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Meeting Minutes

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Introduction

Dr. Lawrence Friedl introduced the meeting agenda. Executive Secretary of the Applied Sciences Advisory Committee (ASAC), Mr. Peter Meister, introduced himself and thanked the Committee members for attending. Dr. Friedl briefly described the ASAC Charter in terms of advising the Applied Sciences Program (ASP) on its policies, plans, and priorities on applications, as well as commenting on broader issues, representing the community to NASA. Ms. Kass Green, ASAC Chair, opened the meeting.

Mr. Friedl welcomed newest ASAC member Dr. Phil Ardanuy, who was bringing much experience in mission and instrument development, and with the midterm Decadal Survey.

The ASP is seeking advice and recommendations, and in that light Mr. Friedl requested that ASAC inform the program of key issues and activities in the Earth Sciences area that are relevant for applications, and to share ASP activities with the community in order to gain feedback. In addition, he asked that the ASAC make its wishes known as to meeting organization, and to consider approaches for conducting the business of ASAC. Should it center around major issues and address in depth on fewer topics? This was a question of depth vs. breadth. Two items to keep in mind specifically were the value of applications; and community input into the next Decadal Survey, due in 2017.

Mr. Friedl addressed actions stemming from previous meetings. ASAC has met with the Earth Science Division (ESD) Director Dr. Michael Freilich on previous occasions. In June 2013, ASAC considered re-sending its 2012 letter to the Earth Science Division Director; this letter can be sent in conjunction with the present meeting report. A decision was made to not stand up a capacity-building sub-committee. In response to ASAC recommendations regarding the human dimensions community engagement activity, NASA is currently in the process of putting a contract in place to address the recommendation. ASP plans to arrange to have contractors brief the ASAC. Dr. Susan Moran has made her Handbook chapter on the Soil Moisture Active Passive (SMAP) mission available; Mr. Meister took an action to distribute the chapter to the ASAC membership. Other topics of interest to be addressed in today’s meeting include possible feedback on a NASA- sponsored study on data continuity; the ASAC might want to ask Dr. Freilich what he would like from this study. In response to a recommendation to engage with the European Space Agency’s (ESA) TIGER program at the next SERVIR meeting, Dr. Moran commented that she would be visiting the TIGER group this summer. Dr. Nancy Dickson took an action to contact Dr. Moran on this topic. The data latency study is complete but has not yet been distributed to ESD, however it can be discussed internally for the interim.

In 2012, ASP held an AGU session and international workshop on developing methods for measuring the value of information, socioeconomic impacts, and assessments of application projects. Two new solicitations in December 2013 added language to this effect: for those projects awarded, NASA will support interested PIs in carrying out an impact analyses. ASP would also like to revisit the idea of a white paper to define a space that ASP and ESD should be working in. An ASAC member commented that it was difficult to measure the value of applications as they depend on policy framework; their value is determined by who benefits and who pays..

Mr. Friedl addressed ASP responses to ASAC recommendations on diversifying communications and outreach, noting that ASP has expanded its annual report. The ASP could not progress on a recommendation to hire a person to staff disasters, beyond extending the detail of existing staff. A participant commented that the US does not seem to possess a vision on where the nation might be in 10-50 years, as to the potential for famine, drought, and energy shortages, and wondered how the ASP might help the US to form a basis for a strategic vision for these matters.

Mr. Friedl requested feedback from the ASAC regarding two years of results using the recently adopted Applications Readiness Level (ARL) metric. ASP has been tracking publications internally, but has devised no performance metric to deliver to the Office of Management and Budget (OMB) as yet. Ms. Green commented that the committee had been impressed at how much applications are key to NASA’s continued funding, based on how they fueled constituents’ understanding of NASA’s relevance, and asked about any increase in the consideration of applications in missions planning. Mr. Friedl noted that each mission now has a program applications lead to really look at applications. One consequence has been the extension, to other missions, of Dr. Moran’s work on SMAP. Ms. Green reiterated the need to concentrate on measuring results from ASP, perhaps by revisiting the committee’s prior recommendation.

ESD and Applied Sciences Overview

Mr. Friedl gave an overview of the main objectives of the ASP. In terms of outcomes, no decisions are needed at this time, but the program would like to get an opinion on how to do more. The ASP has a particular vision as to routine and seamless integration of data, which implies the need for data in usable formats, awareness of future mission needs, and useful products and services from the Earth-observing programs and projects. Dr. Bill Hooke noted that the agricultural community needs data that can influence outcomes (of crop yield, e.g.). Perhaps a short white paper on “decisions and actions” is necessary to explain this.

Mr. Friedl described the dimensions of ASP that show the relevance of ESD and the nation’s investment. ASP is divided into three lines of business encompassing nine themes. Capacity-building has four main elements in building nontraditional audiences, and working with SERVIR, USAID, and the developing world. ASP is now trying to use ARLs as a communication tool, which seems to be accepted, and to which ESD has reacted favorably. In last two years, ASP has exceeded its performance goal of advancing ARLs, having advanced 68% of them to date.

The most recent ASP budget includes a hit from sequestration, and since the 2014 budget was just recently passed, ASP is still showing the President’s request dating from March/April 2013. ESD’s funding is up relative to other organizations. Dr. Hooke observed that there seemed to be a lot of expenses at the science end, and a very narrow applications funnel, which will limit the rate at which society can benefit from what NASA is doing. Mr. Friedl noted that not all applications are done in the ASP; this is an issue that ASAC might wish to address in terms of re-alignment within ESD. There is some way to communicate this in the National Climate Assessment. The community must weigh in on the balance of responsibility between the Data Acquisition and Control System (DACS) and the ASP. How much Research and Analysis (R&A) funding does the community want to go into Applications? Ms. Green asked: what would motivate NASA to fund more applications? Mr. Friedl suggested using the kickstarter concept in the community in an effort to fund new ideas. The Gates Foundation Grand Challenge was mentioned as an example. Dr. Moran commented that applications often have a role in ensuring future missions- this is how it is gone with SMAP, and also LandSat and MODIS. These mission applications have been so strong that they have led to follow-on missions. Mr. Friedl suggested bringing this question of research vs. applications to the community. The same mission can support both if planned properly. The point would be valuable to bring up in the context of the next Decadal Survey.

