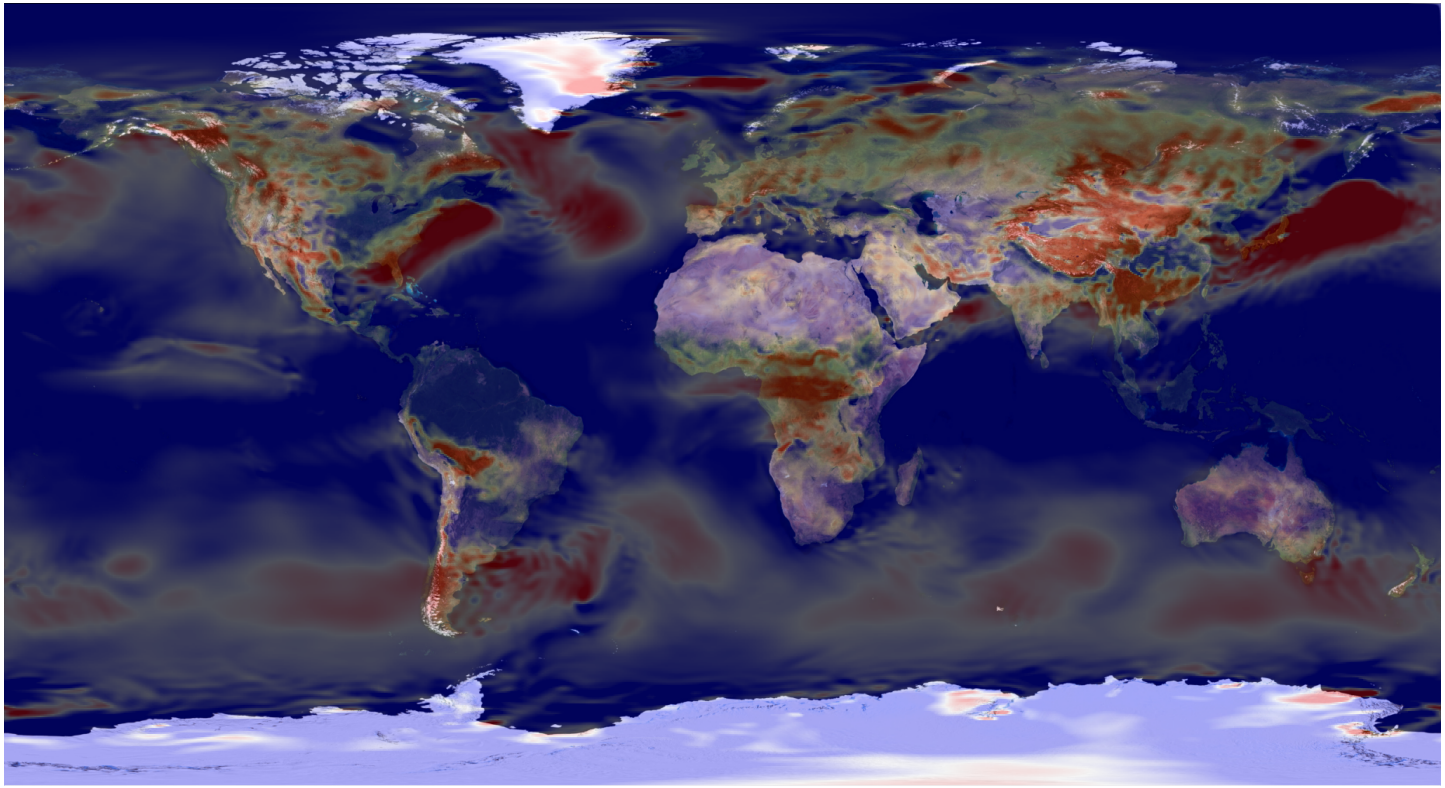

Figure 4: Raw asset for zonal wind data from 3D primitive equation model in `SpeedyWeather.jl`. Show animation after!

