

Working with China in Remote Sensing for Twenty Years and On

— An Interview with Dr. Frederick Campbell

BCAS: *Nice to meet you in Beijing Dr. Campbell. You are a distinguished scientist in remote sensing. Would you like to introduce a little bit about yourself?*

Dr. Campbell: I joined Canada Center for Remote Sensing (CCRS) in 1990, starting off doing missions with the United Nations Office of Outer Space Affairs to South America, and later led airborne radar programs there. In 1993 we got the funding from the IDRC and Canadian Space Agency for GlobeSAR 1, which involved 11 host countries including China. In 1995, after the launch of RADARSAT, I was involved in another major project in South America with support from the Canadian International Development Agency and IDRC.

So I've been working with China since 1993. I retired

from CCRS in 1998 and continued to work with countries around the world. From 2009 to 2011 I was a visiting professor at the Center for Earth Observation and Digital Earth (CEODE), Chinese Academy of Sciences. During that period of time I worked with Chinese colleagues in Beijing for three to five weeks at a time. Together we got involved in some international programs — that's how ABCC was started by RADI. I've been the Executive Director since about 1999. I'm also on the Executive Committee and Treasurer of the International Society for Digital Earth (ISDE), an international organization initiated by and based at RADI. As for this ISRSE meeting, I serve as a member of the Organizing Committee. I've probably been to China 80 times in 20 years.





BCAS: *What's your impression about this meeting?*

Dr. Campbell: The meeting is very well organized. Scientists from around the world gathered in Beijing to present their research on remote sensing, GIS, Digital Earth and everything in between on all applications you can think of: from interferometry to monitoring jellyfish in the ocean. I'm impressed by many presentations here.

BCAS: *Many participants are from Canada. What about Canada's contribution to remote sensing?*

Dr. Campbell: Well, CCRS, the only remote sensing organization in Canada, was founded in 1972. Its original focus was on Landsat. The government then decided that we needed another method of mapping the Arctic ice. So CCRS started developing radar-equipped aircraft and carried out experiments that progressed to a full-fledged monitoring program, which was carried out by a private Canadian company. The research and development of radar expertise through the airborne program led to the eventual building and launch of RADARSAT-1 in October 1995. RADARSAT-1 had a design life span of five years, but it just stopped operation last month. So it did much better than five years. RADARSAT-2 was launched about two years ago. It contains incredible advances over RADARSAT-1 in every technical aspect, and has been a huge success around the world.

BCAS: *How do you see the development of remote sensing in China?*

Dr. Campbell: Remote sensing in China was started by Prof. CHEN Shupeng about 50 years ago. He was the original director of the Institute of Remote Sensing Applications, which has since expanded incredibly. When we came here first in 1993, China was already working with its own airborne radar systems and looking to develop satellites eventually, and to improve and expand its research and application capability in radar data acquisition, processing, etc.

Since then, China has really exploded in a variety of applications areas, in particular, the operational use of radar for the monitoring of crops such as rice, which is leading now to the capability, in the very near future — I predict in the next year or so — to be able to accurately estimate the size of the heads of grains or rice, to gain a much more precise production forecast for the entire country.

Of course, China's also launched a whole series of optical and radar satellites for environmental, oceanic and meteorological use. When I first came, they had one ground station in Beijing; two years ago they opened a second one

in Kashi and a third one in Sanya. I've been to both places. I was at the opening of the Kashi ground station which was fantastic.

I see just nothing but great things for China in remote sensing in the future. I'm really looking forward to collaborating with Chinese scientists and assisting China in cooperation with a lot of other countries, not just the ABCC but many other nations around the world.

BCAS: *So your collaboration with Chinese scientists goes back about 20 years.*

Dr. Campbell: Exactly. And the collaboration has been great. For instance, Prof. GUO Huadong and I have known each other for 20 years. I've been working with him on ISDE since it was founded in 1999. We travelled around the world together, meeting each other at various meetings including the six ABCC meetings. We work pretty well together I think. I really enjoy our partnership.

BCAS: *As for ABCC, what brought these four big countries from different continents together?*

Dr. Campbell: Though the program is called "ABCC", which means Australia, Brazil, Canada and China, its fundamental idea is related to global change studies based on the different climates and environments in these four countries which span an incredible range from the Arctic in Canada to the deserts in Australia. We face different problems which require working together to develop similar solutions.

For example, the Canadian High Arctic is a desert. There is no rain fall, only snow — only about 10 to 15 centimeters every year. It's quite similar to the central deserts in Australia and the Gobi Desert here. All with minimal rainfall, only in Canada the desert is not dry but frozen in permafrost. As the permafrost melts, our ground collapses, and we're losing coastlines in some of those areas. Australia is faced with several problems offshore. A lot of the Great Barrier Reef problems now are manmade because the agricultural product runoff has destroyed the organisms living in the reef. China's decreasing glaciers in Tibet is leading to decreasing water supply, and the Gobi Desert in moving south every year. Therefore, we all face a number of problems which become similar as we develop remote sensing techniques to address them. Through such a program as ABCC, we can share experiences and learn from each other.

At yesterday's session we decided to expand ABCC to include Germany and Malaysia. I'm happy to see we have two new contributors and the program continues to expand around the world.



(From left) Dr. Campbell, RADI Director-General GUO Huadong and CAS President BAI Chunli during ISRSE in Beijing in April 2013.

BCAS: *What's the most important task for ABCC in the future?*

Dr. Campbell: I think there are many important tasks, including funding of course. We have to identify those which we can work on collectively and those we work on individually, and try to contribute to the overall goal of Earth observation programs around the world. China does not just exist inside ABCC; nor does Canada. We must enhance collaboration and share experiences with many other partners. We are looking forward to great things with ABCC — and going on from there.

BCAS: *Good luck to ABCC. Finally, how do you predict the biggest challenge for remote sensing?*

Dr. Campbell: There are so many new satellites to be launched in the future that the community may be inundated, or flooded, with new types of data which have to

be evaluated, assessed, calibrated, reviewed and examined for different applications. As a community we must beware of getting too excited about a new toy. Make sure that we look critically — “is this useful for what I’m working on?” Stand back and stay calm about new satellites, new data.

Another important thing is that scientists should look at all sources of data: space-borne, airborne and particularly ground-based. In fact, if from a space image we can’t tell what it is on the ground — is it wheat, corn, or a tree — it’s useless. We should never stop just because we have the images.

However, this is not to say that scientists should restrict their work to just the satellite data they already have in available or accessible. They all have to be aware of the new satellites that are planned, and the potential applications that they could be used for in their areas of interest — or others of their colleagues.