

## **GIS TRAINING AND RESEARCH CENTER (GIS TReC) FACILITIES AND EQUIPMENT**

The GIS Training and Research Center (GIS TReC) at Idaho State University maintains a staff of personnel with knowledge, skills, and abilities across a wide spectrum of Geographic Information Science. The University's GIS Director and team leader of the GIS TReC, Keith T. Weber is a Certified GIS Professional (GISP) with over 40 peer-reviewed professional publications to his credit. Together with other staff scientists there exists over 30 years of experience in applied GIS research and multispectral remote sensing analysis.

The GIS TReC staff is experienced producing cartography for a wide variety of audiences and purposes and can advise on layout, flow, and print media. In addition, staff members have experience in effective geodatabase design following an end user driven paradigm, along with the production, configuration, and maintenance of geodatabases.

As the recognized regional leader in GIS continuing education, the GIS TReC offers numerous workshops annually which are designed to help GIS professionals maintain and enhance their skills in the field.

We offer a range of GIS courses to undergraduate and graduate students and GIS workshops to agencies, institutions, corporations, faculty, and staff. These courses address topics, such as, core GIS (e.g., Principles of GIS and Advanced GIS), spatial data analysis (e.g., Spatial Analysis and Geostatistical Spatial Data Analysis), programming (e.g., Programming for GIS and Advanced GIS Programming), and other closely related geotechnologies (e.g., IT for GIS, Remote Sensing, and GNSS Applications in Research).

The GIS TReC also completes GIS research projects with faculty, agencies, institutions, and corporations that do not have the facilities or expertise to do so.

The GIS TReC has been awarded the prestigious ESRI Special Achievements in GIS award. This honor was bestowed upon only 150 sites (chosen from among over 300,000 user sites worldwide) in 2000 and again in 2013.

The GIS Training and Research Center is equipped with:

### **HARDWARE**

#### **1. Enterprise GIS Server constellation:**

*Linux Server:* Dell PowerEdge 2650 server running Ubuntu 14.04.2 LTS with hardware RAID-5 546 GB hot swappable SCSI hard drives and 2 Intel Xeon 3.2 GHz CPUs with 12 GB SDRAM and hot-swappable redundant power supplies.

*GIS Web Server and ArcGIS License Server:* Dell PowerEdge 2650 server running Windows Server 2008 Enterprise edition with hardware RAID-5 153 GB hot-swappable SCSI hard drives and 1 Xeon 1.76 GHz CPU with 1GB SDRAM.

*NASA RECOVER Data Server:* Dell PowerEdge R720 server running Windows 2012 R2 with hardware RAID-5 3 TB hot-swappable SAS hard drives and 2 Intel Xeon 8 core 2.00 GHz CPUs with 112 GB SDRAM and hot-swappable redundant power supplies.

*Linux Server:* Dell PowerEdge 2550 server running Ubuntu 14.04.2 LTS with hardware RAID-5 409 GB hot-swappable SCSI hard drives and 2 Pentium III 1.0GHz CPU's with 2 GB RAM and hot-swappable redundant power supplies.

*Spatial Library/LiDAR Server:* Dell PowerEdge R510 server running Ubuntu 14.04.4 LTS Enterprise edition with hardware RAID-5 4.7 TB hot-swappable SAS hard drives and 1 Intel Xeon 2.53 GHz CPU with 12 GB SDRAM and hot-swappable redundant power supplies. Attached to Dell MD1200 Direct Attached Storage with 22 TB hot-swappable SAS hard drives.

*ArcSDE & IBM DB2 Server and GIS Web Mirror Server:* Dell PowerEdge 6650 server running Windows 2008 server with hardware RAID-5 694 GB hot-swappable SCSI hard drives and 4 Xeon 1.4GHz CPUs with 8 GB RAM and hot-swappable redundant power supplies.

*Spatial Library Server:* Dell PowerEdge 2950 running Windows Server 2008 R2 Enterprise edition with hardware RAID-5 1.8 TB hot-swappable SCSI hard drives and 2 Intel Quad Core XCL 2.66 GHz CPUs with 16 GB SDRAM and hot-swappable redundant power supplies.

*ArcGIS Server:* Dell PowerEdge 2950 III running Windows Server 2008 Enterprise Edition with hardware RAID -5 1.8 TB hot-swappable SCSI hard drives and 2 Dual Core Intel Xeon 3.33 GHz CPUs with 32 GB SDRAM and hot-swappable redundant power supplies.

