

Interview with Don Gray (DG) founding Director of the Australian Landsat Station now the Australian Centre for Remote Sensing.

By Catherine Raynerⁱ (CR)
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(This is not a verbatim transcript as many asides, comments and remarks have been left out but essentially the majority is "as spoken")

CR: So Don if we could start with you and your career?

DG: Well I started life as an Airforce apprentice, that is my working career as a radio apprentice, and went to "Frognall" which was the Melbourne Telecommunication Unit Headquarters for RAAF communications. The apprentice school was there and we went to what was then the Melbourne Technical College to do an associate diploma in radio engineering. It was a fairly harsh environment in that you were allowed no failures. As soon as you failed a subject you were relegated to a technician course. I was on the third intake, which was 26 people, and four of us actually finished, at the end. You might say I was one of the lucky ones, or I learnt how to pass exams quicker than anyone else or whatever. Then after I finished the apprenticeship and graduated as a Technician I got selected for a Diploma cadetship and went back to what had become by then, the Royal Melbourne Technical College, doing a fellowship diploma with electrical engineering subjects from Melbourne University. By the time we finished that, which was another 18 months, it had become the Royal Melbourne Institute of Technology, but unfortunately by then had not started issuing degrees, so I was a Diplomat rather than a Graduate. Not that it ever bothered me and I never found the time to go and finish a degree. I had qualifications recognised by the Institution of Engineers which career wise was all that mattered to the point of view of employment. I did a lot of Airforce courses but none of those really count in the academic world. Anyway I spent 14 years 7 months and 3 days in the Royal Australian Airforce.

So then I resigned to take a job at Woomera, at the NASA tracking station at Island Lagoon. I spent three years in Woomera then at the end of 1966, under protest, was compulsory transferred to Canberra as Deputy Director, Tidbinbilla. Specifically to set up the manned space flight part of Tidbinbilla which would support Honeysuckle Creek using the deep space antenna. About a year after that Bob Leslie, who was Director Tidbinbilla, was transferred to what was then the American Projects Branch of the Department of Supply and I won the job at Tidbinbilla, as Director.

In 1968, I think, just in time for Apollo 13, I went to Honeysuckle Creek as Station Director and Tom Reid who was there came to Tidbinbilla and took over from me. I stayed at Honeysuckle Creek up until the beginning of 1978. However, late in 1977 I was also "volunteered" to start setting up the Landsat station and I stayed with that until 1989 when I finally resigned from Public Service and went to do a little consulting work.

CR: So you came very much from the technical side?

DG: Absolutely.

CR: So I have to ask you this “Why were you volunteered”?

DG: It was a funny thing. When the old ERTS satellite was first launched I became quite fascinated by it. The concept seemed so good to me, although I know its original intent was just to check out the technology, because that’s how NASA used to name their satellites in those days. It was called a technology satellite with some sort of descriptive name ahead of that, so you knew it was just a feasibility model. Then if it was successful, the next version of it became some sort of an applications satellite. If it was unsuccessful you never heard of it again except maybe in a Senate hearing in Washington.

ERTS became tremendously successful but before they named it an applications satellite NASA changed its mind and decided all satellites should have a name that described its function in some way. So suddenly we had Seasat. They couldn’t use Earthsat, which is what they wanted originally, as I think the name was already registered to a company or something like that, so it became Landsat. The name was the bane of our life for some years to come as you’d say Landsat and people would say “Uh”. Took a while to live that down!

I went and gave a few lectures around various things like Institution of Engineers, IREE, and so forth about this marvellous new technology that was coming along. I tried to avoid the terrible oversell that was being touted around the world at that time that this thing was going to be the “panacea for all the world’s ills”. That was one of the worst things that the worldwide space industry did to itself, was to boast too much about what this thing would do.

Anyway it became a successful satellite, images started to come out and I went back to running Honeysuckle Creek as a tracking station converting it from an Apollo station to eventually a Deep Space station, so I was fairly busy in all that.

