

Report on overseas visits to Sweden, USA and Japan - 18 October – 10 November, 2000

This report provides summaries of meetings and workshops that I attended during 18 October – 11 November, 2000 in Gothenburg, Sweden, Lake Tahoe and Honolulu, USA and Kanazawa, Japan.

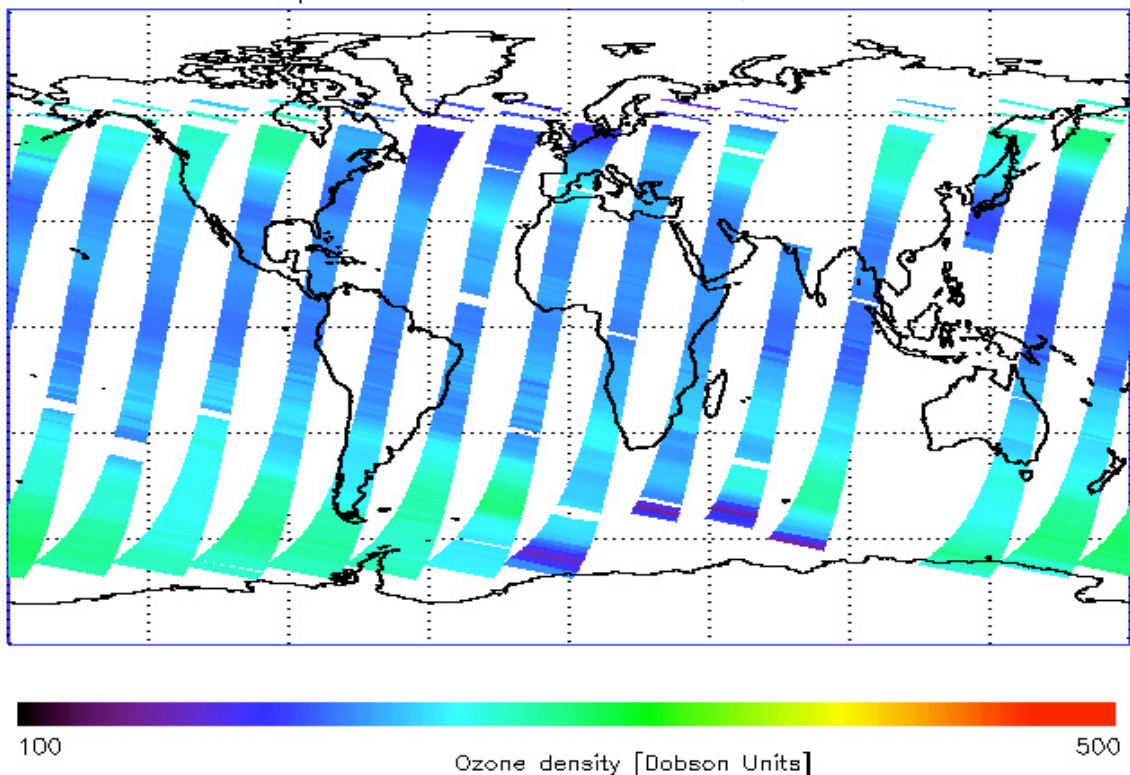
ENVISAT 2000 Symposium, Gothenburg, Sweden, 18–22 October.

This Symposium is held every two years and hosted by the European Space Agency (ESA) to showcase recent results from the ERS series of satellites and provide researchers with information on current and planned space-based remote sensing programmes funded by ESA. The main purpose of my attendance at the meeting was to meet with colleagues working on the ATSR instruments and to deliver two papers on global land surface temperature algorithms. The Symposium attracted more than 1,000 remote sensing specialists (mostly from European Community countries) and was divided into several parallel sessions. The majority of the sessions were devoted to radar applications, radar interferometry being the most reported topic. The unprecedented vertical displacement accuracies now being obtained from the ERS radars has opened up a whole new area of applications. Cities are now being surveyed using radar interferometry in order to identify structural problems with buildings. There were several talks on earthquake assessment and volcano deformation using radar interferometry.