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OmniSuite: ICON Gravity Waves

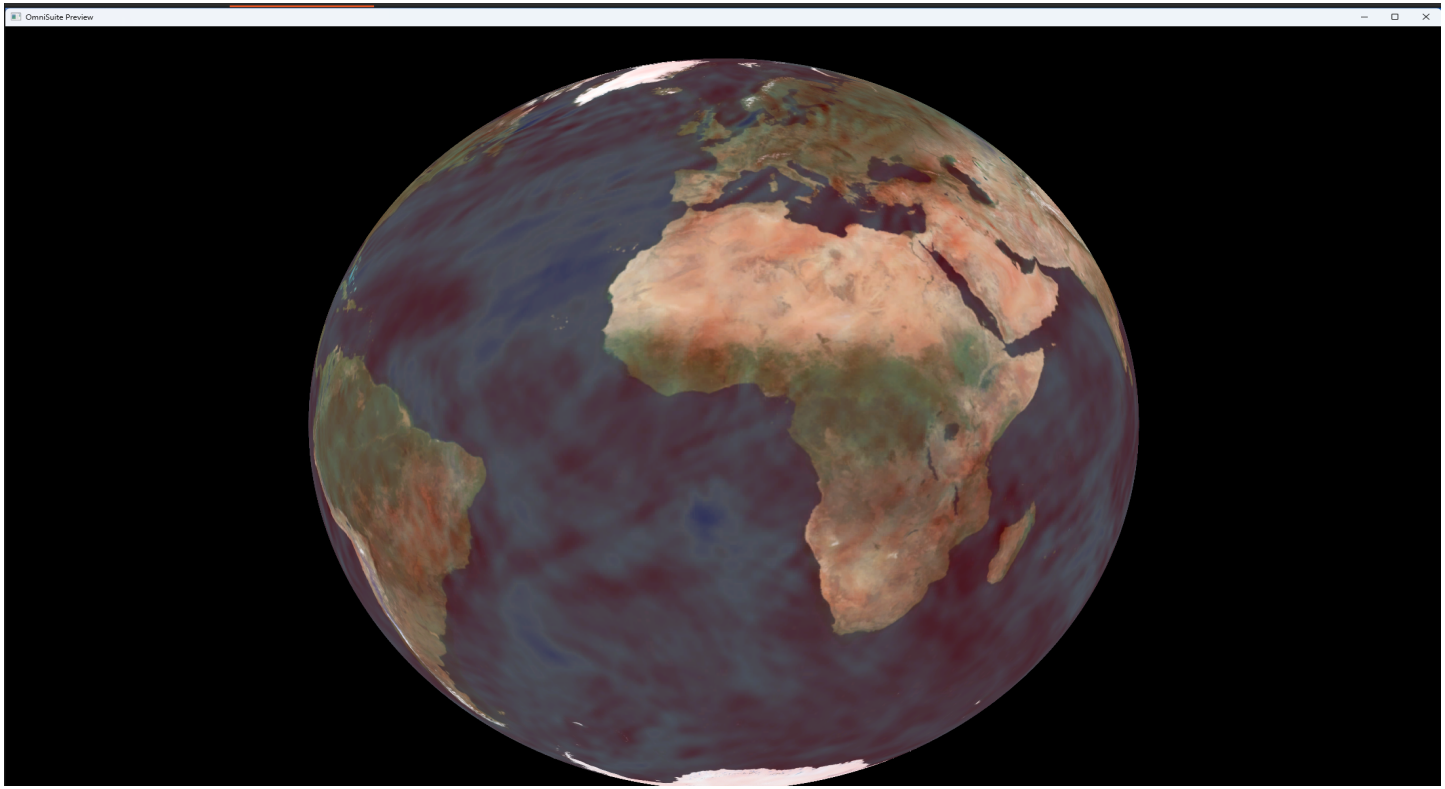

Figure 5: Preview of evolution of gravity waves from R2B7 ICON simulation. Live demo after!

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Raw Animation: ICON Gravity Waves