Mr. Friedl also suggested the community begin to take note of the notional schedule for the next Decadal Survey, as Terms of Reference will be under development in 2014. The water community has already had a water missions meeting in 2013. What does the application community want to do with this? Dr. Hooke commented that the lack of a strategic vision, and the urgency of issues call for the community to be as disciplined as possible. These concerns should be threaded throughout the Decadal Survey and have a separate emphasis as well.

The National Research Council (NRC) Committee on Earth Science and Applications from Space is conducting a Continuity Study through the Space Studies Board; the study might provide metrics to determine whether ESD should continue a particular mission. This may be a topic for a future meeting. Ms. Molly Macauley noted that continuity is necessary for long-term measurements, but this does not preclude innovation in instrumentation or data. The community needs to know when there is a step-change underlying the phenomenon or data, which then provides an on-ramp for innovation.. Ms. Green commented that the demand for continuity is huge from operational organizations. The National Civil Earth Observations Strategy, for example, is in the midst of considering both sustained and experimental observations, coordination among agencies, and identification of priorities, through a portfolio approach. Their results will be released in April 2014. The National Climate Assessment will also be released in this time frame, in the context of decisions and actions, and identification of vulnerabilities.

Mr. Friedl noted that ASP is still very active in promoting international relationships. During an European Space Agency (ESA) Plenary session the previous week, almost 70 international organizations gathered to take stock of the last 10 years of the Group on Earth Observations (GEO), which has pushed for the importance of open data policy. Centre National d'études Spatiales (CNES) is opening its archives for the first time. ESA is also considering this despite controversy in Europe over this. ASP continues to work on land imaging continuity activities in coordination with the US Geological Survey (USGS). The budget for this activity is $40M in the FY14; ESD has received language and direction from OSTP/OMB to assume an expenditure of $120M per year for 20 years. A steering committee is shared between NASA and USGS. A request for information (RFI) resulted in 35 responses regarding architecture. ASP has initiated two-stage projects, and is currently doing the first down-selects after a first-year feasibility study; one for water is currently in phase II. ASP is reviewing phase IIs for wildfires and disasters; the next review will be for ecological forecasting. Each potential PI will present a feasibility study and hold a Q&A session with a review panel. Mr. Friedl made a note for an informal action to follow up on feasibility and intellectual property (IP) issues for phase IIs.

*Articulation of ASP Results*

There have been issues of quantity and regularity, as well as quality. ESD Director Dr. Freilich didn’t seem to think there were a huge number of results. Mr. Friedl was attempting to understand the issue as a director: do we really not have results? That is a programmatic issue. It could be that ASP has a communications issue in terms of packaging the results well. It is clear that the program needs to do better in providing ESD with presentable results. ASP is wrestling with this. Results are not just limited to ASP. The ESD Director has had issues with other parts of division. Dr. Hooke observed that there is typically a long lag period between planning and mission results, such as the ability to do forecasting for Hurricane Sandy; this forecasting ability took decades to develop. It is difficult to capture these types of results immediately. ASP might have to look back on a longer time scale to articulate results.

Disasters give ASP an opportunity to demonstrate the value of Earth observations; they draw media attention to applications, but not in a sustained way. ASP needs a way to extend this awareness. In late November a new SUOMI-NPP science team was formed, and they welcomed applications members for the development of data products, and to continue necessary data products and advance new data products, if possible.

ASP has been creating heritage report that describe heritage in science and technology. One report has developed the story of the Global Fire Information Management System (GFIMS); ASP is looking to do more of this to pay homage to its programs. The program can pay a contractor to do this, or do it internally, or have some of the community to engage in some of this writing. In the international community, the UK is carrying out an interesting Catapultactivity that NASA might want to consider.

Applications Areas and Building Capacity

In response to a 2012 ASAC letter recommending that ASP institutionalize value-added aspects of Earth Science , ASP tasked Program managers (PMs) to identify trusted respected organizations that can help spread and amplify the impacts of Earth Science data products. Do they have needs NASA can provide in a sustainable way? Do they have funding? One such organization has a community provider role, another can provide analytic and decision support tools on websites. ASP had asked PMs to focus on organizations that are not federal agencies. What does ASAC think is meritorious or lacking? Is this something the ASAC wants to pursue? Mr. Friedl introduced the first briefing:

*Health and Air Quality*

Mr.. John Haynes presented the contents of a unified portfolio on infectious disease, environmental health, and air quality standards, the overarching theme of which is the effects of climate change on public health and air quality. ASP released a new ROSES 2013 Announcement of Opportunity on Health and Air Quality (HAQ); proposals are due in April 2014. Thus far, for 11 projects, a median ARL of 8 was accomplished; 36% of the projects advanced two ARL levels. A major accomplishment is illustrated by NASA coverage of the Wyoming Thunder Basin exceptional event in ozone standard exceedance. The cause was a natural intrusion of stratospheric ozone, which was determined via NASA ozone column measurements on Aqua/AIRS, and a coincidental flyby of NASA’s AJAX flight campaign.

