SAND2022-11550C

Exceptional service in the national interest

Sandia National Laboratories

Slycat™

2021 R&D 100 WINNER
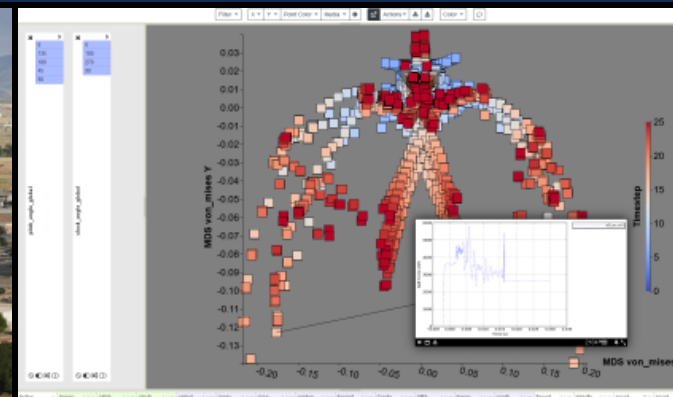
Sandia Site Report

DOECGF

August 30th through September 1st, 2022

W. Alan Scott Sandia National Laboratories

Sandia National Laboratories

Group Missions

- HPC Tier 2 Support: Linux LAN and Clusters for SRN and SCN

- Scientific visualization support: Catalyst, EnSight, ParaView, Slycat, TRAME, Workbench, etc.

- Scientific application performance analysis and support: Targeted support for simulation codes at scale

- Design, acquire, deploy and operate Sandia's hardware for LANs, clusters and disk farms

- Research, deploy tools and support users creating AR/ VR solutions and high impact Cinematic Visualizations

Activities - ParaView

- Help develop, deploy and support ParaView 5.11.0
  - Current measured user base ~260 users/month
  - Multiple LANs and HPC clusters.
  - Built ParaView for LLNL
- Continue to provide user focused feedback and guidance to the ParaView development team.
- Sandia tests most of the ParaView feature and bug fixes on the Kitware bug tracker.
- ParaView GUI and Python training
  - Taught 27 beginning hands on, 4 advanced, 3 python, 1 CTH, and 1 CFD classes at Sandia.
  - Taught 2 lecture style ParaView class at LANL
  - Maintain Classroom tutorials at paraview.org.
- Continue support of the HPC help desk