But in 1977, I guess it was, there was a great deal of confidence within the Department of Science that they were going to get the funding to set up a Landsat Station. I was going to a NASA Station Director’s Conference and they asked me to extend it a little and to go and talk to the people at Goddard Space Flight Centre, who were involved with ERTS. Particularly to talk to them about access fees to the satellite and all that sort of stuff; then also go up to Canada and talk to the Canada Centre for Remote Sensing to get some background from them about what you had to do to get facilities and so forth. But interestingly enough I found out, while I was at Goddard, that plans were well underway to shut Honeysuckle Creek! So I looked around when I came back and there didn’t seem to be too many jobs. Bob Leslie informed me that he hadn’t been able to get a volunteer to take on this project so I said “Why don’t you try me Bob”. I think he meant to do it all the time so he was a better tactician than I was. So that was how I got the job.

In August (1977) the decision came through with the money so we then had to set up where it would happen, choose sites and so forth. The site for the antenna really chose itself as from Alice Springs you cover the whole continent and incidentally got a little bit of Papua New Guinea as well. We couldn’t find a site that would do all of

Australia and New Zealand which was our first design; but we got all of Papua New Guinea and bits of Indonesia as well with the Alice Springs site so that looked like a good choice. It even took in Tasmania which was all right, so we decided to set that up.

But there was a lot of hard thinking about where the Processing Centre would be. My view, which I guess fortunately or unfortunately held sway, was that it should be accessible to the Users; that was my main thing. It didn't matter where you put the antenna, you could always get data from there to a processing centre. But if people were going to come and look at your imagery/available data and so forth, it needed to be some place reasonably accessible. Also Alice Springs is a very, very expensive place to run a highly technical operation so there were advantages to not being there. Eventually they agreed that Canberra was as near to the geographic, rather the demographic centre, of Australia. We thus had the antenna in the geographic centre and the processing centre in the demographic centre or at least that was the rationalisation I put on it. So they decided to do that.

We were fairly fortunate in that there was already a pretty large population of knowledgeable people, people who had been in research using ERTS/Landsat data and it was mostly/very largely 50-60% the mining and exploration industry. There was some interest from agriculture, some interest from people in water management, and there were "dabblers" from the Universities – I think they call it "pure research". So with that kind of a background to setup on we were luckier than most countries. Being such a huge place with so few human resources comparatively, this sort of technology lent itself to the management of your earth resources. So I guess I had an easier road than a lot of people who set up stations around the world.

Kerry O'Sullivan was very influential. Kerry was Chief Research Geologist at CRA. There was also a fellow named Tim Wilson who was a Consulting Geologist and ran his business out of Campbell somewhere. He did a tremendous amount of work in photo-interpretation. Mike Aubrey of course and Gale Moreton from Technical and Field Surveys. Gale was a real apostle, and carried the banner to the fight; a good fellow to have on your side. These are just a few names that quickly come off the "top of the head" along with Jon Huntington, Don Curry, and Dean Graetz.

One other is Alan Falconer. Alan was an Assistant Professor at the University of Queensland and although an Englishman had come here from Canada. Not from CCRS but the parent Department of Energy, Mines and Resources. He had very strong views about some of the things that Canada had done wrong, partly for which he took responsibility, and so was very pleased to get the opportunity to repair the damage. I had heard from users around the world, during my trips, that one of the biggest inhibitors to the taking up of technology was trying to find out what data was available. Most people just followed the lead of the EROS Data Centre, who was distributing the American data, and came up with listings. So it was always very difficult to find if the data you wanted was there and if it was, was it cloud covered, and if it did list some cloud was the cloud cover on the bit you wanted to see or not on the bit you wanted to see. Alan and I sat down and dreamed up the Australian Landsat Image Catalogue. It was the first time anywhere in the world a catalogue was put out in image format. It was quiet a load on the station but the Users could look at the image they were going to buy and they didn't find out six weeks later that

the cloud was right over the top of Hobart where they wanted to do some work. It became the world standard but then the problem of course became how did you get it around a place as big as Australia, so we had to set up a distribution network.

