Geo-informatics education in China

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The paper gives an overview of the current status of education in geo-informatics in China. First, the paper provides a brief introduction to the history of geo-informatics education in China and a general review of the scientific and technological development. It then presents how the development affects the education and training in China. In the paper, universities and institutes in China that can award academic degrees related to geo-informatics are summarized, and undergraduate majors are briefly introduced. Next, the paper reports the work that has been done to implement the discipline catalog and guide for graduate education and requirements. A list of typical curricula in geo-informatics education is suggested. Activities on promoting the graduate student exchange platform are presented. Finally, a case study of geo-informatics education in Wuhan University is discussed.

Keywords: geo-informatics; Surveying and Mapping; remote sensing science and technology; geographical information science (GIS); education and training; China

1. Overview

The higher education of surveying in China can be traced back to late 1890s, when a series of schools on Surveying and Mapping were established by Qing Dynasty. Most of these schools served for the army, and the most well-known one is Imperial School of Military Surveying and Mapping, the establishment of which marked the beginning of the surveying as an independent discipline in China. At that time, three majors were set, namely triangular surveying, topographic surveying, and mapping (1). The first department of Survey in universities was established in Tongji University in 1932. The milestone in the history of geo-informatics education in China is the establishment of Wuhan Institute of Surveying and Mapping (WISM) by integrating surveying departments from Tongji University, Tianjin University, Nanjing Institute of Technology, South China Institute of Technology, and Qingdao Institute of Technology in 1956. In 1980, WISM was renamed as Wuhan Technical University of Surveying and Mapping (WTUSM). In 2000, WTUSM was merged into Wuhan University (WHU). Xia Jianbai, Wang Zhizhuo, Chen Yongling, and Ye Xue’an were founders of geo-informatics education in China, who made significant contributions to the development of geo-informatics education in China. They were all sent out by national government to study geo-informatics in European universities including Imperial College London, Technical University of Berlin, and Technical University Munich. After their return from foreign countries, they had devoted all their lives to the geo-informatics education in China.

Owing to the rapid development of geo-informatics industry, geo-informatics education has progressed significantly in recent decades in China. According to the statistics from the National Administration for Surveying and Mapping and Geoinformation, the productivity value of geo-informatics industry in China has reached 200 billion RMB Yuan. The annual value will keep growing at the average rate of 25% in the next five years. It is estimated that the annual value of geo-informatics industry will reach up to a trillion Yuan by 2020. In addition, in January 2014, the General Office of the State Council of the People’s Republic of China issued an official document on advices about promoting the geo-informatics industry, including key focus fields, market environment, technological innovation and international cooperation, financial support, and related regulations (2). These favorable factors bring a boom in geo-informatics education. For example, more than two hundred universities have academic programs on geo-informatics, and about 15,000 students graduate each year with degrees in geo-informatics including 12,000 undergraduate students, 2500 MS students, and 500 PhD students. China’s education system groups disciplines into a three-level catalog. At the first level, geo-informatics covers both Science and Engineering disciplines in China (Figure 1). In the category of Science, Geography (in particular its sub-discipline geographical information science [GIS]), and Geodesy and Cartography, are the major bodies contributing to geo-informatics education. In the category of Engineering, Surveying and Mapping discipline, and Remote Sensing Engineering contribute to education in
Geoinformatics. The third level of the discipline catalog covers four geoinformatics majors of undergraduate education program: Geographical Science, GIS, Geomatics Engineering, and Remote Sensing Science and Technology. These disciplines reflect the undergraduate education in geoinformatics in China.

Aforementioned disciplines focus on the education at the undergraduate level. At the graduate education level, China’s education system has more flexibility and fine-grained sub-disciplines. In the past several years, the Ministry of Education (MOE) of China and Academic Degrees Board of the National Council of China (ADBNCC) set up expert groups to evaluate each discipline. They maintain a discipline catalog for graduate education programs and update it when necessary. In the catalog, the Surveying and Mapping includes three sub-disciplines, Geodesy and Surveying Engineering, Photogrammetric Engineering and Remote Sensing, and Cartography and Geographical Information Engineering. In the past decade, experts and educationalists in Surveying and Mapping found that the three sub-disciplines are not enough to meet the graduate education and training in the domain. We need more graduate programs targeted to the updated and extended domains. Since 2009, experts in the group of the Surveying and Mapping discipline of ADBNCC, started to work on updating the catalog for their discipline. These experts come from WHU, the National Geomatics Center of China, Southwest Jiaotong University, Tongji University, the PLA Information Engineering University, and China University of Geosciences. They work with experts from other graduate educational units in China to develop fine-grained sub-disciplines and propose a common guide for graduate program and education. As a result, three more sub-disciplines are added into the Surveying and Mapping. They are Navigation and Location-based Service, Mine and Underground Surveying, and Hydrographic Surveying and Charting (Figure 2). A new version of document on “Brief Introduction to Surveying and Mapping” was just released in 2013 to include the latest scientific and technological development of the discipline and updated sub-disciplines.