NASA already has relationships with boundary organizations such as the World Health Organization (WHO), among others. Booz-Allen generated a list of 70 organizations for ASP’s consideration. ASP subsequently selected five organizations for targeting in 2014: ASTHO, IANPHI, ISEE, NACAA, and the Pan American Health Organization (PAHO). ASP has made some contacts with ASTHO and IANPHI, and is re-approaching ISEE after an initial rebuff. NACAA represents air pollution control agencies in 45 states. Its next national meeting is next month, and ASP seeks to have a formal session with them. ASP has had past contact with the Pan American Health Organization (PAHO) and is hoping to establish relationships with new blood. The ROSES solicitations are open to international participants. If initial contacts with ISEE are favorable, ASP may want to approach them for journal articles.

*Water Resources*

Dr. Brad Doorn presented, noting that ASP has been dabbling in 18-day water resource forecasting in a recent solicitation. He presented ARLs of 20 projects in the Water Resources portfolio, noting that it is a work in progress, and has provided the basis for dialogue with PIs. A major result has arisen from a project shared among USDA, NASA and USGS, a feasibility study of satellite data which showed the extent as to how well this data can provide estimates for fallowed acreage, before the season commencement. The California Department of Water Resources has requested a workshop on this study, which will include a press release about the relationship. In looking at boundary organizations, Dr. Doorn used parameters such as impact, capability of influencing the decision process, reputation, and culture of innovation. With respect to water, “states rule.” The California Department of Water Resources is regarded as a leader in this area, as well as the Western States Water Council. There is a strong push to move these activities to the national scene. In this context, NASA is trying to re-engage the Environmental Protection Agency (EPA) on water quality, and is sponsoring two workshops on the subject at Glenn Research Center this Spring. Water supply issues are becoming more common in the US, as is quality. NASA holds quarterly meetings with USGS, and is focusing on more thermal data with USGS and on groundwater information. Internationally, ASP is working with Nancy Dickson on determining which relationships will work. With USAID, ASP is focusing on integrating their grants with NASA. GEO Water is putting emphasis on strategic planning, and is getting interest from other federal agencies on this. Within the private sector, the reinsurance industry (an engaged partner on the SMAP mission), and the Bill and Melinda Gates Foundation are also seen as good partners. ASP has the potential to establish a relationship with the American Water Resource Association. NASA has met with the Gates Foundation in the past, and is trying to understand how their funding works. Results have not been as concrete as one would wish.

In response to a question, Dr. Doorn felt that the ARLs are working well. Ms. Green requested that Dr. Doorn formally capture the criteria for identifying boundary organizations. Asked how ASP deals with projects that don’t advance on the ARL scale, Mr. Friedl responded that these issues are treated on an *ad hoc* basis, usually through a discussion with the PI, to see for example if there are particular stages where projects slow down. It has been observed that engagement between PMs and PIs at the upper ARL stage constitutes an effective method.

*Capacity Building*

Dr. Nancy Searby presented the briefing. In capacity-building, the goal is to expand national and international activities to broaden the range of users of Earth observation data. SERVIR and DEVELOP are the two principal organizations with which ASP is involved. The program is also with GEO, partly to understand how to leverage other resources. Capacity-building is a little different than the other portfolios. SERVIR has 11 projects, and most projects are still in the early phase; they are moving forward overall. The Gulf of Mexico Initiative encompassed 48 projects; many have closed out as of December 2013. A major accomplishment was improved flood forecasting, from 3 days to 8 days, which was accomplished in Bangladesh in time for the monsoon season. ASP provided 160 million people with better forecasting.

In terms of existing boundary organizations, ASP engages them based on who can help ASP reach new end-users and also participate in the Train the Trainers program. ASP engages with the US Water Partnership (Department of State), the World Bank, and the World Resources Incorporated Aqueduct model, which thinks like the business sector. There is a memorandum of understanding (MOA) in place between the World Bank and the US Government. ASP plans to develop relationships with the Department of State’s Foreign Services Institute, and Development Alternatives Incorporated (DAI), the latter of which has worked with the SERVIR team.

*Disasters*

Dr. Frank Lindsay provided the briefing, noting that NASA is not trying to supplant the Federal Emergency Management Agency (FEMA) in its role, but is trying to understand which NASA capabilities they can leverage. NASA tries to respond to both regional and international disasters. The portfolio has aspects across response, mitigation, etc., and tries to coordinate with R&A when each disaster strikes. Thus far the ARLs seem to be effective, and are a good *lingua franca* as they are similar to the TRL concept. For FY13, there was good advancement in ARLs. Dr. Lindsay noted a major accomplishment with Typhoon Haiyan, using a system at JPL called ARIA that mostly looks at geohazards. Using ARIA, JPL was able to generate damage proxy maps for the Philippines. JPL worked with the Italian COSMO-Med to obtain synthetic aperture radar (SAR) imagery, which was then tied with a surface roughness algorithm to yield damage proxies. With an automatic connection, the system can get data ahead of time to make comparisons. During this event, NASA was approached by civil agencies to try to identify undamaged landing fields. The effort was well covered in the media.

ASP has identified disaster boundary organizations such as UN SPIDER, which is in the forefront in areas such as crowdsourcing, and the National Disaster Preparedness Training Center (NDPTC). Other organizations identified are the Global Flood Working Group, an international group working on improving models, which also has good ties with organizations such as the Red Cross. The All Hazard Consortium, which organizes relief across states, is also considered a promising organization with which to engage.

*Ecological Forecasting*

Woody Turner presented on the subject of ecological forecasting, which has to address the challenge of scale in seeking to use satellite imagery for models of living systems. Prediction is key. Areas of programmatic focus are conservation biology and natural resource management. The forecasting portfolio contains existing projects, mostly midway or more through their projects life cycles, and 12 new feasibility projects just getting underway with a gateway review scheduled early next year. A major accomplishment was noted in improvements in the timing of forecasts of returning California salmon stocks for better fishery management. In this case satellite data and associated models allow for longer-term projections than the demographics-only data currently used by fishery. This new forecasting method is based on determining the availability of krill, upon which the young salmon feed, as estimated through environmental data provided by JASON and MODIS instrumentation.

