

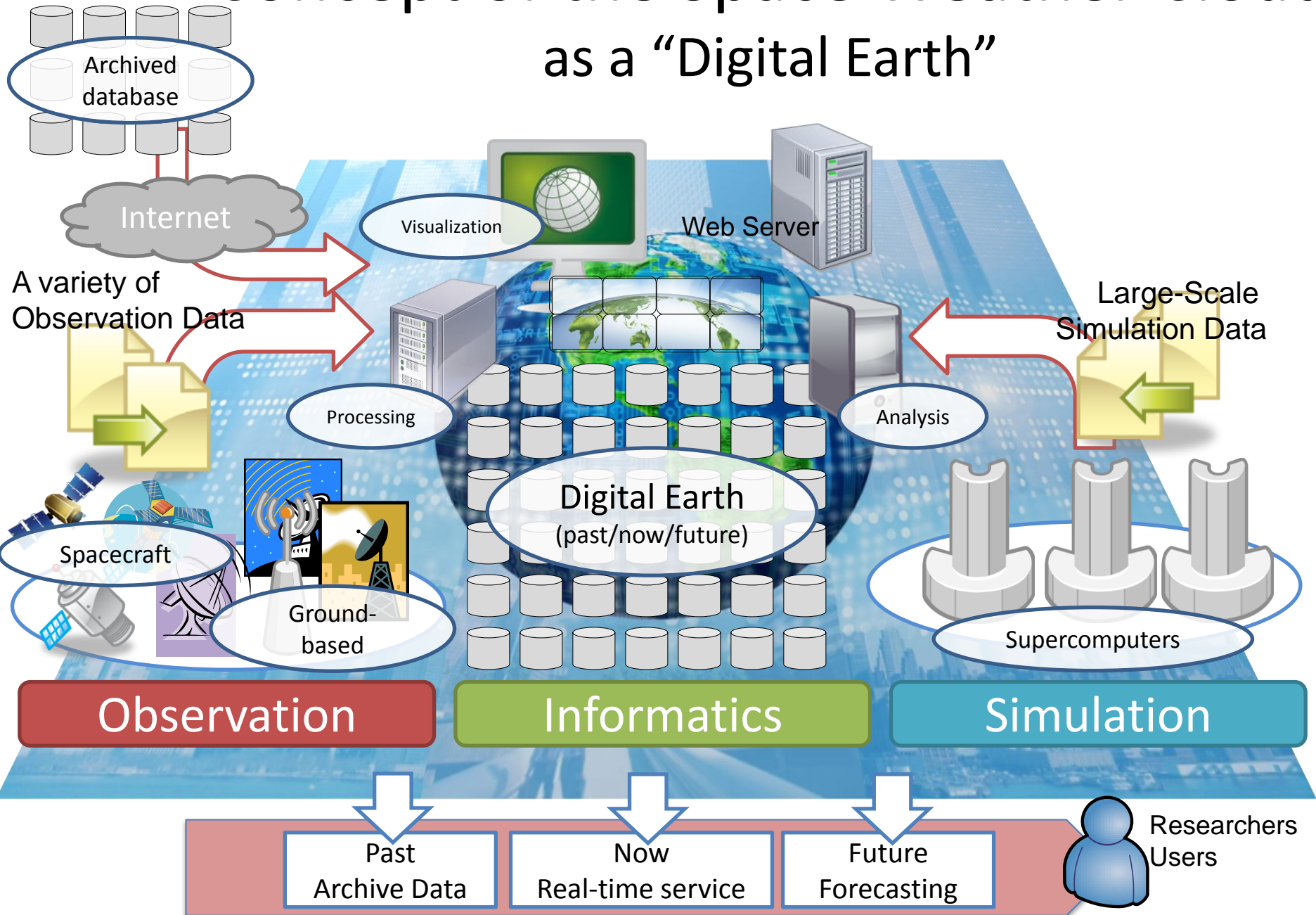
# NICT Space Weather Cloud: “OneSpaceNet” Cloud Storage