In terms of graduate education and training, basic requirements for achieving doctoral or master’s degrees were issued as a guide for each graduate education unit/organization in China. The requirements include literacy, professional skills, knowledge structure, academic capabilities, thesis writing, and dissertation defense. All these requirements will provide a reference guide for evaluate the qualities of graduate education and training in different universities in China. In addition, under the sponsorship of MOE and ADBNCC, a student exchange platform has been established in the Surveying and Mapping and Geographical Information Science (Figure 1). Undergraduate education in geoinformatics.

![Diagram of Geoinformatics](image)

**Figure 1.** Undergraduate education in geoinformatics.

![Diagram of Surveying and Mapping](image)

**Figure 2.** Updated sub-disciplines of Surveying and Mapping.
Mapping discipline. The platform includes a series of doctoral forums and summer schools held by different universities. One typical example is the summer schools held annually by the State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing (LIESMARS) of WHU. These academic activities attract hundreds of students from China and even other countries. The platform prompts the sharing of high-quality education resources, information and knowledge exchanges, and regional and international collaborations, and improves capabilities of students.

The remainder of the paper is structured as follows. Section 2 discusses the discipline catalog of geoinformatics education including major setting at undergraduate level (Section 2.1) and revision of discipline catalog at graduate level (Section 2.2). Guide for graduate education and requirements including recommended curricula for MS and PhD students are provided in Section 3. In Section 4, graduate student exchange platform is presented including doctoral forums and summer schools. A case study of geoinformatics education in WHU is given in Section 5. The last section concludes the article and proposes an outlook of geoinformatics education in China.

2. Discipline catalog of geoinformatics education

2.1. Major setting at undergraduate level

As illustrated in Figure 1, there are four majors at undergraduate education on Geoinformatics, namely Geographical Science, GIS, Geomatics Engineering, and Remote Sensing Science and Technology. Students specializing in first two majors will graduate with Bachelor of Science, and students studying in last two majors will be awarded with Bachelor of Engineering. Geographical Science major is set to cultivate talents on teaching and researching. It covers a series branches including Human Geography, Physical Geography, Economic Geography, Regional Geography, Environmental Geography. Teaching courses involve basic theories and systematic knowledge in the fields of Geology, Geomorphology, Geography, Meteorology, Pedogeography. Grounded mainly in Geographical Information System, Remote Sensing, Computer Science, and Information Science, GIS, however, pays more attention on scientific applications. Syllabus mainly include Geography, Computer Programming, Surveying and Remote Sensing (e.g. Digital Mapping and Cartography, Remote Sensing and Its Application), and GIS courses (e.g. GIS Principle and Application, Web GIS and Geographic Information Service, and Development of GIS Software).

The two engineering programs focus on skill training and technological applications. Geomatics Engineering sets up a series of practical course, including Introduction to Geomatics, Surveying (e.g. land/cadastral/aerial/mining/engineering surveying), Errors theory and Surveying Adjustment, Photogrammetry, Digital Image processing. It has strong relationships with Geodesy, Photogrammetry, Cartography, Engineering Surveying, and Geographical Information System. Remote Sensing Science and Technology, also relates to a wide range of disciplines, including Space Science, Information Science, Geoscience, Electronic Science, Compute Science, etc. Main courses include Principle and Application of Remote Sensing, Principle and Application of GPS, Aerial and Space Photogrammetry, Digital Image Processing, Remote Sensing Image Interpretation, and Microwave Remote Sensing.

2.2. Revision of discipline catalog at graduate level

With the increasing demand of geospatial information in various application domains, geoinformatics industry market in China gains rapid development in the past decade (3). It is estimated that there are over 400,000 employees and 20,000 licensed organization and enterprises involved in geoinformatics industry in China (4). China’s industry structure on geoinformatics has also gone through significant changes in recent years, including more specified domain markets. Traditional education and training systems do not satisfy the increasingly changing demands of employment market. For example, the Surveying and Mapping has expanded from traditional disciplines to navigation, Earth observation, mineral science, and marine science.