ASP is currently working with several boundary organizations including the Department of Interior. Targets for future relationships include Cornell e-Bird, camera trap networks (U Wisconsin), and Environmental DNA (which identifies genomic material in water); ASP is also responding to a concern with the lack of long-term data on biological parameters. Targets for future engagement include applications such as iNaturalist, and small platforms like the Smithsonian Institution’s hexacopter program.

Discussion

The ASAC discussed the morning’s presentations, and suggested that ASP hire consultants to identify new boundary organizations. Dr. Ceccato noted that ASP needs a framework for this approach to identify gaps in data, policy and tools, and to determine how NASA can help. It was observed that state agencies are starting to work together corporately, such as in New England; a consolidation of organizations is easier to work with than 50 different fish and game agencies, separately. Dr. Haynes reported identifying boundary organizations through a Booz-Allen literature search, which identified regions and stakeholders. NASA is also looking at organizations that monitor emerging and re-emerging diseases, and is revisiting the Environmental Epidemiological Society now that some Earth Science tools have matured. Dr. Macauley suggested that ASAC might contemplate hosting a meeting of collaborators with the NASA Administrator and OSTP, to celebrate collaborators for reaching across disciplines. Dr. Moran suggested, with respect to experience with SMAP, that ASP should try to get more coordination as more missions ramp up. Dr. Hooke recommended not waiting for top-down instruction. A participant suggested that ASP search out “pull” organizations, rather than “push,” or figure out how to educate push organizations to become pull organizations; focus on “doing” rather than “talking” organizations. ASP might want to consider a Lessons Learned exercise, or a textbook on how to use Earth Observation data. ASP should also think in terms of marketing, by advertising such data as its 20% improvement in salmon forecasting. Figures such as those that address percentage improvement have an impact on monetary value. A 20% increase in forecast accuracy translates to *x*$M of dollars per year. A new metric to consider might be an “application user level” that addresses the readiness of the user. Ms. Green commended the presenters, noting that it looks like the program managers are already building a framework for decision-making. A participant commented that NASA needs a more evocative way to present the results of long-term studies. In response to a comment on potential misuse of remote sensing, Dr. Moran responded that the SMAP data users typically have no alternative; old soil moisture data doesn’t function the way satellite data does, which gets back to the concept of pain in the economy. Dr. Macauley noted that more quantitative measures represent an odd commodity, which can enable cost-effectiveness, or provide new knowledge, and felt that the ASP is sophisticated enough to define how it is making a difference.

Data Latency Study

Mr. Friedl provided a brief introduction to an ASP study that was carried out to look at latency needs, noting that the report is still internal. He added that ASAC may want to respond to this study through a formal working group. Dr. Mark Carroll presented the results.

The study, initiated by the ESD Flight Program, began a year and a half ago, and the study group submitted its final report in September 2013; additional revisions will be made. The study sought to anticipate the latency needs of upcoming ESD missions, with special attention to developing synergies across user communities. Latency and user needs, and latency and technical capabilities (methods for delivering data) were considered. The study was carried out by a steering committee that included membership from ESD branches. First, latency of existing missions and those forthcoming, including SMAP, LandSat 8, VIIRs, etc. was determined. For most of these missions and sensors, Level 0 to Level 1 (L0-L1) requirements were considered. Based on 14 questions for review, 7000 users were queried, yielding 500 results (7-8% response). Most responders required a latency of 36 hours. About 24% replied that the latency period length didn’t matter. Applications people wanted data faster. There is a wide variety of need in the community. Optimal latency was considered to be less than two hours, and almost 80% of 462 responders said within 36 hours. Operational uses were most often related to active fire response, followed by weather and marine forecasting. In these areas, data older than 4 hours were not considered useful. There are 3 classes of latency needs, in terms of products- operations (less than 3 hours), near-real time (one-day), and research and science (quality over latency). The study concluded that there is a need to provide improved community awareness of ESD’s intended support for future operational and near-real-time applications. The study suggests that a ROSES call can include a statement of latency needs, which can then be planned in advance to develop low-latency algorithms along with science algorithms. Secondly, data products must be very well characterized in terms of their classification as a science data product vs. low-latency product. Third, fire weather and agricultural forecasting data can easily be expanded into useful products for insurance providers, disaster response organizations, and regulatory agencies. Current low latency data needs are met primarily with direct broadcast or LANCE. There must be a balance between engineering needs and the needs of the community.

Dr. Lindsay led the discussion on study ramifications, noting that for applied users, latency tends to be critical. This is generally information for ESD. Ms. Green asked for examples of what kind of things could be implemented to change parameters for users. Dr. Lindsay felt that fire-response users were well supported through LANCE and the use of active fire sensors, but felt that the community would like to have more products other than just visual. Ms. Green provided an anecdote illustrating the utility of Esri for spotting fires during the Rim Fire incident of 2013. Asked if latency could be become a criterion for missions, Mr. Friedl was uncertain whether a Program Executive (PE) could use this information to plan for latency products in a mission: are there some factors are key to understand for the mission overall, to understand when to do low latency, and when to do otherwise? Should missions invest in such technologies, on-board or on the ground? Dr. Lindsay responded felt there was enough data richness in the latency study to make that linkage. Dr. Carroll felt that a few high-value areas had been identified that could be further studied in order to identify products with high applications value. Dr. Lindsay reported a great deal of interest in LANCE and direct-broadcast usage, and as a result ASP has been looking at on-board processing to identify some tall poles for latency. It is clear that the community prefers LANCE, however. Key new users for lower latency data include the regulatory agencies and the insurance industry, such as agricultural reinsurance, and FEMA and disaster insurance. There are additional low-latency products that are useful for weather forecasting.