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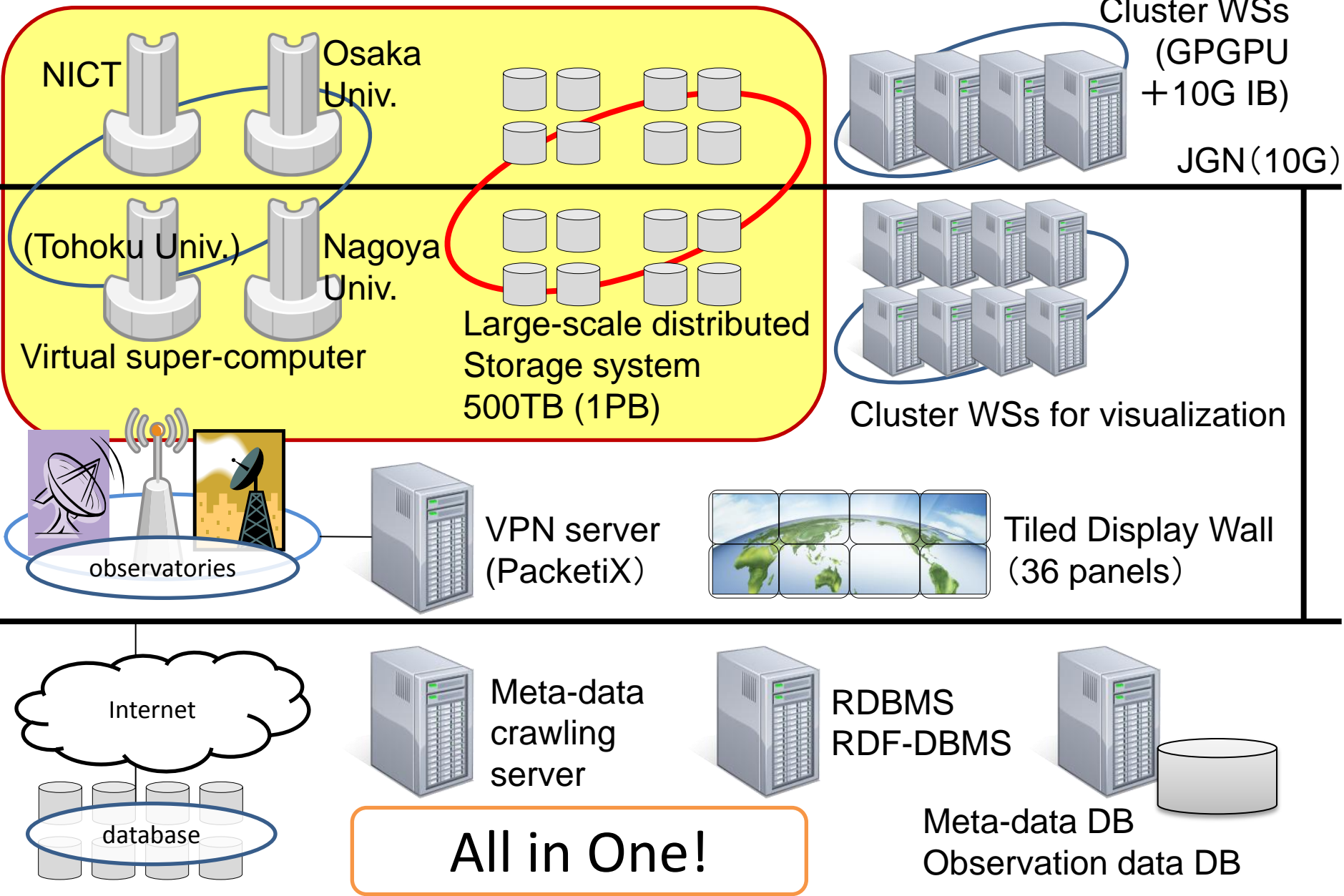
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SC10 Booth 1521 (17/11/2010)  
in Ernest N. Morial Convention Center, New Orleans, LA