In order to meet demands of geoinformatics industry and provide well-educated people for the changing employment market, the expert group on Surveying and Mapping discipline from ADBNCC updates the discipline catalog by adding three more sub-disciplines, namely Navigation and Location-based Service, Mine and Underground Surveying, and Hydrographic Surveying and Charting. The technologies and methodologies for the Surveying and Mapping discipline have been extended to the planning and management of underground and ocean resources, as well as sovereignty, territory, and public security. For example, the sub-discipline, Navigation and Location-based Service, which involves satellite positioning, internet of things, disaster management, and smart weapons, plays a significant role in social economy and national security. The Mine and Underground Surveying sub-discipline provides accurate, timely, and reliable spatial information and decision support for exploitation of mineral resources, utilization of underground space, disaster rescue, and environmental protection of the ground surface. The Hydrographic Surveying and Charting becomes more and more important in China, since China is a country with a vast maritime territory, having a mainland coastline of about 18,000 km and more than 6500 islands. Hydrographic Surveying and Charting is an essential discipline for maritime navigation, marine construction, development of rich sea resources, and protection of marine rights and interests.
A new version of document on “Brief Introduction to Surveying and Mapping” was released recently in 2013. It includes development history, contents, scope, cultivation target, and related disciplines of Surveying and Mapping discipline. Surveying and Mapping is a science and technology to study the acquisition, storage, processing, analysis, management, transmission, presentation, distribution, and application of spatially and temporally related information about the Earth or other planets. It has a close relation with Geophysics, Astronomy, Geography, Marine Science, Space Science, Environmental Science, Computer Science and Information Science, and many other engineering disciplines.

Statistics show that the number of personnel with master or higher degrees increased 2.2 times from 2005 to 2012. More than 200 universities and over 20 vocational schools have geoinformatics-related programs, and more than 200 research institutions conduct geoinformatics research. Every year about 15,000 students graduate with degrees in GIS. Hence, the education quality of students in geoinformatics is very important in China. Under the guidance of the ADBNCC, the expert group on Surveying and Mapping discipline also evaluates universities and institutes that are qualified to award doctoral degrees in Surveying and Mapping. The following 9 universities in China are certified to award doctor degrees of Surveying and Mapping.

- Wuhan University (Wuhan)
- Tongji University (Shanghai)
- Shandong University of Science and Technology (Qingdao)
- Central South University (Changsha)
- Liaoning Technical University (Fuxin)
- Peking University (Beijing)
- Southwest Jiaotong University (Chengdu)
- PLA Information Engineering University (Zhengzhou)
- China University of Mining Technology (Xuzhou)

3. Guide for graduate education and requirements

In order to satisfy industrial demands for high-quality professional and technical personnel in geoinformatics, the expert group on Surveying and Mapping of ADBNCC works with representatives from geoinformatics-related organizations and enterprises, and proposes a common guide for graduate program and education. The common guide includes the basic requirements for graduate students and provides a list of curricula for doctor and master education.

3.1. Basic requirements for graduate students

The basic requirements for graduate students include literacy, professional skills, knowledge structure, academic capabilities, thesis writing, and dissertation defense. The literacy section requires that the graduate students have capabilities to read professional literature smoothly and write academic articles. The professional skills indicate that the graduate students are capable of doing geoinformatics-related technical works. The knowledge structure specifies the knowledge that a graduate student should master, including basic materials and specified contents. The academic capabilities include the capability of acquiring knowledge, conducting scientific research, critical thinking, and innovation. As concerned to thesis writing, it is the comprehensive reflection of one’s research findings. It should be normative in format and complete in content with systematic method and sufficient experiments. For the PhD students, their thesis should be peer reviewed by at least 3 professors in geoinformatics disciplines before going to the dissertation defense.

