

Project No. : 16006 Core Institution in Japan: National Astronomical Observatory of Japan
---

**JSPS Core-to-Core Program Strategic Research Networks-  
FY2006 Research Report**

<b>Project No.</b>	16006
<b>Research Theme</b>	Establishment of Japanese Virtual Observatory in relation with International Virtual Observatory by utilizing state-of-the-art information technology
<b>Duration of Project</b>	April, 2006 -- March, 2009
<b>Core Institution in Japan</b>	National Astronomical Observatory of Japan

**Implementing Organizations**

<b>Country</b>	Japan
<b>Core Institution</b>	National Astronomical Observatory of Japan
<b>Co-Chair (name and title)</b>	Ohishi, Masatoshi / Associate Professor
<b>Number of Cooperating Institutions</b>	7
<b>Cooperating Institutions</b>	Ochanomizu university, Tokyo Institute of Technology, University of Tokyo, JAXA/ISAS, Tokyo Gakugei university, Waseda university, Graduate University for Advanced Studies

<b>Country</b>	the United States of America
<b>Core Institution</b>	Space Telescope Science Institute
<b>Co-Chair (name and title)</b>	Robert James Hanisch / Project Manager
<b>Number of Cooperating Institutions</b>	9
<b>Cooperating Institutions</b>	The Johns Hopkins University , California Institute of Technology , National Center for Supercomputing Applications , National Radio Astronomy Observatory , National Optical Astronomy Observatories , San Diego Supercomputing Center , Smithsonian Astrophysical Observatory , NASA Goddard Space Flight Center , Dominion Astrophysical Observatory
<b>Matching Fund</b>	US National Science Foundation, NSF grant, No. AST012244

Country	the Uited Kingdom
Core Institution	Cambridge University
Co-Chair (name and title)	Nicholas Andrew Walton / AstroGrid Project Scientist
Number of Cooperating Institutions	7
Cooperating Institutions	Jodrell Bank Observatory , University of Edinburgh, Rutherford Appleton Laboratory, The University of Manchester, Mullard Space Science Laboratory , University of Leicester , The Queen's University of Belfast
Matching Fund	UK Particle Physics and Astronomy Research Council, eScience Research Programme, AstroGrid2

Country	Germany
Core Institution	European Southern Observatory
Co-Chair (name and title)	Peter Joseph Quinn / Head
Number of Cooperating Institutions	1
Cooperating Institutions	Strasbourg Data Centre
Matching Fund	European Commission, EU FP6, 011892-VO-TECH

### Result of Program Implementation

We held two IVOA (International Virtual Observatory Alliance, <http://www.ivoa.net/>) interoperability meetings as the "Seminars" in May and September, 2006. The former was held in Victoria, Canada, with more than 90 participants. The meetings adopted several standard protocols to interconnect individual VO projects around the world. Similarly the meetings agreed to adopt an idea to integrate existing data access protocols, that was proposed by Japan. We also held a seminar in Tokyo, Japan, in May 2006, jointly with the Open Grid Forum to exchange state-of-the-art information on the Grid technology. Japanese Virtual Observatory project has successfully implemented an upgraded workflow mechanism to describe data queries and data analyses procedures. European counterparts (UK and France) have agreed to develop an internationally interoperable workflow system with Japan, based on the Japanese system. The JVO has been regarded as a core of the new Astronomy Data Center of the NAOJ, that started in April 2006 on. The concept of VO has been disseminated in other research areas, such as the Solar Terrestrial Environment research and the Bioinformatics.

### Achievements in FY2006 (Self Review)

We have successfully upgrade a workflow system to execute shell commands, to utilize branchings, and so on. As a result it is possible to describe a sequence to query data and analyse the data in a single script. NAOJ partially opened the JVO system for open use since August 2006. In the course of such development JVO contributed to the standardization in the International Virtual Observatory Alliance (IVOA); Ohishi acted as the IVOA chair until August 2006, and Shirasaki worked as a vice-chair of the VOQL working group. Some program members were invited to give talks on the virtual observatory in several international meetings. It should be noted that the Core-to-Core program members published 61 academic papers, including 10 invited talks. Clearly these quantities verifies that the Japanese VO activity level has been very high, that was accerelated by the Core-to-Core program of the JSPS.

### Future Plan (Measures toward Achieving Research Objectives)

NAOJ has adopted the VO infrastructure as the core of the Astronomy Data Center that started since April 2006. The JVO project plans to develop operational VO system within two years by implementing friendly user-interfaces, secure authentication mechanism, distributed storage system, and so on. JAXA/ISAS plans to implement VO-enabled databases in order to publish newly observed data such as AKARI and SUZAKU satellite. In parallel with the development of the operational system, we plan to prepare to treat data products from the ALMA (Atacama Large Millimeter/submillimeter Array) through discussion with international ALMA community.