# Concept of the Space Weather Cloud as a "Digital Earth"



# The NICT SW cloud (Nov. 2010)



# Distributed Storage for SW cloud



IT Headquarters

[Storage Servers 2 Set]

- Physical/Logical Size:  
96 TB / 72 TB

[with low cost commodities]

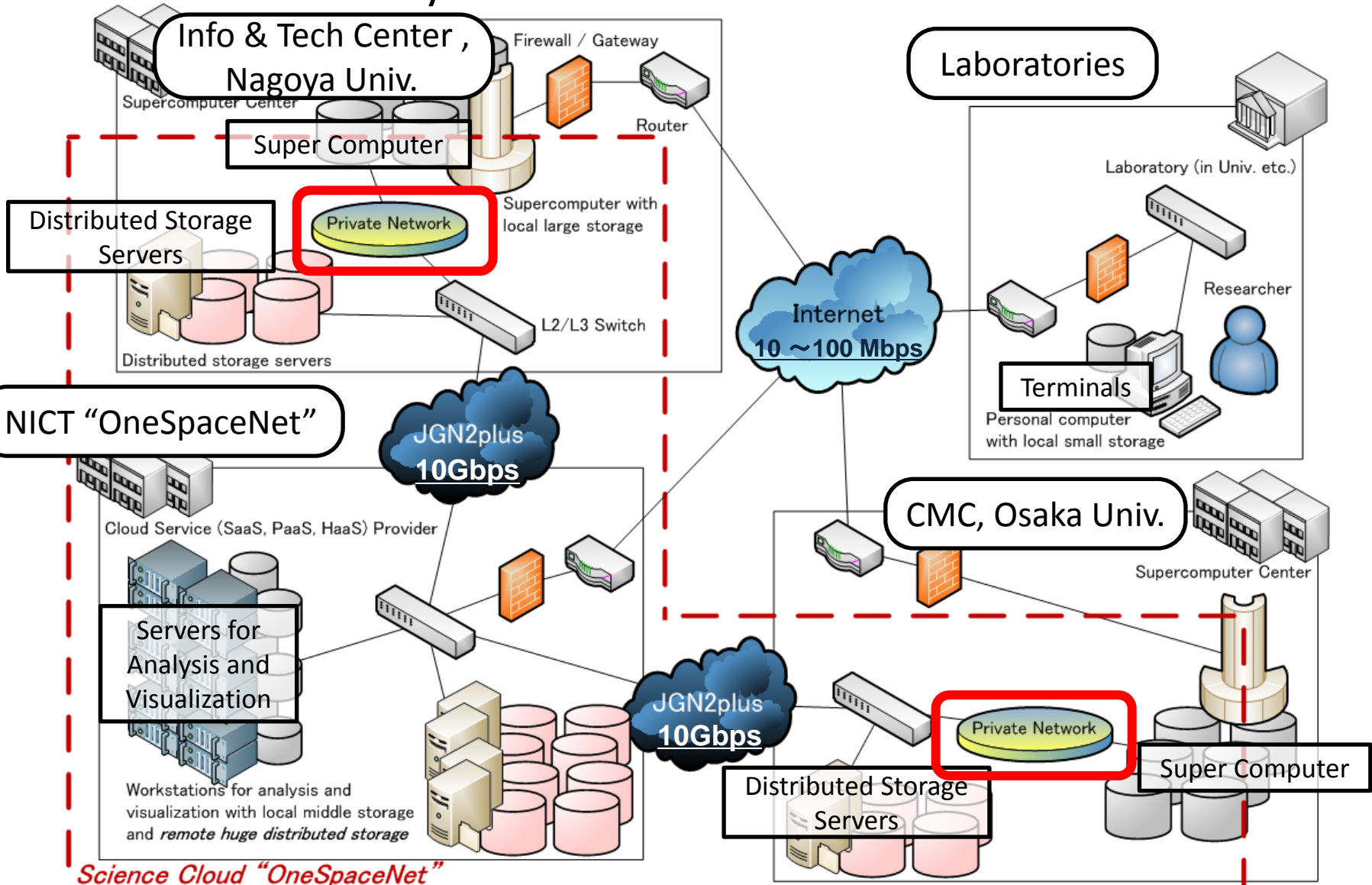
- Cost: \$150 / TB
- Write speed: 139 MB/sec