Geoinformatics education in China includes undergraduate and graduate educational levels. The graduate level includes doctor and master degrees programs. The doctor degree program usually takes about 3–6 years for students to complete. A PhD student is required to publish at least one peer-reviewed academic paper as a reflection of academic capabilities. The master’s degree program is further classified into academic master’s degree (full time, 3 years) and professional master’s degree (full time, 2 years). The academic master’s degree is offered for those students who want to conduct scientific researches, while the professional master’s degree is oriented to cultivate professional and skillful personnel for employment market. The candidate for academic master’s degree program is generally required to publish a peer-reviewed conference paper or an article in referred journal related to Geoinformatics. Compared with the 3 years program, the professional master’s degree program has less time and lower credits required for the program. However, it assigns more credit hours for professional practices. This program helps students connect their theoretical knowledge with practices in geoinformatics by exposing them to the real working environment. It meets growing demands for geoinformatics personnel and benefits graduates’ early employment. Moreover, another kind of master’s degree program, named engineering master’s degree program (part-time, 2–3 years) is also offered by some universities to train qualified engineers for industrial enterprises.

3.2. Recommended curricula for MS and PhD students

To better delivering latest research and knowledge in Geoinformatics, experts from ADBNCC suggest a list of curricula for doctor and master’s degree programs, listed in Tables 1 and 2, respectively. The PhD students will spend more time on academic researches and thus take less course studies. The curricula suggest 11 courses totally for the PhD program. Each credit means 18 lecture hours. Table 1 shows that the courses are grouped
The primary objective of doctoral forums is to provide doctoral students with opportunities for presenting their research projects and network with each other. The doctoral forums are organized by different universities/institutes with different topics each year. The forum usually lasts for 3–4 days with no more than 100 PhD students being allowed to register. Free accommodations and meals are offered for registered PhD students. Table 3 and Figure 4 show the related information about the last four forums. The 2014 doctoral forum on “Surveying and Mapping and its application to the Western Development” was held in Southwest Jiaotong University on May 10–11.

4.2. Summer schools
The Geoinformatics Summer School, which usually lasts for 10–20 days, is a program organized by LIESMARS every year for attracting young students towards advanced studies and research in geoinformatics (Figure 5). It is a good way of sharing high-quality education resources. Lots of top lecturers in geoinformatics are invited to give lessons to summer school students. The summer school includes lecturers, courses, lab exercises, social events, and field trip. Apart from acquiring new knowledge, culture and nature experiences, it is an excellent opportunity for students and young researchers to meet highly esteemed scholars, young people from around the world and strengthen their networks.