But before we get to that there were two people who influenced me greatly as to what the Landsat station should be from the Users point of view. One was David Simonett who was an expatriate Australian, Professor at the University of California and the other was David Landgrebe from Purdue University. They came out here as soon as we got the word we were going to build a station to conduct a couple of seminars (Ken McCracken might have arranged this, I think) and I spent hours and hours with them getting the feel of what they as experienced users would like to see in the data distribution world. So that influenced me greatly too and the one overriding philosophy I have always had right through this process is - make it responsive to the Users. That's the important thing. Fight your other battles elsewhere but be responsive to Users and they will adopt the technology, if it works for them of course.

Now we had to write up the specifications for this thing and again Ken McCracken came to my rescue. Frank Northey and myself were sitting down to write the technical specifications after we had done a world tour, I guess you'd call it a "fact finding" job. We went and talked to existing stations, Italy, then we went into France and talked to some of the SPOT people, but that was only sort of embryonic. Well it was actually CNES as SPOT hadn't even been invented then. Then we went to Brazil, EROS data centre then up to Canada and had a look at the station at Newfoundland and Prince Albert. We talked to all these people and got all the information we could about what sort of things needed to go into the specifications. Frank and I would have no trouble in building a tracking station, antennas, receivers, we knew all about that but what did you do with the data? How did you process it? So Ken gave us Andy Green for quite a period and another whose name I can never remember to set up the geometric accuracy side of the thing. He for the geometric processing and Andy for the radiometric processing. So they both were very influential people as to what went into our first station and what our understanding of it all was.

ERTS went up with three instruments. It had an RBV (Return Beam Vidicon) camera which was the primary instrument and everybody knew you'd get pictures from that and that's what everybody would want. It had a data gathering and relay thing - you know - interrogate the earth and back up - I've just forgotten what they called that thing - that was for people to get ground truth at the same time and then there was this sort of sideline thing called a Multispectral Scanner (MSS). But we for once got lucky. We didn't have enough money to afford both the RBV and the MSS processing. But by the time we had to make the decision what we bought, suddenly nobody wanted RBV and everyone wanted MSS, so we had an easy decision to make. It really hurt the Brazilian's as they put all their stuff into RBV in the first place and then had to spend lots and lots of money to change over to MSS processing. For some reason the Canadian's always seemed to be able to attract money to do what they wanted, so they had both systems from the start.

Now we also got a lot of help from a fellow called Val Crawley who ran a business called Aerial Surveys in Melbourne. He'd been distributing some Landsat imagery

which he got through the National Mapping connection, mostly to do with survey work rather than mineral exploration, but he gave us a lot of help setting up our photo-labs. Now a real anachronism was the amount of money we had to spend on photo-labs was quite incredible because the total technique at that time was based on infrared aerial photography principles and interpretation techniques; false colour imagery and so forth. There was just not the capacity to do the digital work as is done now. By far the greatest amount of data, even worldwide, was 90% imagery and 10% digital data and so one of the things we found was that to preserve the image quality you could not send your imagery to commercial outlets. They would become so busy with their holiday snaps and so forth that it didn't bother them particularly if their chemicals started to get a bit "gluggy". The Canadians had found it and Val Crawley found the same thing with aerial photography. So we decided not to try this; we did send some sample stuff off to a few different people and got back such bad results it automatically meant we put in our own photo-lab. The last of the photo-lab technicians retires tomorrow would you believe?

That was something to me a totally new black-magic, this photographic business. It was quiet magical and I had to physically restrain fellers from "dodging" the images. They'd find a line somewhere in the image and say "Hell that can't be there", so they'd wave these little sticks over the image as it was being produced. What they were trying to cut out was Cameron Crossing were you could see three State borders on the image quite distinctly and they were trying to wave these things out cause you couldn't possibly see a fence from space! Not on MSS data! Something had made these funny marks on the image. We had to educate them to some extent that what was in the data was meant to be in the data but by the same token they knew what colours ought to be like and how they should come out particularly the false colour stuff. We had an ex-Airforce photographic officer who retired just nicely in time to take up the job with us and he did tremendous work for us. A guy from Rochester, where Kodak is based, John Graham was the one who knew all about the films we needed. He helped us greatly and while he wanted us to use Kodak products obviously, he was also tremendously honest in what you should do. So not everything we did was Kodak and not everything was on their letterhead to tell me or give me advice.