NICT Okina  
Subtropical  
Remoto-Server

Information Technology  
Center, Nagoya Univ.

# Network and Server structure

for Integration of Supercomputer into  
Analysis and Visualization Environment



# Virtual Laboratory "OneSpaceNet"

Data from Calculation are transferred to virtual storage automatically

Submit jobs and Start Calculation

"OneSpaceNet"

Supercomputer with local huge storage

Wall / Gateway

```
morikawa@seg-vis02:~/home/morikawa
[inosato@seg-vis02 ~]$ df -h -t fuse
Filesystem      Size  Used Avail Use% Mounted on
fuse            250T 207T  43T  83% /gfarm/inosato
[inosato@seg-vis02 ~]$ ls /gfarm/inosato/home/inosato/NLFF/M
T_PH1/KD/1212_2030/OUT_LEV2_AV5
ALPHA2D_NLFF      XRT_NLFF.031  XRT_NLFF.051
ALPHA_AVE_NLFF   XRT_NLFF.032  XRT_NLFF.052
ANGLE2D_NLFF     XRT_NLFF.033  XRT_NLFF.053
AVS              XRT_NLFF.034  XRT_NLFF.054
B3D_NLFF_1212_2030 XRT_NLFF.035  XRT_NLFF.055
BOTTOM_BX       XRT_NLFF.036  XRT_NLFF.056
BOTTOM_BY       XRT_NLFF.037  XRT_NLFF.057
```

Researcher

Virtual Huge Storage

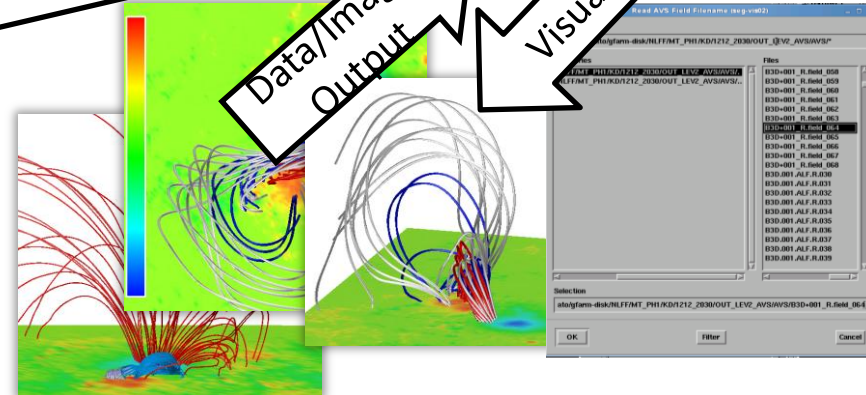
Virtual storage is "mount"ed by gfarm2fs

Virtual Storage is available like "NFS" or "CIFS"