Ms. Green suggested that ASP obtain a finer-grained view of who the real users are, and to include sidebars in the study language that would describe how the lower latency data products could be used, and by whom. Dr. Hooke suggested that data availability could be useful; data availability helped drive the development of GPS, and opened new horizons. While acknowledging that the study is still an internal document, ASAC expressed an interest in reviewing it. Mr. Friedl suggested that Dr. Lindsay *et al.* meet up with Dr. Moran and SMAP to compare notes.

Session 6- Data Access and Applications

Mr. Friedl provided a brief introduction to the session and to Ethan McMann from EPA, who has begun a detail with NASA to help run the Space Apps Challenge. Session 6 was meant to provide follow-up information on what NASA is doing to encourage application users.

Dr. Sarah Hemmings led the session with Christopher Lynnes from Goddard’s Data Analysis Center. ASP has taken two approaches to address data access: one is to reduce barriers to usage, and the other is to define user needs. One effort has resulted in an easy-to-use interface called Giovanni (Bridge Between Data and Science) for exploring satellite and remote sensing data. Giovanni was created for the science community, but began to attracted applications users in the water and air quality community. Giovanni can be used to reorganize data into “data rods” for applications use, for pulling out time series, for instance. Similar work is ongoing at the National Snow and Ice Data Center. Conversion to GIS-friendly formats and constructing pictures from numerical data is being made possible, as well as providing remote access to Open Geospatial Consortium services. Data how-to services are good for the science, applications and educational communities. A sample shapefile-masking “recipe” has been developed to represent statewide rainfall total. ASP continues to divine user needs by obtaining and analyzing user input, user needs, advisory group feedback, help-desk tickets, EOSDIS American Customer Satisfaction Index (ACSI) surveys, applications workshops, and ARSET interactions. Thus far ASP has analyzed comments a user-needs analysis survey of 26 user types.

Dr. Steve Berrick presented details of the EOSDIS user registration system for LANCE, helping to answer the question of: who is using your data? He noted that there had been some grumbling about registration, which did not affect the outcome. The purpose of the registration was to identify machine interfaces. Dr. Berrick described Worldview as a mobile-device friendly system that is capable of featuring data layers, mostly from LANCE real-time systems, and which can pan and zoom like Google maps. Global Imagery Browse Services are used to visualize the data layers. The system is being leveraged by the community and by the International Space Apps Challenge. ESIP Information Quality Cluster fitness-for-use criteria include latency, accuracy, ease of use, and resolution. There is also an effort to represent the error/uncertainty to the user; ASP is still grappling with how to do this. Dr. Hemmings added that communities have asked for implementation of a rating system.

Dr. Brian Banks, representing the US Water Partnership (USWP), briefed the ASAC on the partnership’s mission, which is to unite and mobilize, and to create a common entrypoint for water information. The USWP has about 100 members in the public and private sectors, including USAID, NOAA, Ford, and Procter & Gamble. Its web portal is about sharing expertise, and focuses on users in the developing world. Users through NASA/USAID (SERVIR) and USWP have been surveyed, using questions such as: Where are you getting water information and how is it useful? How fast is your Internet connection? Roughly 10 “user personas” have been synthesized to put a face on user types. A prototypical government aide creates and analyzes maps. A general public user often views maps and reads reference stories. User prototypes have helped to guide the design of the website. Key findings include: users need information to determine resource credibility, users have a limited capability for raw data, as well as limited time and capability for uploading data. An RFP has been issued with an eye to sharing best practices. SERVIR data was also used to help inform the Web portal design. Currently efforts are focused on determining the balance between machine and human requests, and requests for big data. There are a few “power users” who crawl the FTP site and pull everything down, who tend to be the modeling community. Of foreign users, China is probably one of the biggest users of some DACs; their usage sometimes affecting servers. Ms. Green suggested that USWP approach users to ask what type of data sets they want, perhaps by putting a tool on the web portal that can ask questions about their needs.

Mr. McMann offered a few comments on the International Space Apps Challenge, which he described as an “app-a-thon” that will take place 12-14 April. The challenge affords an opportunity for software researchers to pose solutions to questions that NASA and the space community have posed. The challenge allows participants a chance to form a prototype, and to continue a working relationship with teams after the challenge is complete. A theme sponsor within NASA is currently evaluating problem statements, which are to be reviewed by both Mr. McMann and Mr. Friedl. Dr. Ardanuy commented that ASP/ASAC may want to address the potential for reconstituting a weather research program between NOAA and NASA.

Ethics Briefing

NASA Counsel provided the annual required ethics briefing for the ASAC.

Capacity Building Program Assessment
Dr. Nancy Searby briefed the ASAC on a report assessing the Capacity Building Program (CBP) and progress that had been made since its release. The report included findings that CBP could benefit from creating sustainability of the capacity built by operations, looking at a refined strategy through examining outcomes, looking at indicators of progress, increasing access to Earth Science data and data tools, identifying new partnerships, cultivating a larger user base, and creating a better methodology to assess impact. ASAC has reviewed the report, which has been adjusted accordingly, through *an ad* hoc process, with Dr. Dickson serving as a sounding board.

Dr. Dickson weighed in, congratulating the CBP on its progress, and on addressing ASAC recommendations. Extremely valuable progress has been made; the CBP can be viewed as a means of articulating technical information and bringing it to the field for policy-making, creating usable knowledge for decision-support, and improving the relationship between research and applications. She suggested integrating user demand into CBP’s purview, and teasing out the program’s impact by creating coherent stories and encouraging tools for user benefit. Users should be engaged first, instead of assuming that CBP knows best. CBP should support Web-based efforts and integration with non-NASA data, while pursuing steady progress in identifying partners, particularly with USAID. Dr. Dickson noted that while many surveys are being done, ASP might consider instead focusing on success stories, such as within the WHO framework for Climate and Health, where NASA could play a useful role. ASAC continues to advocate for a communications officer to elucidate success stories. ASP should consider using Google Scholar to track conference proceedings.

