

Land use and cover dynamics of China in support of GOF-C-GOLD and NEESPI sciences

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Introduction

This project was funded by NASA to address the following three objectives:

- Capacity building
- Development of land use/cover related data to support NEESPI and GOF-C-GOLD
- Carbon stocks and sequestration in the northern part of China

This poster presents recent activities in addressing these three objectives. The science questions asked in the project are:

- What is the land use/cover dynamics of China over the past thirty years?
- What is the consequence of LULC on carbon sequestration?

Results

- Capacity building – Several core groups, including Institute of Geographic Science and Natural Resources Research, of Chinese Academy of Science (led by Dr. Jiuyan Liu), and 21st Century Aerospace Technology (Dr. Shuang Wu), National Center for Remote Sensing (Dr. Liqin Shao), and Heilongjiang Bureau of Survey and Mapping (Dr. Zhigang Li), Jiangxi Normal University (Dr. Lin Zheng) etc. to join the team to work on the land use/cover dynamics and to link the changes to socioeconomic drivers. In addition to workshops and international conferences, new satellite images have been obtained (Figures 1 and 2) from the new Beijing-1 satellite.
- Land use/cover products have been developed by Dr. Jiuyan Liu's group and some change analysis is progress. Figure 3 and 4 show an example of land use/cover product and change analysis in the northwestern part of China. There appears to be significant agricultural intensification from mid 80s to 2000. Also, ecosystem recovery from fire events is also being studied and it seems that the NPP from GLO-PAM model suggests a much quicker recovery rate than most studies suggested (Figure 5).
- Estimate of carbon stocks and sequestration in China is in progress using GEMS model (Figure 6). A fine resolution soil data (1:1M) has been in negotiation for us to use for soil carbon mapping.



Figures 1(left) and 2 (right): New satellite images over Tianjin, China showing the city and its airport. The city image was acquired with multispectral sensor (shown in TM 4,3,2 combination) at 32m resolution while the Pan image (on the right) has 4m resolution. The swaths are 600km and 24km respectively.

GEMS - CHINA

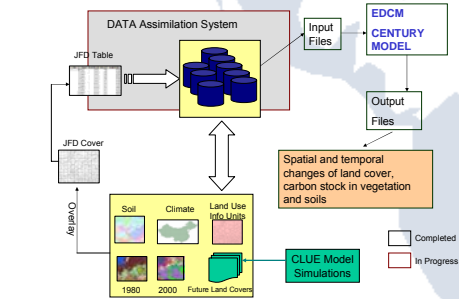


Figure 6: A modeling framework that is being run to estimate carbon stocks for the entire China by our co-investigator, Dr. Shuguang Liu and graduate student, Ling Yao, at USGS. It is expected that this work will be complete by the middle of 2006.

Conclusion

- Capacity building has been very successful and our Chinese colleagues are playing a key role in this addressing research issues NEESPI and GOF-C-GOLD have identified. Data sources have been identified to potentially fill in the gaps of current fine resolution Landsat type images and collaborators are willing to work with us to provide some data acquisitions over hot spot areas, at least.
- Land use and land cover in China has gone through significant changes over the past thirty years and their consequences on environment, especially on carbon sequestration, appears to be significant. There are some areas we need to further study. The example is the ecosystem recovery rate in the boreal region of China needs to be analyzed with finer satellite images, which is in progress now.
- Modeling carbon sequestration/stocks is well under way. Both GEMS and DNDC models have been setup running and we are expecting results in the few months.

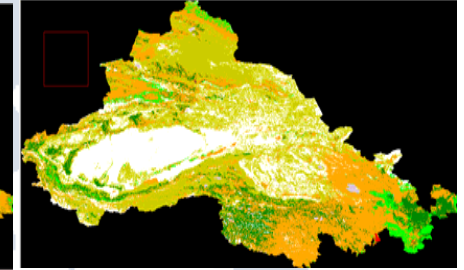
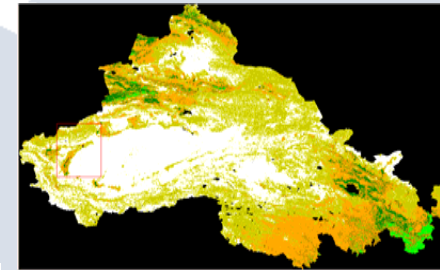
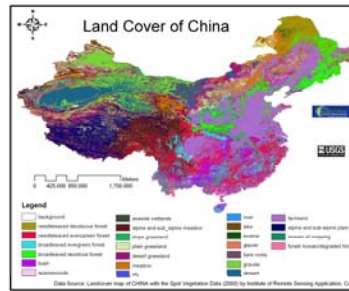
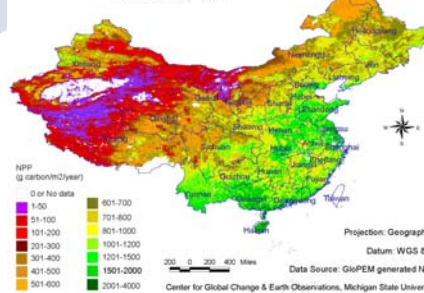
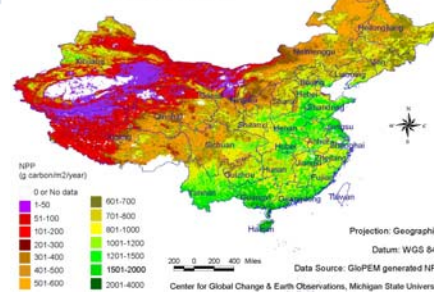


Figure 3 and 4: Land use/cover products have been developed by the Institute of Remote Sensing Applications, CAS, and land use/cover change analysis in the northwestern part of China. There appears to be significant agricultural intensification from mid 80s to 2000.

Summed Annual Net Primary Production (NPP) P. R. China, 1981



Summed Annual Net Primary Production (NPP) P. R. China, 2000



Recovery of 1987 Daxing'anling Fire

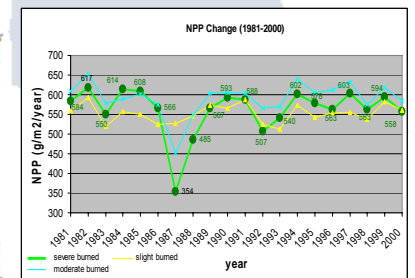


Figure 5: China's NPP changes from 1981-2000 (left two figures) and analysis of ecosystem recovery rate from fire events. It seems that the NPP suggests a much quicker recovery rate than most studies suggested.