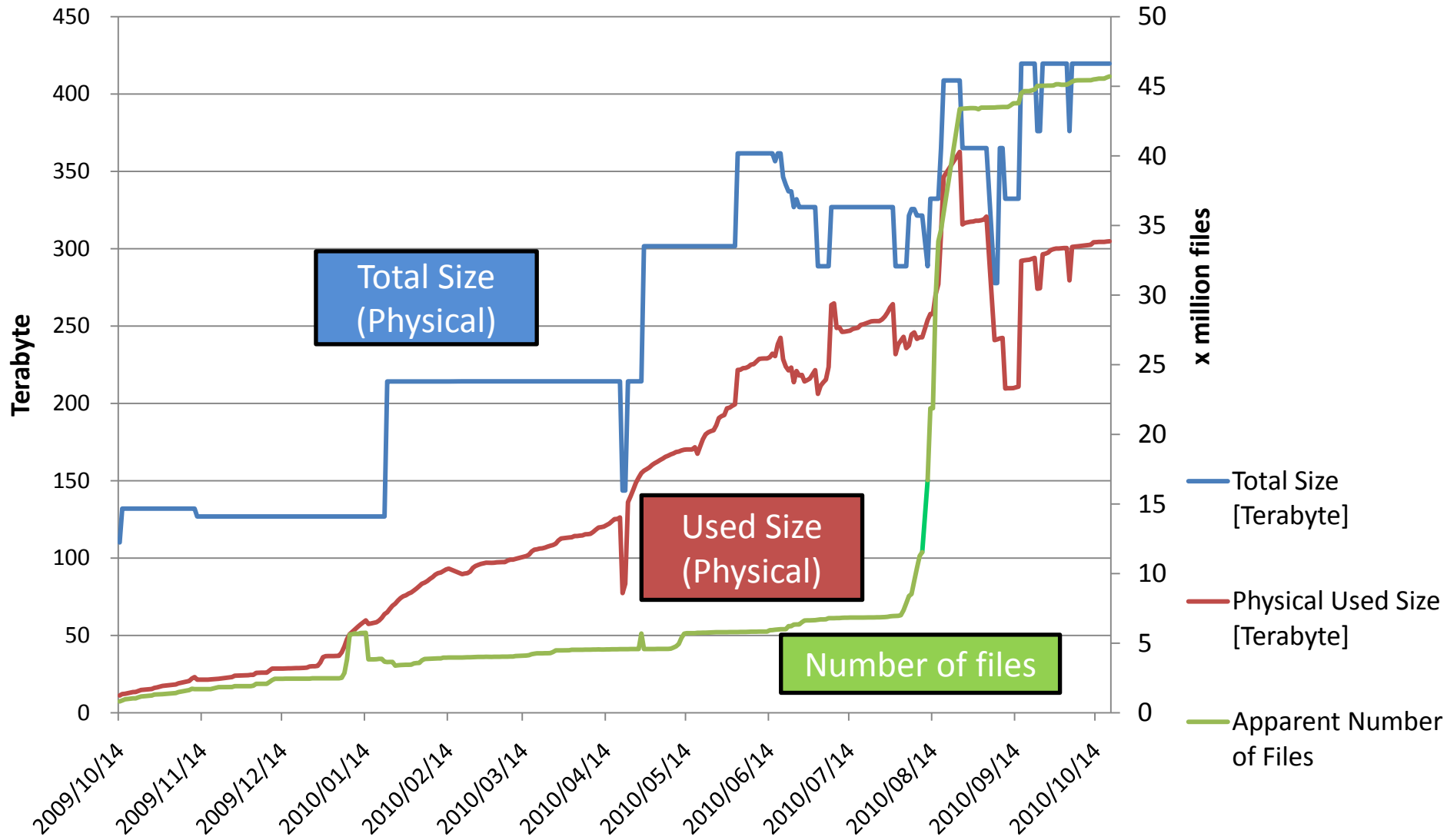
Data/Image Output

Visualize

Workstations for analysis and visualization with local huge storage

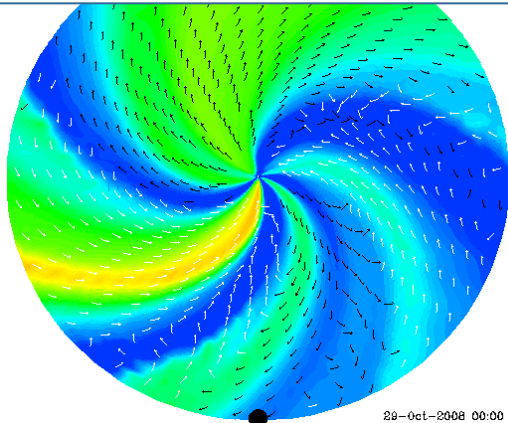