The ATSR sessions were divided further into sub-disciplines – land, oceans, atmosphere, cryosphere and calibration and validation. My talk on a global land surface temperature algorithm was well received and there is strong interest in having such a product available. Unfortunately, at this time the plan to generate the LST product are on hold for reasons that are not completely clear. I also presented a talk on behalf of my lead author on canonical LST algorithms for use with the ATSR. Both papers are to be published in the symposium proceedings and will be available on CD-ROM. Both talks are available as PowerPoint presentations.

I attended all of the ATSR sessions, the sessions on results from the Global Ozone Monitoring Experiment (GOME) and some of the radar presentations. Products from GOME are now available electronically via a *Fast Delivery Service*. Look at <http://www.knmi.nl/gome.fd>.

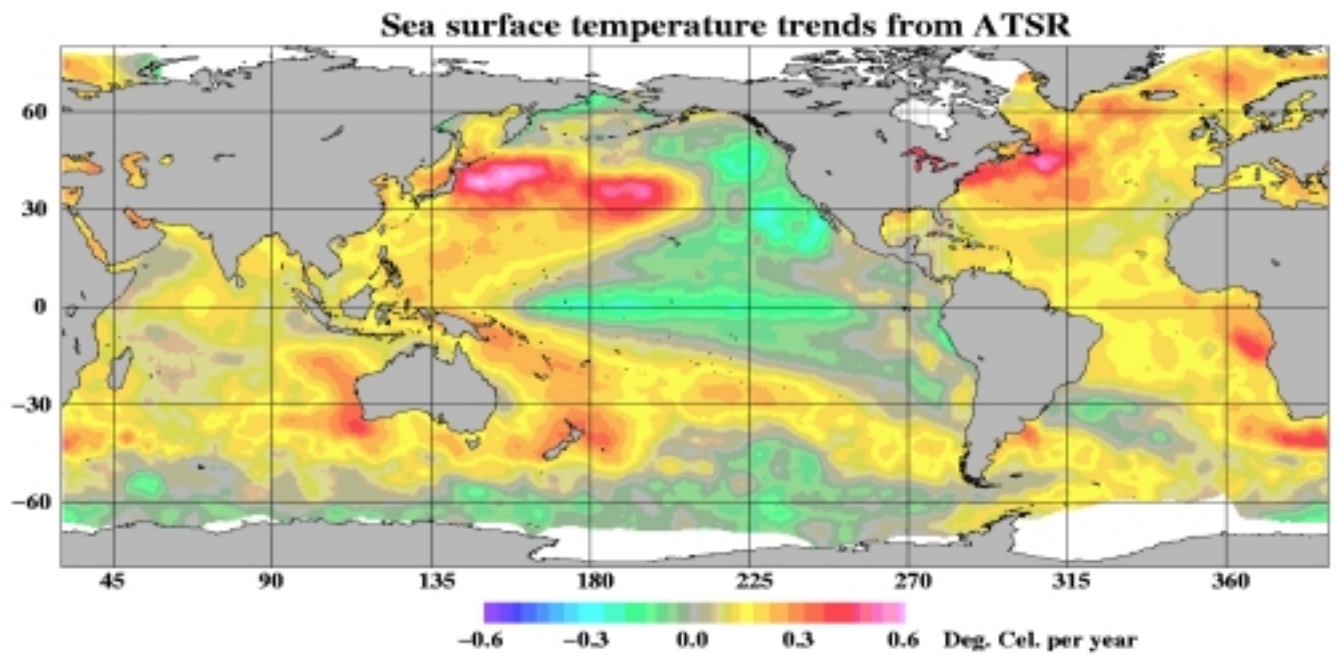
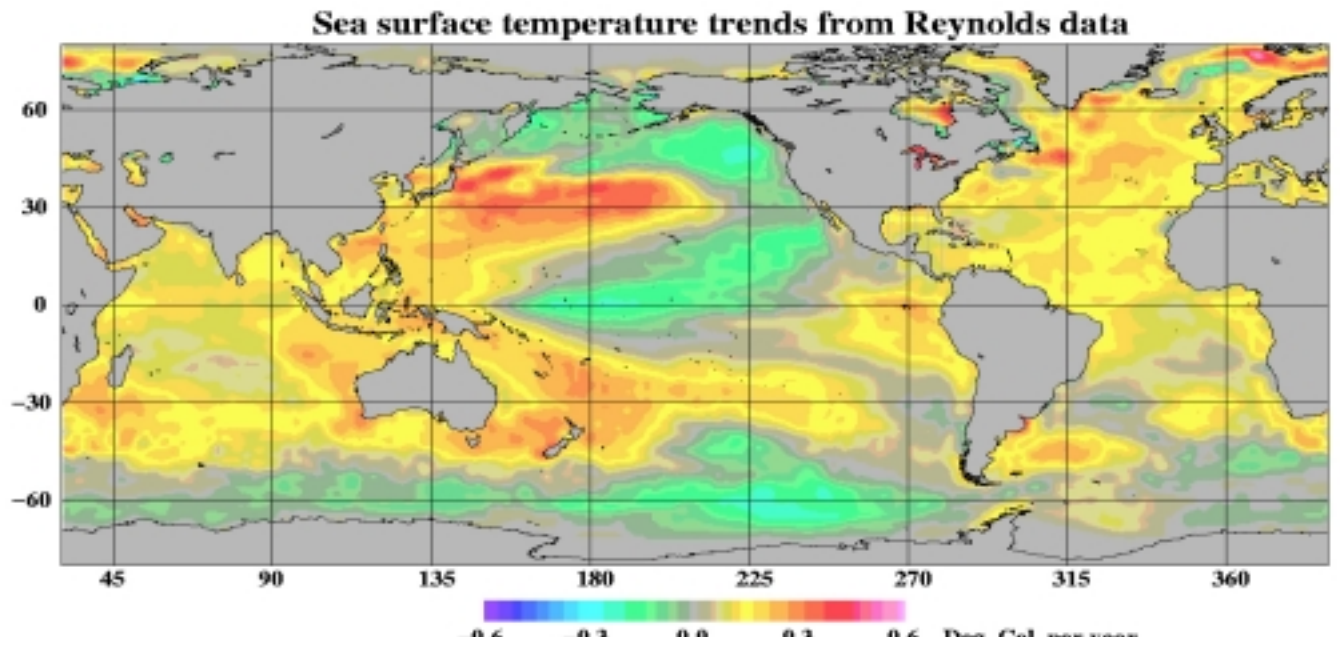
Stratospheric ozone above 120 mb , 16–17 Nov