The 2014 Geoinformatics Summer School was held from May 19th to 28th, in conjunction with the Mid-Term Symposium of ISPRS Commission VI on Data, Information, and Knowledge Sharing for Geo-Education (6, 7). About 60 international students from 13 countries and over 100 Chinese students from 32 universities participated in this summer school. Figure 6 shows a group photo of this grant event. It included both technical contents and social events. Four teaching courses were delivered, namely Geospatial Service Platform for Education and Research (8), Spatial Statistics, Mobile Laser Scanning and Mapping, and Open Source Mapmaking Technologies. In addition, course practice and student projects were provided to help students strengthen the course contents. Besides the classroom lectures, a field
| Course item                                      | Courses                                                                 | Credit | Remark                                                                 |
|------------------------------------------------|-------------------------------------------------------------------------|--------|------------------------------------------------------------------------|
| Basic courses of comprehensive education       | Theory and Practice of Socialism with Chinese Characteristics           | 2      |                                                                         |
|                                                 | Dialectics of Nature                                                   | 1      |                                                                         |
|                                                 | English                                                                | 2      |                                                                         |
|                                                 | Matrix Theory \([a]\)                                                   | 2      | At least one is required for Courses \([a]\), \([b]\), and \([c]\)    |
|                                                 | Numerical Analysis \([b]\)                                              | 2      |                                                                         |
|                                                 | Advanced Algebra \([c]\)                                               | 2      |                                                                         |
| Disciplinary basic courses                      | Theory and Methods of Measurement Data Processing                      | 2      | Choose any three courses                                               |
|                                                 | Space Geodesy                                                         | 2      |                                                                         |
|                                                 | Aerial and Space Photogrammetry                                         | 2      |                                                                         |
|                                                 | New Remote Sensing Information Processing and Application Technique     | 2      |                                                                         |
|                                                 | Geographic Information Automatic Synthesis Principle and Theory         | 2      |                                                                         |
|                                                 | Geographic Information Theory and Technique                             | 2      |                                                                         |
| Specialized courses                             | Specialized English (Principle and Application of Remote Sensing) \([1]\) | 2      | At least one is required for Courses \([1]\), \([2]\), and \([3]\)    |
|                                                 | Specialized English (Spatial Statistics and Analysis) \([2]\)           | 2      |                                                                         |
|                                                 | Specialized English (Digital Mapping and Map Generalization) \([3]\)    | 2      |                                                                         |
|                                                 | Principle and Application of GPS \([4]\)                               | 2      | At least one is required for Courses \([4]\), \([5]\), \([6]\), and \([7]\) |
|                                                 | Digital Image Processing                                               | 2      |                                                                         |
|                                                 | GIS Software Engineering                                               | 2      |                                                                         |
|                                                 | 3S Integration and MultiMedia Communication \([7]\)                    | 2      |                                                                         |
|                                                 | Lecture Notes of Modern Science &Technology                            | 1      | At least 10 lectures                                                   |
| Optional courses                                | Second Foreign Language (German, French, Japanese)                     | 3      |                                                                         |
|                                                 | Hyperspectral Remote Sensing                                           | 2      |                                                                         |
|                                                 | Microwave Remote Sensing                                               | 2      |                                                                         |
|                                                 | Advanced Topics on Remote Sensing                                      | 2      |                                                                         |
|                                                 | Research Methodology and Scientific Writing                            | 1      |                                                                         |
|                                                 | Digital Terrain Surface Simulation and its Methods                      | 2      |                                                                         |
|                                                 | InSAR                                                                  | 2      |                                                                         |
|                                                 | Computer Network                                                       | 2      |                                                                         |
|                                                 | Web Geographic Information Systems and Services                         | 2      |                                                                         |
|                                                 | GPS/INS Combined Navigation and Application                             | 2      |                                                                         |
|                                                 | Principle of LIDAR and Its Applications                                | 2      |                                                                         |
|                                                 | Technology and Application of Satellite Gravity Surveying              | 2      |                                                                         |
|                                                 | Development and Application of Thematic GIS                            | 2      |                                                                         |
| Supplementary courses for trans-disciplinary students (any two courses) | The Principle of Photogrammetry Principle and Methods of Remote Sensing | 0      | At least 2 courses for those students who did not major in geoinformatics at undergraduate period |
|                                                 | The Principle of Geographic Information System                         | 0      |                                                                         |
|                                                 | Spatial Data Error Processing                                          | 0      |                                                                         |
|                                                 | Digital Image Processing                                               | 0      |                                                                         |
Figure 3. Credit hours distribution for the master’s degree program.

Table 3. Doctoral forums on Surveying and Mapping.

| Year | Location                                      | Participant information                                           |
|------|-----------------------------------------------|-------------------------------------------------------------------|
| 2010 | China University of Mining and Technology     | 200 participants from 14 universities and institutes               |
|      | (Xuzhou)                                      |                                                                   |
| 2011 | Information Engineering University (Zhengzhou)| 38 invited senior researchers and 123 PhD students from 54 universities and institutes |
| 2012 | Tongji University (Shanghai)                  | 10 invited senior researchers and 100 PhD students                |
| 2014 | Southwest Jiaotong University (Chengdu)       | 55 invited senior researchers and 103 PhD students from 30 universities and institutes |

Figure 4. Doctoral forums.

Figure 5. Summer school class.
trip to the Three Gorges and Yangtze River was organized on May 22. In addition, there were two social events to learn history of WHU and establish the social network. The first event is to visit History Museum of WHU, and the second is a badminton game for student participants. On the closing ceremony, four excellent groups chosen from the four teaching courses made representations about they had learnt in the classroom and lab. Their fruitful achievements showed that the participants have acquired valuable knowledge and established successful network during this summer.

5. Geoinformatics in WHU

WHU takes the lead in geoinformatics education in China. It has a comprehensive range of disciplines in geoinformatics offered by three schools and one national key laboratory, namely, School of Geodesy and Surveying Engineering, School of Remote Sensing Engineering, School of Resource and Environment (GIS), and LIESMARS. Geoinformatics is also the preponderant discipline in WHU. Table 4 shows the statistical data of geoinformatics education in WHU. There are about 300 academic staffs in various research fields of geoinformatics working in WHU. Over 2000 undergraduate students, 1500 MS students, and 500 PhD students specialize in Geoinformatics. For example, Figures 7 and 8 show the number of graduate enrolments and graduates in LIESMARS, respectively. WHU has advanced education infrastructure and international cooperation programs on Geoinformatics, which keep this discipline a strong momentum of development and high employment rate of geoinformatics students (Figure 9).