# Status of OSN Cloud Storage

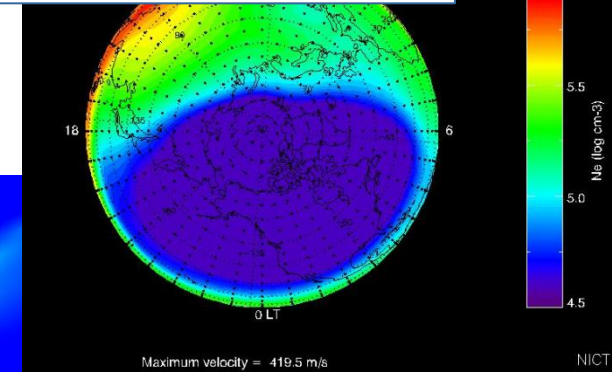


# Real-time space weather forecast

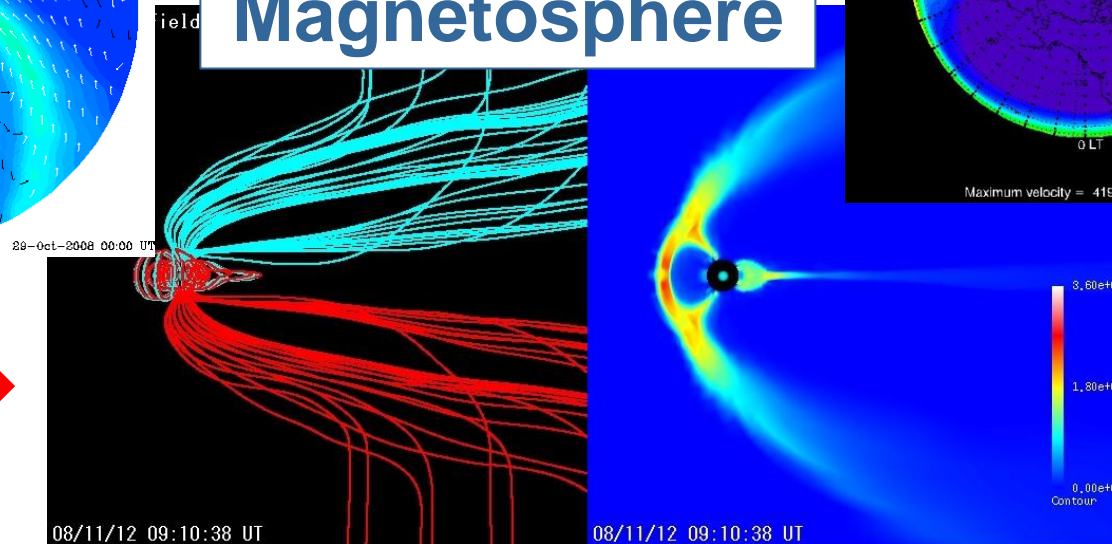
## Sun and Solar wind