ASAC’s formal response states that the CBP should prioritize end users, consider domestic vs. international coverage, consider financial allocation to the 4 programs, and in terms of staffing, should consider making permanent the positions of outstanding staff, such as Dr. Searby. Drs. Dickson and Ceccato agreed that *ad hoc* is the way to proceed, possibly through a short memo to be prepared over the next month. Mr. Friedl, responding to a comment, observed that working with USAID implies a deepening as well as a broadening of NASA relationships, and agreed the language should be clear in this respect. Dr. Moran noted that NASA has an established relationship with NOAA to continue NOAA-developed activities, and can also leverage activity in the World Meteorological Organization (WMO). For SPORT and SERVIR, they actually collaborate extensively. A participant commented on a prior NASA/NOAA partnership involving a sensor on a geostationary satellite, which had been a great success; however the effort to use sounders in geostationary orbit disappeared due to reduced flight opportunities. Mr. Friedl suggested touching on this subject during ASAC’s conversation with Dr. Freilich, and perhaps consider a socioeconomic impact analysis.

Dr. Moran commented on NASA’s current status with SERVIR, which focuses in international data with US interest, and noted that there is a great need in South America for this data. DEVELOP can function as a cheap tool for expanding data access. Webinars are global, and can reach a wider audience, but there needs to be hands-on training.

Ms. Green asked members for opinions on the most interesting briefing and potential key findings.

Dr. Bill Gail noted there had been many small important things, indicating how much progress has been made, and how much ASP is listening to ASAC. He felt that the sessions had been uniformly great.

Dr. Hooke felt that the ARL concept seemed a very successful and a meaningful way of looking at things, that ESD would do well to invest more in ASP, and that ASP was impressively integrated, given the size and age of the program.

Dr. Dickson enjoyed the Applications and CB sessions, and was surprised at the strength of identifying boundary organizations, and criteria for them. She particularly liked the “one slide tells a story” format and was encouraged by the adaptation of ARLs.

Dr. Ceccato was impressed by the amount of work that had been carried out in response to ASAC recommendations, and noted that ASP has a good structure for tackling problems. He enjoyed the data access briefings and felt the latency report was a good way to approach problems.

Asked to comment on any key findings, Dr. Ardanuy broached the topic of global change and their effects on marginal regions; projected scarcities of water and food resources, and subsequent societal unrest, should be addressed in the midterm update to the Decadal Survey, Tremendous unrest is possible.

Dr. Moran enjoyed data access and applications session, and learned quite a bit from the program managers’ presentations,

Mr. Friedl reported his favorite session as being data access, which had made him aware of Chris Lynnes data, and felt that the program manager briefings could be a basis for a finding.

Dr. Macauley likened the ASP to a high-tech garage with good tools and good people, and felt unclear on what the garage sought to build. Applications must go intimately hand in hand with mission design, thus the missions must be kept informed on applications outcomes. At present, it seems we don’t really know who is using this and making a difference. She also felt that ASAC is also a part of the boundary organization, and could function as an on-ramp for new stuff.

January 23, 2014

Dr. Friedl introduced the day’s agenda, beginning with efforts at NASA to understand how its science and applications affect societal issues, referring to a number of publications, including strategic planning documents and NRC studies. ASP is investigating community engagement in food security, water resources and disasters by looking at key boundary organization partners. He was looking for a sense of how far ESD/ASP should “lean forward” in addressing grand challenges and societal needs, and the value of application activities in this context. An ASAC member commented that Earth scientists need to understand the “why” question that social science addresses; but it is not clear that the ASP should be in the middle of this.

Session 9- Earth Science, Human Dimensions, Societal Challenges

Dr. Sarah Burgess-Herbert described a recent NASA report, in which an inventory of sources of major global challenges was created through a broad literature search. The inventory identified 240 sources representing over 950 challenges and issues, which was subsequently categorized into 28 issue sectors, 17 of which were NASA-relevant. The total number of issues and challenges relevant to NASA included subjects such as children, oceans, pollution, and space.

Dr. Chris Weaver of the US Global Change Research Program (USGCRP) briefed ASAC on social sciences in the context of global change, describing results from a recently completed *ad hoc* Social Sciences Task Force. The USGRP is a Congressionally mandated program, created to understand, assess, predict and respond to human-induced and natural global change. A new 2012 Strategic Plan is a decadal plan organized around 4 strategic goals: basic research, informing decisions, assessing responses, and communicating results. There is also a National Preparedness mandate related to all the agencies, as well as regional efforts. Social science can identify principles that can make research work better. The Task Force was stood up to identify options and provide actionable recommendations to help integrate social science with Earth science.

Recommendations of the task force’s white paper include placing a high priority on the National Climate Assessment and existing organizations, by identifying targets of opportunity for integrating social and Earth sciences through a conceptual framework—economic valuation of impacts, cost of responses, and cost of inactions. Top recommendations are to “operationalize” knowledge, scale up research to support decision-making, determine how to use social science expertise to evaluate and move science to action. Priority topics were identified for new fundamental research in identifying vulnerabilities and adaptive capacities. There were a number of policy issues identified in interoperability for integrated social and natural sciences data. Potential discussion questions include: How can NASA participate? What is the value of NASA information? What interactions are needed between social and natural sciences? Dr. Weaver felt it was clear that society must react to current physical change, conceptualize the risk of future change, and take an action to prevent deleterious change, as well to ameliorate it when possible.

