Running S4PM requires installation of auxiliary packages. The AIRS L1/L2 algorithm workflow runs based on S4PM infrastructure and involves quite a few libraries, e.g. HDF, sdpkt, and basic data, e.g. DEM, MODIS, AVHRR. Migrating it can be time-consuming. The diagram at right shows the procedures for pre-installation and testing of S4PM and AIRS algorithms first on the local box, then the Nebula box.

Performance Comparison between Nebula & Local

<table>
<thead>
<tr>
<th>AIRS L1/L2/4PM Data Processing</th>
<th>Nebula</th>
<th>Local</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual AIRS Processing</td>
<td>$80666.28-$134,277.14</td>
<td>$8.60/GB</td>
<td>Update, maintenance, administration.</td>
</tr>
<tr>
<td>4 at Local box</td>
<td>$10,012.29-$16,687.14</td>
<td>$0.57/GB</td>
<td>Update, maintenance, administration.</td>
</tr>
<tr>
<td>4 at Nebula box</td>
<td>$8,159.40-$13,599.00</td>
<td>$0.47/GB</td>
<td>Not include instance setting up, test, idle.</td>
</tr>
</tbody>
</table>

Cost Comparison between Nebula & Local

Advantages of NASA Nebula Cloud Platform:
- User friendly interface, access to and management of Nebula resources; dashboard & EucaTools.
- Better performance compared to local box.
- Scalability, on-demand provisioning of resources in near real-time, and no user involvement for peak loads.
- Cloning, simple bundling process to save a modified/improved image.
- An excellent feature to maintain, back up, and monitor the systems, hence, increased reliability.
- Knowledge base, including detailed instructions, tutorial, and FAQ.

Lessons Learned:
- Bundle early, bundle and backup often!
- Take detailed notes:
  - Record each step taken to launch and install and may require software packages.
  - Acquire SA assistance
  - Use same directory structure
  - Use Euca2ools
- Expect the process to be time-consuming.

Challenges Faced:
- Stability – e.g. portals are not stable, network (FTP/Wget) is slow and not stable.
- Underdeveloped (e.g. Object Store) managing and monitoring tools.
- Bare-bones images, wrong location of attached and monitoring tools.
- Underdeveloped (e.g. Object Store) managing and monitoring tools.
- Size Limitation, e.g. limited size of volume, at most 16GB.
- Commercial Software installation and licenses.

Future: Making operational system at Nebula
a) Migrate more of GIS DISC’s applications/portals, e.g. Giovanni portals, to the Nebula Cloud platform;

b) Making mature migrated applications operational on the Nebula Cloud platform.

c) Testing some commercial Cloud applications designed for government, e.g. Amazon GovCloud.

Acknowledgements: Authors affiliated with Center for Spatial Information Science and Systems (CSISS).
George Mason University have a cooperative agreement with GIS DISC (Agreement No.: NNX08A023A), Center Director: Dr. Liñu O'D.