## Ionosphere



## Magnetosphere



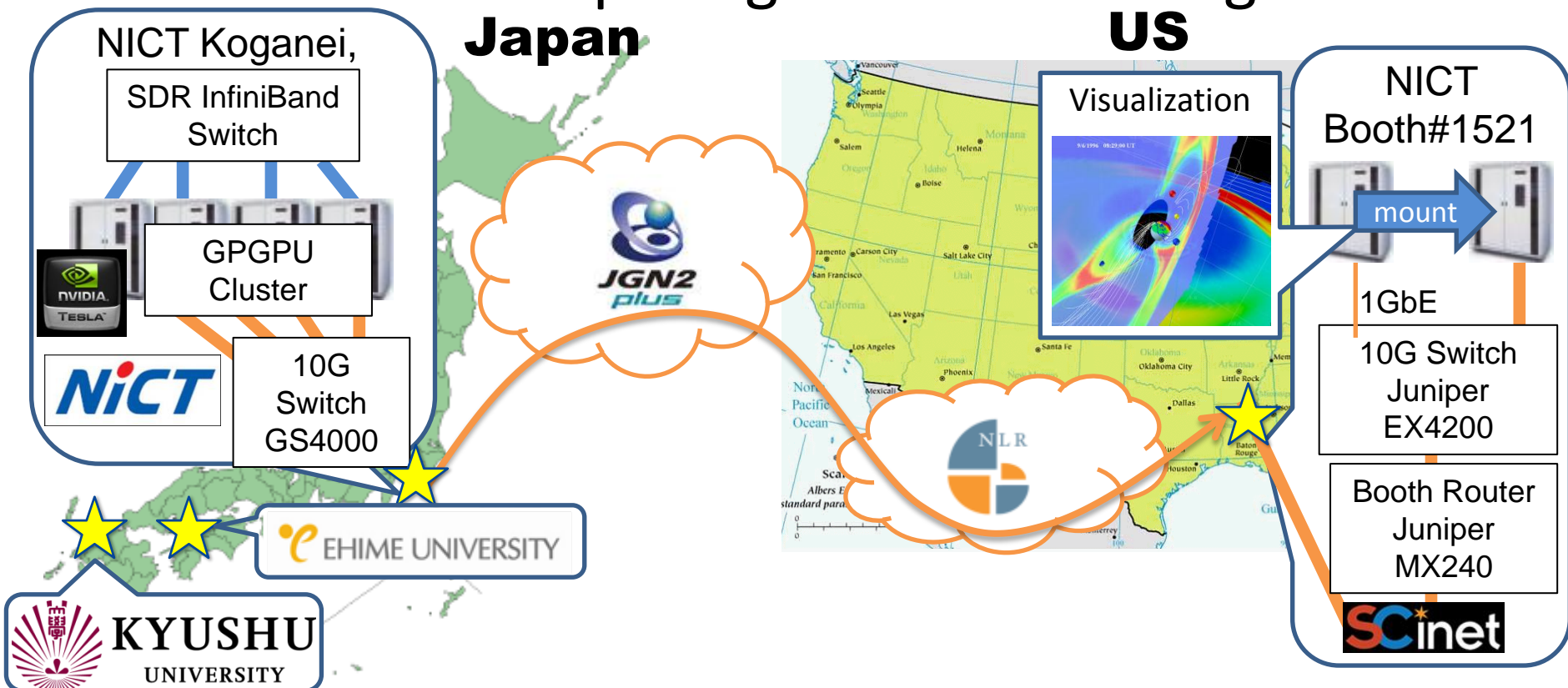
- We simulate the space weather using our super computer in real time and store the data in OSN Cloud Storage.