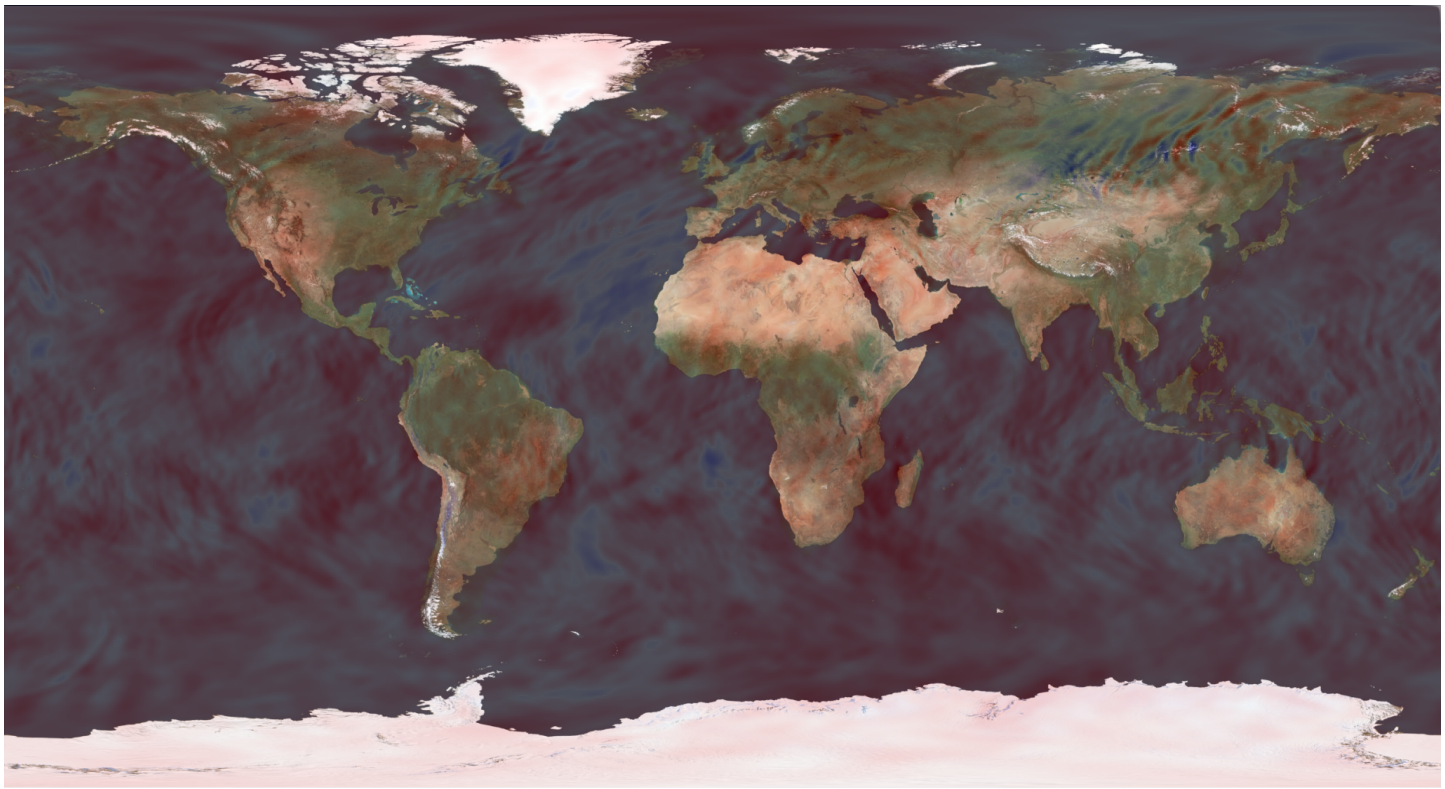

Figure 6: Raw asset for gravity wave data from ICON. Show animation after!

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Typical `omnisuite-viz` Workflow

- Subclass `Reader` to load NetCDF/Grib data and store it in a `Grid` object
- Subclass `AnimatorConfig` to control the asset output.
- Subclass `Animator` and override two methods.

```python
    # read netcdf data, the blue marble image, and post process
    reader = IconDataReader(
        netcdf_response_var_file_path=netcdf_response_var_file_path,
        netcdf_long_name_of_response_var=netcdf_long_name_of_response_var,
        netcdf_height_file_path=netcdf_height_file_path,
        netcdf_long_name_of_height_var=netcdf_long_name_of_height_var,

        blue_marble_path=blue_marble_path,

        min_vertical_layer_height_in_meters=(
            min_vertical_layer_height_in_meters),
        max_vertical_layer_height_in_meters=(
            max_vertical_layer_height_in_meters))

    reader.read()
    reader.postprocess()

    grid = reader.grid
    num_frames_in_animation = grid.response.shape[0]  # equal to n timesteps

    blue_marble_img = reader.blue_marble_img

    # set up plotting configuration
    config = NetcdfAnimatorConfig(
        save_animation=save_animation,
        output_dir=output_dir,

        coastlines_kwargs={"lw": 0.0},
        plot_height_in_pixels=plot_height_in_pixels,
        plot_width_in_pixels=plot_width_in_pixels,

        netcdf_var_cmap_on_plot=cmap,
        netcdf_var_transparency_on_plot=alpha,

        num_frames_in_animation=num_frames_in_animation,

        netcdf_response_var_file_path=netcdf_response_var_file_path,
        blue_marble_path=blue_marble_path)

    # write the frames to disk
    animator = ICONModelAnimator(
        grid=grid, config=config, blue_marble_img=blue_marble_img)

    animator.animate()
```

Figure 7: Example workflow to generate OmniSuite assets.