Dr. Bob Chen presented a briefing on Human Dimensions and Societal Challenges, describing the utility of Socioeconomic Data and Applications Center (SEDAC), a data center whose mission is to integrate operations data and serve as a gateway. Known for its population data, SEDAC has a user working group chaired by Dr. Macauley. SEDAC identifies global sites at risk of sea level rise and hosts extensive map galleries. Many users want to see images before they dig into data. SEDAC has also built some interfaces for spatial queries of population data. Where does SEDAC fit? The Decadal Survey cites the need for addressing socioeconomic issues, which require effective translation of Earth-observing data into applied products.

NRC has reviewed the USGCRP Strategic Plan. Characteristics of sustainability science have been identified. USGCRP is cited in papers about 200 times per year, and has been cited widely in journals such as Science, Nature, Malaria Journal, and Ecological Economics. In 2012, many citations focused on population distribution data. Forty-nine papers had both NASA and SEDAC data cited in the same paper. From a broad perspective, SEDAC is interested in how it can promote integrated use of data by others, and has assessed these 49 papers in terms of how the data was used to create a taxonomy of sorts. Top categories included trend/spatial analysis, simulation modeling, and research translation (how water resources interact with populations). Half the papers analyzed had reasonably significant use of population data, as well as downstream distribution of SEDAC data in the formats of atlases and tables, and useful background information for education. SEDAC also supports decision-support processes, such as those used in the Millennium Challenge indicators, which involve case studies of the impact of indicators on policy (e.g., South Korea reported a measurable impact on air quality after being ranked poorly). SEDAC is also supporting National Climate Assessment indicators, and is providing data for issues involving significant planetary change in the future, such as the Climate Extremes study issued by the CIA. There are many other of initiatives for which SEDAC can provide data: the Vital Signs integrated monitoring system; USAID projects (remote sensing, soil data, modeling issues of social process); and analyses of migration, cities and climate change. Others are the NSF project Terra Populus; The International Panel on Climate Change (IPCC) RCPs (reference concentration pathways), new social science data like GDELT that analyzes data on global conflict. The continuum between observations and models is getting fuzzy; privacy and confidentiality issues also inhibit integration of data. Organizations must also deal with uncertainty and the complexity of systems, and how these relate to policy.

Dr. Meredith Lane presented a briefing on the Board on Environmental Change and Society (BESC). The board’s expertise includes decision science, public health, socioeconomic valuation, risk analysis, energy and natural resources, and societal development within an ecological context. BESC interacts with other boards at the NRC, including the Space Studies Board (SSB), the Ocean Studies Board, the Board on Life Sciences, and the Board on Atmospheric Science and Climate interaction with BESC. Reports by BESC predecessor include Decision Making for the Environment, a report for the intelligence community. BESC is currently working on expanding the definition of risk to include human factors for DHS, the use of climate data in financial decision-making, and working with the EPA to help build social science knowledge in regulation-making. BESC is also interested also in standing up a round table to assess climate data’s effects on future investments.

BESC recently issued a Climate and Social Stress report, which concluded that risk is determined by the interplay of event severity, exposure to the event, and vulnerability. What exactly constitutes vulnerability? The value here is entirely a social factor- if we didn’t care about it, it wouldn’t matter. Exposure and vulnerability result from direct effects of climate event, and effects mediated by social systems. There are two types of climate events- acute, high impact disasters of low probability, versus gradually warming global temperatures that alter rainfall patterns (low effect, cumulative over time). Responses to these events are different politically and psychologically. The latter are more likely to be hugely important. Earth science and social scientists don’t think alike; they speak different languages, pointing to a need for translational research. BESC could pair with particular NRC boards to come up with comprehensive answers, review plans and programs, produce full-blown reports, etc., to address translational research between Earth and social sciences.

Dr. Weaver noted that the USGCRP Strategic Plan is explicit about basic Earth system understanding. The same science can be used to support mitigation and adaptation strategies as well as the understanding of carbon cycles, e.g. If geo-engineering becomes a policy issue, USGCRP does have a research agenda sketched out. There is a fragmented national mitigation policy at present, but no well-defined home for it. Dr. Lane commented that social equity in adaptation planning does come up in BECS, and the notion is served by its Committee on Law and Justice. To date, there seem to be no broader studies on remote sensing and social science. Dr. Chen reported that there are some case studies of impact on policies, available on-line at Yale University.

ASAC discussed where NASA might best fit in the social science area. SEDAC is already in place and working with the USGCRP. The National Climate Assessment could be used as a basis for a global change information system, or a metadata database. A logical next step would be to provide an information architecture; SEDAC is there to provide accessibility for integrated studies, and can leverage NASA’s data holdings. Dr. Lane envisioned a scenario of local tribal regionals collaborating with decision scientists, to build a plan to come up with the best answers/tools for a particular locality. Dr. Hooke observed that the world has become a lot of pilot projects, and sharing is needed across these projects, to make it easier for people at that level to use the kinds of things NASA has. Dr. Gail commented that decision makers shun uncertainty. With climate change, standard science breaks down at some level, and policy-makers still need to make decisions in that context.

Dr. Weaver noted that USGCRP is working with FEMA to understand changes in flood plain risks. There are many potential follow-on effects of a change in policy- where are the lever points where these experiments can flourish? Dr. Chen felt that indicator approaches were important- every country is a pilot project. Indicators can reflect best practices and can provide a powerful catalyst for change in the decision framework.