# Space Weather Forecast With GPU Computing and Networking

## Japan

## US



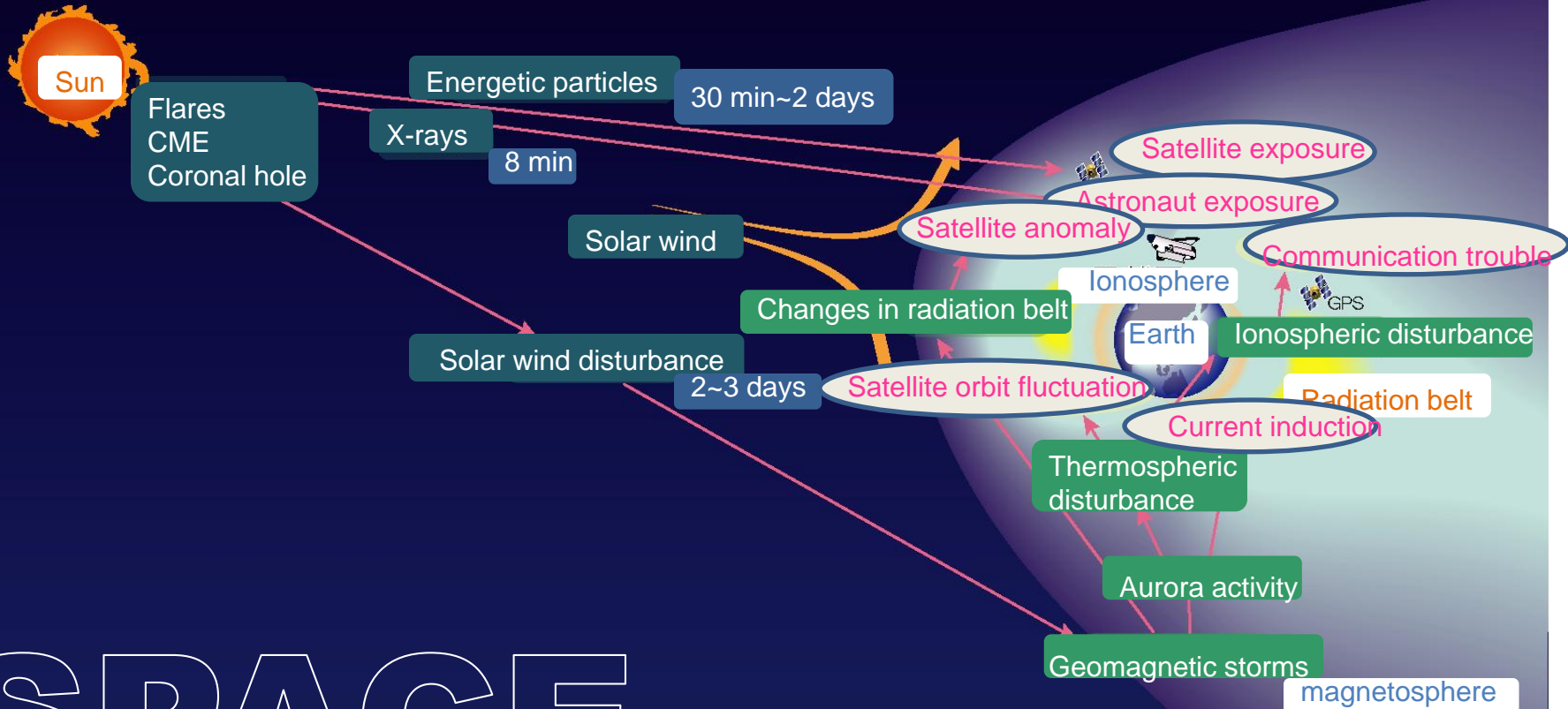
- The Space Weather Forecast group will perform the numerical simulation of space weather with GPU and transfer the huge simulation data in realtime from NICT Koganei, Tokyo to the NICT Booth at SC10 through the 10Gbps network.
- The transferred massive data will be processed to demonstrate 3D Visualization of space weather forecast at the NICT booth.
- For the connection, JGN2plus will connect to NLR at Los Angeles and then to SCinet at New Orleans.

# Summary

- NICT “OneSpaceNet” Cloud Storage is constructed
  - Storage servers are distributed nationwide via JGN2plus
  - Users can use the distributed storage normally like NFS etc.
  - Low Cost (\$150/TB) by commodities
  - Total Size: 420 TB (-> 1PB in 2010)
- Toward to Integration of Supercomputer into Analysis and Visualization Environment
  - Goal: Data from super computers can be accessed “IMMEDIATELY” from servers for analysis and visualization
  - Construction of transfer system is finished
    - Now, transfer speed is being measured (about 50 Gigabyte/hrs)
  - Demonstration phase
    - Event:
      - SC10: Space Weather Forecast With GPU Computing and Networking
    - Research:
      - A simulation and analysis for reconstruction of coronal magnetic field (Inoue, et. al.)

# 付録

# ■ What is Space Weather (SW)?



# SPACE WEATHER