*ArcGIS Server:* Dell PowerEdge R710 running Windows Server 2008 R2 Enterprise Edition with hardware RAID- 5 6 TB hot-swappable SCSI hard drives and 1 Quad Core Intel Xeon 2.93 GHz CPU with 48 GB SDRAM and hot-swappable redundant power supplies.

On-site server constellation is backed up by two APC 3000 SmartUPS devices, powered through two discrete Idaho Power incoming electrical lines.

*Archive Server (Off-Site):* Dell PowerEdge 2800 server running Windows Server 2008 Enterprise Edition with hardware RAID-5 2.2TB hot-swappable SCSI hard drives and 1 Xeon 3.0GHz CPU with 2 GB SDRAM

2. **Dedicated Instructional Workstation:** Dell Optiplex 9020 workstation running Windows 8.1 with 1 TB of hard drive space and 1 Intel i7-4790 3.60 GHz CPU with 16 GB RAM.
3. **Student Workstations:** Fifteen(15) : Dell Optiplex 9020 workstation running Windows 8.1 with 1 TB of hard drive space and 1 Intel i7-4790 3.60 GHz CPU with 16 GB RAM and dual monitors. Also part of this system: Xerox Phaser 3350 black and white printer.
4. **Research and Development Server:** Dell PowerEdge R420 server running Windows Server 2012 64-bit edition with 1 TB hard drive and 2 Xeon 6 core 1.90 GHz CPU with 96 GB SDRAM. Running Windows Hyper-V virtual machines.
5. **Hadoop Pseudo-Cluster:** Dell PowerEdge 850 server running Ubuntu 14.04.4 with 1 TB hard drive and 1 Pentium D 3.2 GHz CPU with 8 GB RAM
6. **Teaching Assistant Workstation:** Dell Optiplex 9020 workstation running Windows 8.1 with 1 TB of hard drive space and 1 Intel i7-4790 3.60 GHz CPU with 16 GB RAM and dual monitors.

7. **Research Workstations**

Four (4) Dell Precision T1700 workstations running Windows 8.1 with 1 TB of hard drive space and 1 Intel i7-4790 3.60 GHz CPU with 16 GB RAM and 3 monitors.

Three (3) Dell Optiplex 9020 workstation running Windows 8.1 with 1.5 TB of hard drive space and 1 Intel i7-4790 3.60 GHz CPU with 32 GB RAM and dual monitors.

One (1) Dell Optiplex 9020 workstation running Windows 8.1 with 1 TB of hard drive space and 1 Intel i7-4790 3.60 GHz CPU with 16 GB RAM and 3 monitors.

One (1) Dell Precision T3620 workstation running Windows 8.1 with 2 TB of hard drive space and 1 Intel i7-6700 3.4 GHz CPU with 16 GB RAM and dual monitors.

8. **Cartographic Workstation**

One (1) Dell Precision Precision T1700 workstations running Windows 8.1 with 1 TB of hard drive space and 1 Intel i7-4790 3.60 GHz CPU with 16 GB RAM. Also part of this system:  
Two (2) 20.1" flat panel monitors and a Canon Image PROGRAF iPF8000s 44" wide printer with 1200 dpi printing capabilities and an 80 GB hard drive.

9. **Other**

One (1) Dell Precision T5810 running Windows 8.1 with 1 TB of hard drive space and 1 Intel Xeon E5-1620 4 core 3.5 GHz CPU with 32 GB RAM.

One (1) Dell Latitude D630 laptop computer running Windows 7 Enterprise with a 120 GB hard drive and 1 Intel Duo 2.00 GHz CPU with 2 GB RAM.

One (1) Panasonic Toughbook field laptop computer running Windows 7 Enterprise with 75 GB hard drive and 1 Intel Duo 1.66 GHz CPU with 512 MB RAM.

One (1) HP Pavilion dv2 laptop computer running Windows 7 Enterprise with 320GB hard drive and 1 AMD Neo 1.6GHz CPU with 4GB RAM.

One (1) HP Pavilion dv5 laptop computer running Windows 7 with 500GB hard drive and 1 Intel Core i5 2.53 GHz CPU with 4GB RAM.

One (1) Xerox Phaser 7750DN color laser printer.

One (1) Hewlett Packard 8300 ScanJet flatbed scanner.

One (1) Hewlett Packard Office Jet 720 capable of scanning, faxing, color copying and printing.

Gigabit Ethernet deployed for all workstations and servers. Dark fiber network from the GIS Center to the ISU backbone. ISU is an Internet2 University.