5.1. Education infrastructure

WHU has advanced infrastructure supporting geoinformatics education and researches. Hundreds of computers are provided freely for graduate students’. Large-scale cluster systems are established for academic researches. From the hardware perspective, WHU has MODIS and NOAA ground receiving system, airborne aerial cameras

Table 4. Statistical data of geoinformatics education in Wuhan University.

| Item             | Geoinformatics-related number | Total number in WHU |
|------------------|-------------------------------|---------------------|
| School           | 3 Schools+ 1 Lab              | 30                  |
| Academic Staff   | 300                           | 3400                |
| Undergraduate Student | 2000                      | 30,000              |
| MS Student       | 1500                          | 15,000              |
| PhD Candidate    | 500                           | 5000                |

Figure 6. Group photo of 2014 Geoinformatics Summer School in Wuhan.
(e.g. 60 mm RCD105), airborne laser scanner (e.g. ALS-50-II), positioning and orientation systems (e.g. POS AV 510), UAV and aero-photography systems, various surveying instruments (e.g. Leica/Topcon/Trimble Total Stations), mobile measuring vehicles, microwave radiometers, radar scatterometers, portable sun-photometers (e.g. CE318 M), infrared spectrometers (102F), and 3D laser scanner (e.g. RIEGL VZ-400 and VIVID910).

From the software perspective, WHU has developed, bought, and been donated with a lot of software/platforms/systems, including GIS software (e.g. ArcGIS, GeoStar, Geoway DLG-Checker, and FME Desktop), remote sensing image processing programs (e.g. PCI Geomatics, eCognition, ERDAS IMAGINE, and ENVI), point cloud processing software (ALDPro – airborne lidar data processing software, PolyWorks – point cloud...
processing and modeling software, and SingleCali – camera calibration tool), photogrammetry software system (e.g. VirtuoZo, WuCAPS, Geoway DPS, DPGrid, OpenRS, iWitness, ImageStation SSK, and INPHO – aviation remote sensing image processing system), image processing software (e.g. HD video recognition software, image segmentation system based on Cloud model, GeoSAIPS, and Geoway V3.6), hyperspectral remote sensing imaging system (HyperScan), Smart2 (satellite mission analysis tool), 3D visualization software (e.g. Skyline, SOFTIMAGE), and geospatial service platform software (e.g. China Geo-Explorer, Geosurf, GeoGlobe, GeoPW, GeoModelBuilder, GeoSquare, GeoChaining).

Moreover, WHU established many practice teaching bases with geoinformatics agencies and manufactures, such as Henan/Shanxi/Hubei Institute of Surveying and Mapping and Beijing GEOWAY Software Co., Ltd. These practice teaching bases enhance students’ hand-on abilities and help them gain working experience.

5.2. International cooperation

WHU has developed wide ranges of international cooperation programs with world first class universities (Table 5). Dual bachelor’s and master’s degrees are provided by diverse programs. These programs are aimed at cultivate talents in geoinformatics fields with global views. WHU also attach importance to joint researches with leading universities such as the Delft University of Technology (TU Delft), Newcastle University, Loughborough University, and York University. For example, WHU and TU Delft signed an agreement with which “WHU-TU Delft Joint Research Centre on Spatial Information” was established in 2012. Besides, China Scholarship Council funds lots of students for overseas study every year. Geoinformatics students were sent to top universities in German, the United States, the United Kingdom, Sweden, Netherlands, Italy, France, and so on.

6. Concluding remarks and future outlook

The paper gives an overview of the current status of geoinformatics education in China, and review the work having been done by expert group on Surveying and Mapping. The expert group has made significant progress in geoinformatics education in the last few years. Geoinformatics in China has become the pervasive technology for country’s economic progress and industrialization. Consequently, the education and training system in geoinformatics can play an active role in the development of geoinformatics industry.

Furthermore, there is still a long way to go to improve the geoinformatics education to a higher level. In the past, China’s geoinformatics education programs were developed by learning from U.S. and European countries. At present, we establish comprehensive education and training system serving for the booming geoinformatics Industries and markets. In the future, we intend to (1) improve the quality of graduate programs, (2) control the size of graduate recruitment, (3) further strengthen international exchange and cooperation, and (4) develop an International geoinformatics School that plans to hire international scholars working full time in WHU.

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