Recent ozone column amounts derived from GOME and available electronically from the *Fast Delivery Service*.

The plenary session included a rather well made video presentation on the history of the ERS programme and the plans for the upcoming launch of the ENVISAT, probably in November 2001. There was a very interesting

paper given by Per Knudsen on sea surface temperature trends derived from the ATSR and the Reynolds's analysis. A high degree of correlation was found between the data-sets and the trends have considerable spatial structure. These data, being independent analyses, can be used to validate climate model simulations.

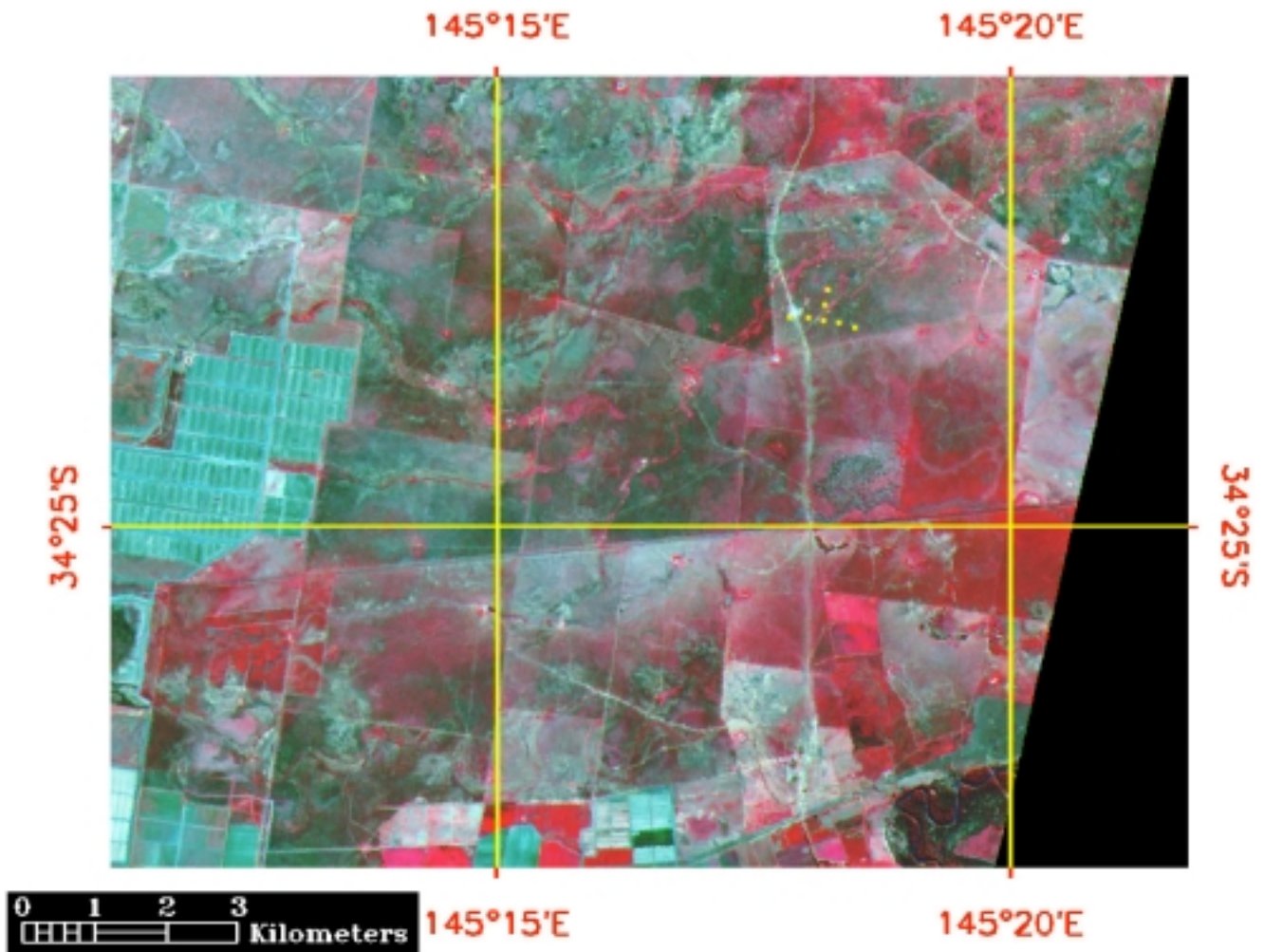


Global Trends in ATSR Sea Surface Temperature. (After P. Knudsen. Reproduced with permission.)

ASTER Team Meeting, Tahoe City, Nevada, USA, 2–3 November, 2000.

NASA invited me to attend the ASTER Team meeting as a *no fee* consultant¹ The ASTER instrument is carried on board the Terra satellite and has been producing excellent data since instrument turn-on in February 2000. ASTER data has very high spatial resolution (10 m in visible/nir infrared; 30 m in the thermal infrared), but low temporal coverage. The meeting included talks on the status of the instrument, data acquisition schedule and data product distribution. Hugh Keiffer (Flagsatff, Arizona) gave a very good talk on the detailed spectral and electronic characterisation of the ASTER. Dr Simon Hook presented two talks on ASTER and MODIS cal/val at Lake Tahoe and the Australian field sites. His talks are available as PowerPoint presentations.

The workshop location was chosen to be close to one of the primary ASTER validation sites on Lake Tahoe. CSIRO and JPL are collaborating on using this site and the Australian sites to provide ASTER validation data. As a result Australia has access to the satellite data and already there have been several images acquired at Hay, Amburla and Thangoo.



ASTER image acquired at the Uardry field site in May 2000.

Band (μ)	Measured temp. (K)	Predicted temp. (K)	Difference (K)
8.29	285.45	285.27	+0.18
8.64	285.87	285.39	+0.48
9.08	285.55	285.87	+0.32
10.66	286.99	287.44	+0.45
11.29	287.45	286.95	+0.50

Table 1. Comparison of ASTER top-of-atmosphere brightness temperatures with predicted temperatures based on

¹A *no fee* consultant is paid only for travel accommodation, and per diem expences.

radiosonde data, *in situ* temperatures at Uardry and the Modtran-3 radiative transfer model.

The differences are within the anticipated measurement errors and the result shows that the ASTER thermal channels have been well characterised. ASTER data will soon be released to the public, although acquiring imagery for specific sites at specific times remains a difficult task.