So we set the place up. We got good acceptance early but with all the goodwill in the world we could not have anticipated the demand that hit us immediately and within three months of opening we had a six month backlog of orders!! The only way out of it was to increase the hours you operated the station. Like most places the second and third shifts, you know the evening and midnight shifts, are far more productive than the day shifts 'cause in the day shifts you have to do all this maintenance and all the things that require the clever people in there so you've got less actual "on the air" time. Never had any problem with taking the data; that was a nice set thing because the satellite was very kind going over at the same time every morning, 7 days a week. Mind you, would have been nicer if it went to sleep at weekends, but it didn't.

So to tackle the backlog we had to try and get almost double the staff, certainly treble the "coal-face" people to operate the station longer. I wound up having to write up a full Cabinet submission for something like \$35,000 to see out the 2 months remaining in the year to pay the bills!!

CR: We should talk a little bit about the upgrade of the station as it seemed to take a very long time to get the money for it?

DG: Oh yes, because we really established the place on a shoestring. I think it was \$4.5 million all up which included the buildings, the electronic and photographic equipment, and as I remember it was just over \$3 million for the for the receiving and processing. \$3.8 comes to mind; \$3.8 million including the photo-lab, the photo-lab was about \$600,000, and the rest was buildings, site-works and that sort of thing, so a pretty much shoestring operation. Absolutely minimal. When you started then to look at an upgrade it was going to cost more to upgrade the station than it had cost originally. It was very, very difficult as they kept pointing to the fact that we were not meeting our costs. It depended what you counted in the costs of course. NASA used to get \$200,000 a year for access to the satellite suddenly it was handed over to NOAA and the most immediate, almost instant effect, was that it went to US\$600,000 a year. So that wrecked the whole of our sort of predictions, and our ability to argue "Well we were not far below costs". But then we got into the adoption of accrual accounting within the Commonwealth and then you had to make allowance for depreciation and all sorts of things that had never been counted before. So these costs kept going up. We easily made our operating costs but we never made up all these other costs that went around it. Despite the fact that the original Cabinet decision said that the aim was to meet our operating costs there was always this argument that this was a big black-hole that the Commonwealth was pouring money into.

It took some people like Ken McCracken's Division of CSIRO Mineral Physics to come up with a radar processor. It also took AMIRA, which was the Australian Minerals Industry Research Association, to come up with a Landsat 4 processor. It was limited in what it could do but it could get the data, and you could get it out to people, and they knew what you had and it came at a time when people were getting more of an ability to do more of their own digital processing. We started to see a big jump in the sales of digital data as opposed to the photographic. But the interesting thing was that at the end of the day they all wanted a picture so we used to make our lab available to make high grade pictures from whatever they processed the data to be – and promised never to show them to anybody else! That became a very substantial part of ACRES business; producing imagery from the Customer's digital data.

Then also the improved spatial resolution meant that the mapping people could make greater use of the data for map revision - not for compilation but revision.

CR: This is the Thematic Mapper instrumentation?

DG: Yes and then SPOT of course came along so those things tended to give another boost so there was sufficient throughput. Then we changed over and became a part of the Division of National Mapping; came out of the old Science area and went into National Mapping. National Mapping or Energy and Resources, I think they were, seemed to be better negotiators for funding than Science had been.

ⁱ Catherine has been involved in Science Communication in one form or another since the early 1980s when she was an explainer at the fledgling Questacon. During her undergraduate studies in Physics and Mathematics at ANU she became a founding member of the Questacon Science Circus. She spent the next fifteen years as a technical writer in fields ranging from the building industry to information technology to workforce management and activity reporting. In 2001, with the assistance of a scholarship from the Australian Centre for Remote Sensing, she completed an M.Phil. at CPAS, *A History of Satellite-based Remote Sensing in Australia 1971-1989*. After a pause to start a family, Catherine returned to ANU in 2003, this time in the Research Office, collecting, analysing and interpreting statistics relating to the University's research performance.

Many years of working with performance indicators of various types has given Catherine the underlying motivation for her PhD research into the communication of organisational outcomes using simple performance indicators.