ParaView at Sandia
Total number of users per month
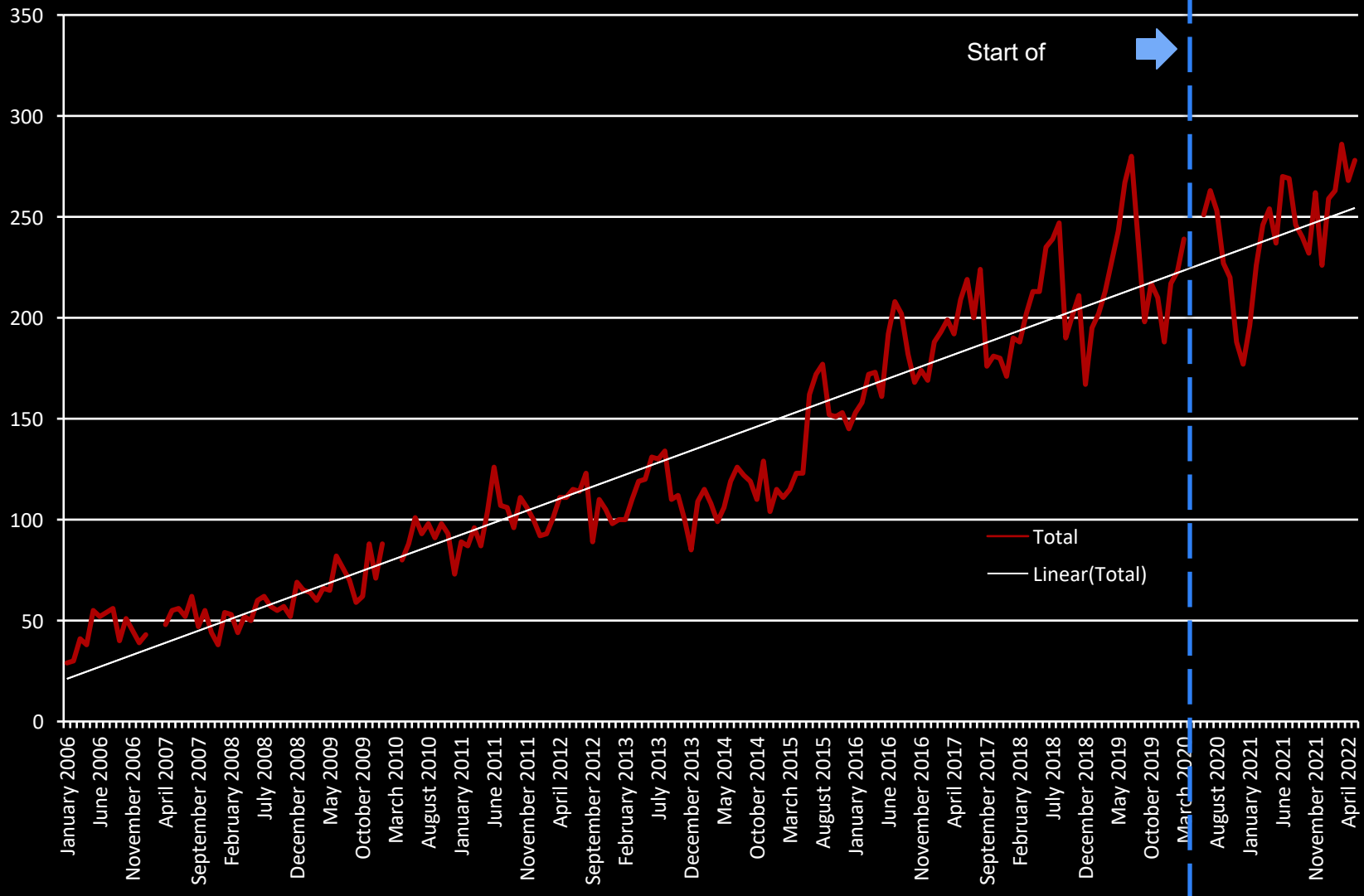
Sandia supported ParaView

- 160 closed bugs and features in ParaView 5.10.0, 5.10.1 and 5.11.0
- IOSS reader replaces the Legacy Exodus Reader and CGNS reader
- Various IOSS performance, feature and bug improvements
- IOSS reader adds assemblies
- Information tab redesign
- Discontinuous Galerkin phase 1 (uses existing IOSS functionality)
- Numerous VTK example files are now part of the ParaView install
- Find data was rewritten and is now dockable on the right side of the view
- ParaView classroom tutorials are now part of ReadTheDocs
- New palette backgrounds (co-funded with LANL)
- Better output messages dialog controls
- Globbing for readers added to Python trace

Sandia supported Catalyst

- Level 2 Milestone: Quantitative Analysis with Catalyst in SPARC
  - Identify SNL analyst barriers to utility, useability, and adoption (UUA)
  - Teamed with SNL user experience (UX) experts for formal assessment of useability and initial adoption
  - ISAV SC22 Paper submitted
- Ansible and Ansible Tower for DevOps
  - Automated build, test, and deployment of Catalyst 5.10 for SPARC on all SNL HPC platforms with ansible playbooks
  - Nightly build and test on all platforms from Ansible Tower
  - Results reported to CDash dashboard
  - Catalyst IOSS for Sierra build, test, and deploy on many SNL HPC Platforms
- Full integration of Catalyst into SPARC input deck
  - New post processing syntax Catalyst control blocks in SPARC input deck
  - Composite processing Catalyst control blocks to send multiple output meshes to the same Catalyst script
- Started work on Catalyst API 2 (LLNL Conduit) in SEACAS IOSS