I visited the Lake Tahoe validation site with Dr Simon Hook (JPL) and we discussed the instrumentation package and plans for processing the data. A CSIRO ScanRad instrument was mounted on the pier at Lake Tahoe by John Bennett earlier this year.

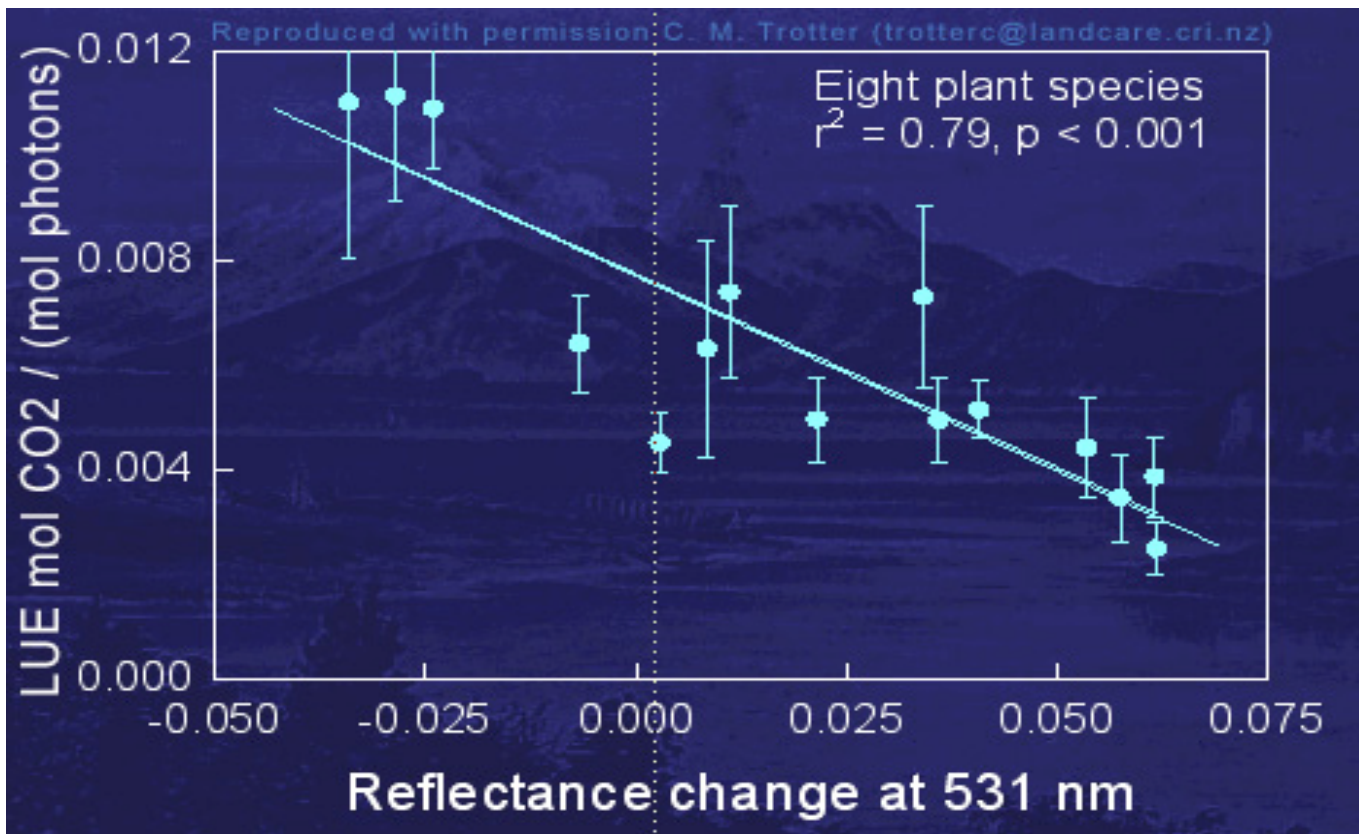
EOS-IDS Volcanology Team meeting, University of Hawaii, Honolulu, 4–5 November, 2000.