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Getting Operational/ERA-* Data?

- *Problem:* Limited (2 TB) storage for login nodes on ECMWF's HPC system called ATOS.
- *Goal:* Efficiently transfer Operational, ERA-5, ERA-Intermin, or ERA-40 data from these login nodes to Levante.
- *Solution:* Automated transfer and deletion of IFS data suitable for ICON simulations to Levante. Prior solution only acquired a more limited form of operational data.
- *Limitation:* Still requires ECMWF credentials—no workarounds to this.

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Automated Solution

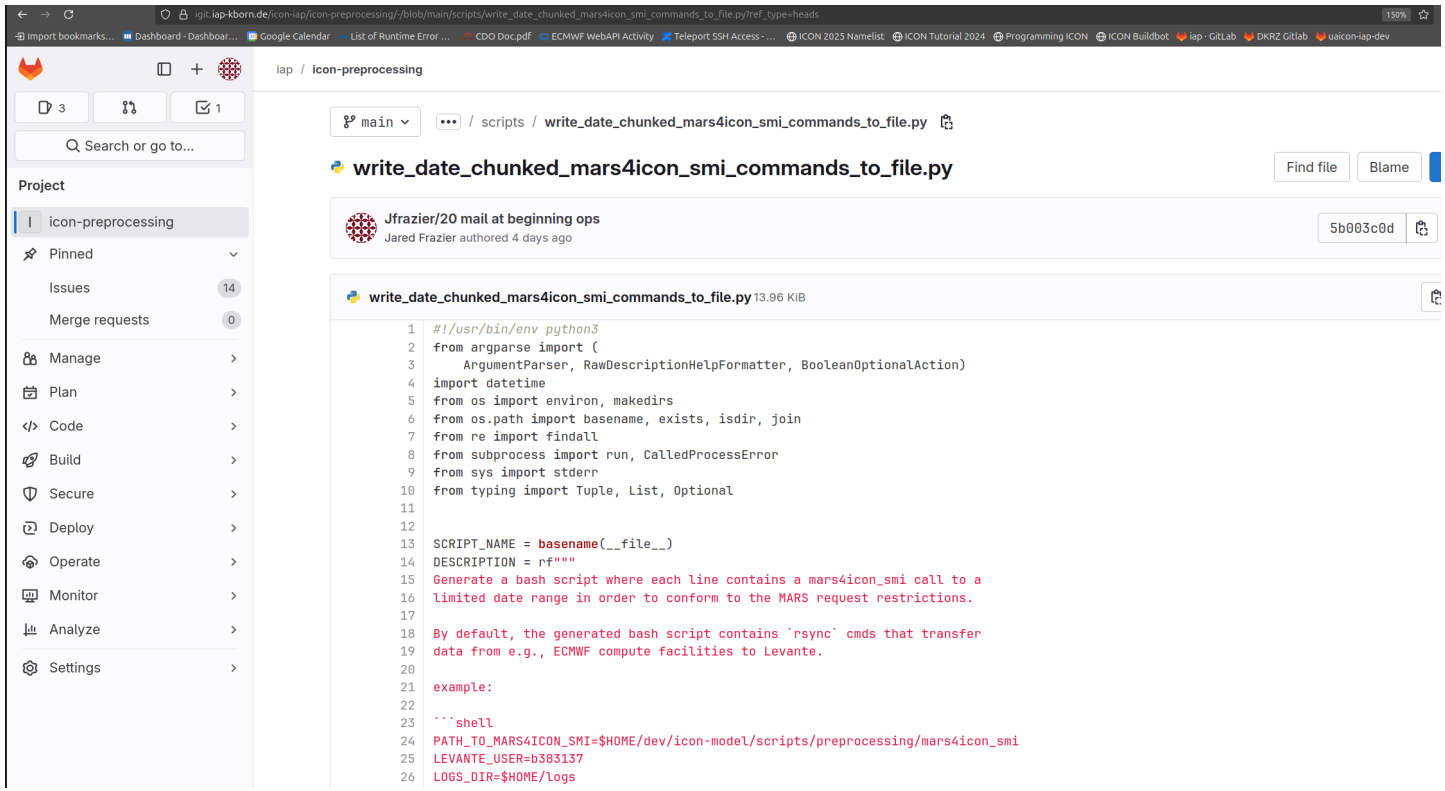

Figure 8: Script automating ERA-* data transfer to Levante. See icon-preprocessing/scripts/. For reference, c.a. 5 days to transfer 20 years of ERA-5 data (c.a. 20 TB).