# Catalyst DevOps Dashboard

Activities - EnSight

- Deploy and Support EnSight

    - Multiple LANs and HPC Platforms

    - Sandia transitioned to AnsysLM licensing

    - EnSight 2022 in use

- Most users work in Thermal/Fluids/Aeronautics, Solid Mechanics/Structural Dynamics, and Computational Simulation codes
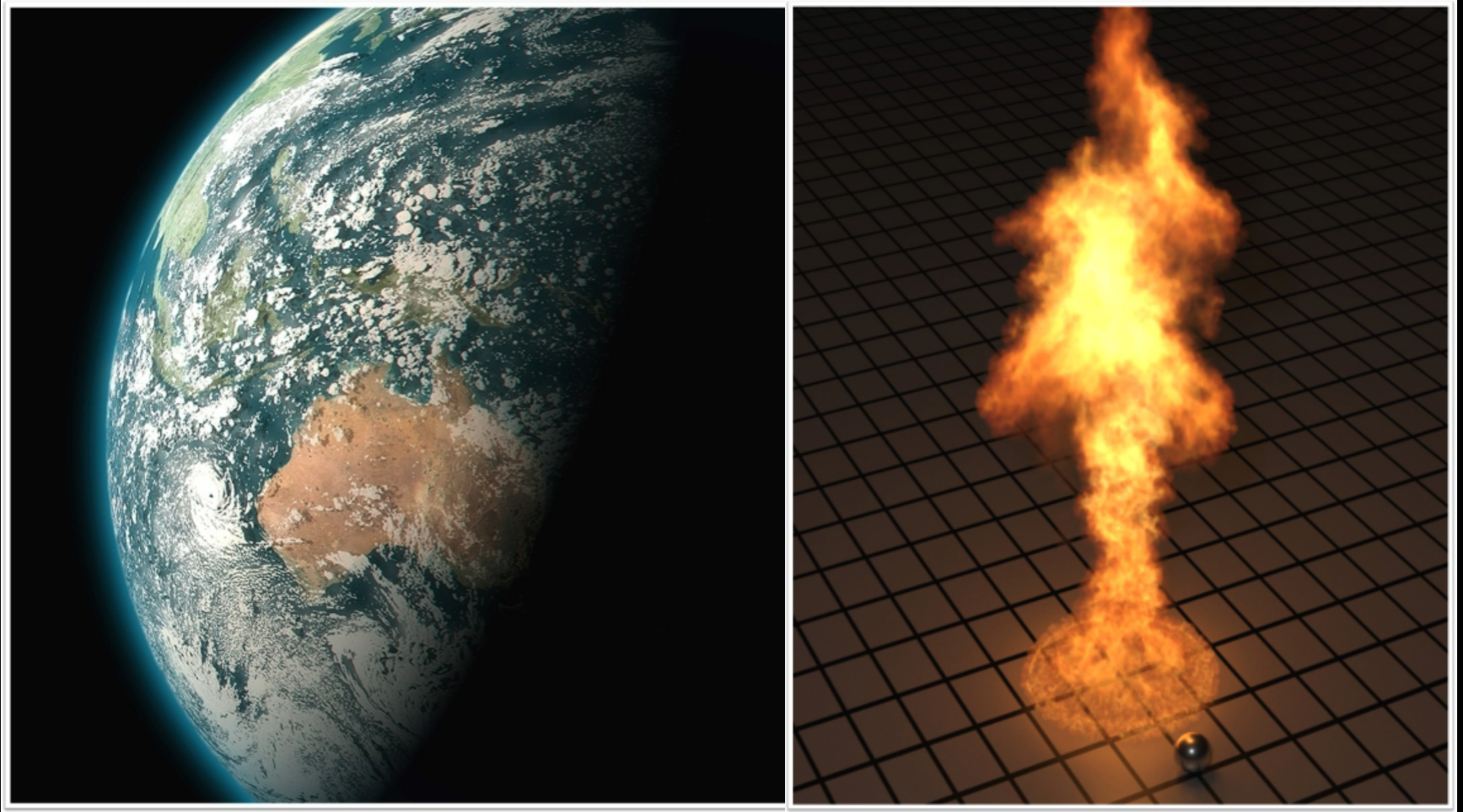
Activities - Slycat™