This was the last team meeting of this highly successful activity, funded through NASA for 8 years. The goals of the team have been to develop state of the art methods for studying volcanoes and their effect on the environment using NASA's flagship satellite platforms Terra and Aqua. The multidisciplinary nature of the team has led to extremely productive discussions and broader understanding of the problems. The meeting consisted of individual talks ranging from analyses of the recent impact of the Hekla eruption to global 'hot-spot' monitoring, to radar analysis of dome inflation/deflation. The last part of the afternoon of the second day was devoted to discussions regarding the new team's activity. This team, of which I am a member, has been funded for 3 years to study the environmental effects of volcanic plumes. One interesting problem which will be studied by the team concerns the conversion rates for SO_2 to H_2SO_4 and how this might be measured at the Kilauea volcanic plume in a lagrangian experiment. Steve Bussinger (Meteorology Dept., University of Hawaii) gave a talk on the use of the HYSPLIT model for forecasting volcanic fog (VOG) around Hawaii and included plans to utilise remotely sensed measurements of SO_2 .

ADEOS-II/GLI meeting, Kanazawa, Japan, 7–10 November, 2000.

The annual meeting of the ADEOS-II/GLI PI's was hosted by NASDA in Kanazawa. As is typical at Japanese meetings the schedule of talks was very crowded with talks (mostly in broken English) every 15 minutes from early morning to quite late. A succession of NASDA space engineers and bureaucrats described the technical features (and problems) and funding priorities of the GLI programme. The loss of the HIIA rocket (and the demise of MTSAT) has set the Japanese space programme back at least 1 year and possibly more. The new launch date for the ADEOS-II platform is February 2002 with a possible slip to November 2002. The budget for 2001 has been cut by 30% and this is likely to impact the current level of foreign PI funding by a proportional amount. My contribution to this programme is in land studies and the provision of research algorithms for surface radiation budget studies. It is likely that as the algorithms mature and are accepted by NASDA, the emphasis will shift toward calibration and validation. In this regard the Australian cal/val sites are highly regraded and valued as very useful to GLI vicarious calibration. The team leader of the land group has approached me to host a cal/val activity in Australia during 2002. The Japanese will bring a remotely controlled helicopter that has been instrumented to provide remote sensing measurements commensurate with the GLI measurements. Thus while a funding cut might be expected during 2001, with careful planning it is possible that the funding may be increased in 2002 to accommodate the requirements of the cal/val exercises.

Craig Trotter from New Zealand presented an interesting talk which included some results on using a narrow band at 530 nm to measure fluorescence from plants. The excess energy involved in photosynthesis is dissipated through fluorescence and this is measurable by remote sensing. He showed that there is a strong correlation between this energy and CO_2 transpiration thus providing a means of indirectly estimating CO_2 from plants. His key result is shown below.



New opportunities in remote sensing of carbon dioxide in plants. (After Craig Trotter. *Reproduced with permission.*)

I have many documents, CD-ROMs and much more detail on the ADEOS-II/GLI programme for anyone wishing to know more.

Significant developments, conclusions and opportunities from the visits

1. In Sweden. Two papers presented and published in the Symposium Proceedings. Discussions with senior ESA officials regarding prospects for future collaborations and funding for Australian remote sensing. New results on SST trends from satellite data. These results should be compared to our GCMs.
2. In USA - ASTER science team meeting. Acquisition of ASTER and PACRIM-II data for Australian field sites (see <http://masterweb.jpl.nasa.gov/pacrim2/data/default.htm>). Visit to Lake Tahoe site and inspection of CSIRO ScanRad deployment. Two presentations made on behalf of NASA JPL/CSIRO joint activities. Discussions on next round of NASA funding proposals for Aqua.
3. In USA - EOS-IDS volcanology team meeting. Approval to use new funds for travel and logistical costs associated with field work. Possible further collaborations between CAR and UoH for monitoring VOG (discussions with Greg Ayers TBD). Invitation to re-propose VOLCAM for geostationary orbit over the Indian Ocean. Possible involvement of Australia in the program. Further discussions necessary with Bureau, NASA Goddard (Bill Smith) and Australian industry.
4. In Japan- ADEOS-II/GLI meeting. Presentation of contract results and acceptance of deliverables by NASDA. Invitation to host core field site in Australia with expectation of further funding. Invitation to re-propose algorithms for standard product generation by NASDA. Request by Prof. Honda to collaborate on experiment to bring a remote controlled helicopter to Australia for cal/val activities. New possibilities for remote sensing of CO₂ from plants using 531 nm fluorescence feature.