8 ft. prismatic projection screen and Mitsubishi 1080i LCD projector.

One (1) Portable BoxLight LCD projector.

Six (6) Trimble Juno SB hand held GPS receivers.

One (1) Trimble GeoXT hand held GPS receiver.

Three (3) Trimble GeoXH hand held GPS receivers

One (1) Davis Vantage Pro2 Weather Station with soil moisture and temperature probes and solar radiation sensors.

## **SOFTWARE**

1. ESRI's ArcGIS 10.4 (including Spatial Analyst, 3D Analyst, Network Analyst, Geostatistical Analyst extensions, and MapObjects 1.2)
2. ESRI's ArcGIS Server 10.3.1
3. ENVI remote sensing software
4. ESRI's ArcPad and ArcPad Application Builder
5. Clark University Lab's Idrisi TerrSet GIS for Windows
6. Jasc Paint Shop Pro ver. X7
7. Onyx Poster Shop Pro
8. Trimble Pathfinder Office software 4.2
9. Trimble Pathfinder Community Base Station software (ver. 2.68)
10. MS Office 2013 Professional
11. EndNote 6.0
12. Adobe Acrobat 9.0
13. MS Visual Studio 2008 Professional edition.
14. ESRI Spatial Database Engine (SDE) for DB2
15. IBM DB2 with Spatial Extender
16. ESRI State wide site license

## **DATA**

1. ESRI SDE implementation on IBM DB2 RDBMS populated with detailed data sets to support research at ISU.
2. Full DEM and DRG coverage for our Area of Concern (AOC, cf. <http://giscenter.isu.edu/data>)
3. Over 2,000 DOQQ's
4. Lightning strike data for southeastern Idaho (1998-2000)
5. Land cover change analysis data for AOC.
6. Historic wildfire data for southeastern Idaho.
7. NAIP digital ortho imagery for southeastern Idaho counties (2004, 2006, 2009, 2011, 2013)
8. Landsat 7 ETM+ imagery for 2000, 2001, and 2003 for the study area.
9. Landsat 5 TM imagery for 1987, 1997, 1998 and 2000-2011 for our AOC
10. Landsat TM imagery for 1985, 1992, and 1998 for the Palcazu River valley, Peru
11. Imagery for Focused Study Areas (FSA's) within the AOC:
  - a) Digital Globe Quickbird high spatial resolution multispectral imagery (0.6mpp and 2.5mpp)
  - b) Space Imaging IKONOS high spatial resolution multispectral imagery (4mpp)
  - c) Positive Systems ADAR high spatial resolution multispectral imagery (0.7mpp)
  - d) 3Di AISA hyperspectral imagery (1mpp)
  - e) HyVista Hymap hyperspectral imagery (3mpp)
  - f) RADARSAT LIDAR imagery
12. Idaho State University GIS data sets
13. Lower Portneuf River Valley aquifer GIS data sets
14. Digital Chart of the World GIS data sets
15. 1:1 million, 2 million, and 3 million world data sets
16. ESRI street data sets for the entire US

17. STATSGO soils coverage for most of the western US
18. SSURGO soils coverage for parts of Bannock, Power, and Oneida counties, Idaho.
19. Pictometry 6-inch imagery for Bannock County (2010).

## **REMOTE SENSING CAPABILITIES**

The remote sensing capabilities at ISU include the GIS TReC and facilities in the Department of Geosciences (including the Digital Mapping Lab and the Boise Center Aerospace Laboratory). The GIS TReC has ENVI, Idrisi, ERDAS, and LUCCAS software. Currently, the Department of Geosciences has ENVI, Idrisi, ERDAS and ER Mapper software. Investigators have experience processing remote sensing data acquired by the following platforms: AVHRR, Landsat, SPOT, IKONOS, Quickbird, WorldView 2, AISA, ADAR, HyMAP, PROBE 1, CASI, RADARSAT, ERS, AIRSAR, and airborne LiDAR data. The following are research topics that the GIS TReC and Department of Geosciences are currently involved with:

1. Use remotely sensed imagery for rangeland health assessment.
2. Use hyperspectral imagery for invasive weed detection and mapping
3. Use high-spatial resolution multispectral imagery for invasive weed detection and mapping.
4. Use SAR data for geomorphic and topographic mapping of the SRP
5. Use high-spatial resolution multispectral imagery and airborne LiDAR for landslide evaluation
6. Use airborne LiDAR data for low-height vegetation studies
7. Use SAR data for evaluating fluvial processes and volcanic evolution on the SRP