Slycat™ - web-based analysis of large ensembles of high-dimensional data, such as produced by simulations on HPC platforms

- R&D 100 2021 Award Winner

- Slycat™ v3.3 January 2022

- Surface metrics integrated for 3D objects
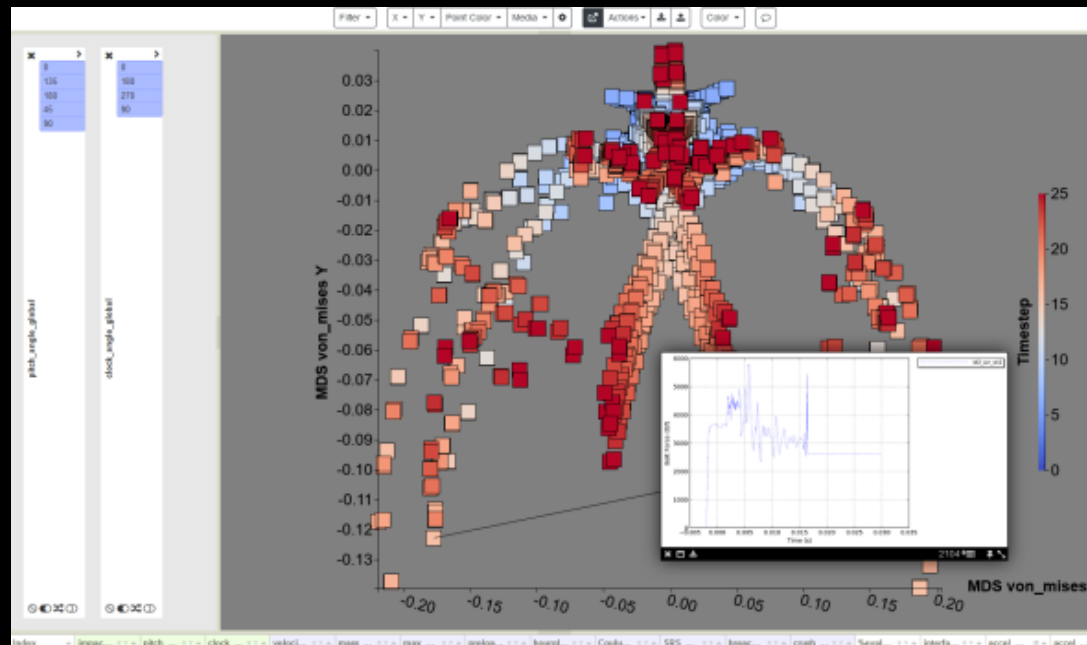
Activities – Impactful Visualization

Renderings of E3SM SCREAM climate simulation and fire simulation datasets. Visualizations by Brad Carvey

AR/VR

- Held 4th Annual XR conference
  - Roughly 450 attendees (virtual). Roughly 20% external to Sandia
- Lots of ongoing projects, but many are OUO

Upcoming year - Production Viz

- ParaView
    - Prism
    - Material Interface Filter enhanced to handle rectilinear mesh
    - Discontinuous Galerkin Phase II
    - ParaView Trame in production at Sandia
    - Catalyst API 2 implemented
    - Statistics refinement
    - Trace refinement