Mr. Friedl asked: if NASA is going to support these global challenge issues, does the Agency need to get into the social science space? How does ASAC feel ASP should set its priorities? Dr. Ceccato recommended identifying an incentive/mechanism to link with partners. Dr. Ardanuy felt that social science should be driven into R&D, and ASP is appropriate for bringing recognition to the basic science. Dr. Hooke suggested that NASA act as an advocate for building social sciences into the Agency, but also provide an articulate voice, and avoid the view of social science as a policy weapon. Dr. Macauley felt there could there be a jointly designed social science solicitation between NASA and NSF (e.g., in the context of SEDAC’s relevance to GCRP). Asked about low-hanging fruit opportunities between ASP and SEDAC, Dr. Chen mentioned its NCA indicators activity, and added that SEDAC is working on EarthCube with NSF. However, NSF tends to coordinate badly with the existing data centers. Dr. Lane felt that the social dimension should be integral to ASP, as people use NASA science to make decisions. Mr. Friedl asked whether this might require a new research agenda on decision science activities within the ASP. Dr. Gail commented that such an agenda would define a new role for ASP, with the program as an input mechanism to ESD research with respect to bringing in awareness of social impacts. Dr. Chen noted that a NASA grant on coastal storms included a social science aspect that represented a quarter of the award. Ms. Green recommended using existing grants first. Dr. Ardanuy suggested using NASA’s vision statement to benefit all mankind, to identify desired outcomes in food security, disaster response, and water resources. These accomplishments could be success metrics.

Session 10- Long Term Sustained Applications

Dr. Diane Davies, LANCE Operations Manager, led a briefing on the EOSDIS Fire Information for Resource Management System (FIRMS), and its work with its UN counterpart, Global Fire Information Management System (GFIMS). The purpose of FIRMS is to put information directly into the hands of users. MODIS, Aqua and Terra satellites provide data in the forms of email alerts as well as downloadable fire data. The data can be used for any area of interest, and to make notifications in areas of interest. Dr. Davies reported that FIRMS is already working closely with the MODIS and VIIRS team in anticipation of MODIS’s eventual termination. NASA has refined FIRMS for transition to the Food and Agriculture Organization (FAO), under which it is known as UN GFIMS. GFIMS was launched in 2010, and has users on both sides of the digital divide, but its key applications are in strategic fire management. Generally, the fire management systems also have applications in legal logging, air quality, education, and agricultural monitoring, depending on mandates and a certain level of resources. FIRMSsends out 2000 email alerts a day. Anecdotes have thus far provided the best outcome evaluations. One user in South Africa was able to access data from two satellites, and knew that data obtained from MODIS indicated a big event. People add value to MODIS data by redistributing it. Benefits such as encroachment alerts and better allocation of resources have also been realized.

FIRMS and GFIMS level the playing field and promote transparency between departments and institutions, and have resulted in an increase in understanding and awareness of fire. Greenpeace has used MODIS data to challenge Russian data on wildfires, to cite one example. FIRMS was successful because it responded to an existing need for real-time fire information. The product is small and easy to use, and was driven by end-user requirements. FIRMS uses outreach communications and Open Source software, the latter of which has enabled re-use of software in other countries. Conservation International enabled FIRMS/GFIMS to translate alerts into many languages, and work with non-governmental organizations to enable correct usage. UNFAO is a large organization with a large mandate, which presented some challenges. The initial three-year time frame for translation into global usage was insufficient, and required a two year extension. NASA LANCE pays for fire data, and GFIMS is funded by FAO.

Dr. Rick Mueller presented the details of a recent product developed by the National Agricultural Statistics Service (NASS), developed with NASA data. NASS deals with the US only; one of its well-known products based on area sampling frames is Cropland Data Layer (CDL), the latest version of which was released this month. CDL is a visualization product provided to the public. NASS has also developed a yield model, and now has an operational modeling program for the major corn and soybean states. Its latest grant, funded in April 2009 for $1.1M, is working toward measurements of crop progress and conditions, to create a National Crop Monitoring System. Volunteers collected data on crop progress over a three-year period, with which NASS created a web-based ground truth collection system, but this effort is ending. NASS is moving forward however with a crop vegetation condition monitoring system called VegScape. Users are private parties, policy makers, and researchers. NASS publishes a weekly crop progress survey, resulting in low-resolution crop condition static maps. It is a somewhat subjective survey, but satellite observations are used to supplement subjective ground assessments. The data is nationally released at state levels, but data is kept at county levels. Moving on from static maps to VegScape, NASS has improved spatiality with MODIS, improved temporality with more frequent updates, and will provide interactive data, on-the-fly processing, before and after imagery, and querying tools. VegScape is a free and open service, with tools that can help visually quantify where crops are drying up. Applications have already proven helpful in responding to the Spink County SD, June 2013, hail and tornado events, and the 2011 Missouri Bootheel flood. VegScape also serves CDL by identifying crop stress areas. VegScape started in February 2013, and to date has had 2300 unique users. CropScape has about 10,000 users per year. VegScape is increasing in usage as it becomes more well-known.

NASS is investing funds on VegScape in addition to what it is provided by NASA. Satellite continuity is a concern, as in what happens when MODIS runs out. A VIIRS-type application has yet to be developed. Ongoing research in crop emergence will also be incorporated into VegScape, as well as SMAP data for soil moisture. Moving forward, NASS will need more NASA funding, and currently enjoys good collaborative support with George Mason University. NASS has received feedback from users, mostly agribusiness customers who want additional functionality. CropScape is now funded by USDA.

Dr. Jim Verdin presented a briefing on the drought-monitoring applications of NASA data and technology, currently active with the National Integrated Drought Information System (NIDIS) and the Famine Early Warning System (FEWS). NIDIS is a multi-agency system that operates using local pilots. One of its principal products is the US Drought Monitor. Data comes from both ground stations and satellites. USGS contributes the Vegetation Drought Response Index (VegDRI), which has been boosted by MODIS data; a key to this innovation was the LANCE server. Latency of data products has been critical to this success. As an example, in 2011 the state of Colorado had severe drought on its Eastern plains, during which time satellite data helped fill in between sparse station reporting. Another ongoing application is Fallowed Area Mapping; this information is used to support drought disaster designations, water re-routing and allocations. FAM has provided views of California fallowing in 2007 and 2009.

The FEWS Net provides monthly food security assessments, also relying on satellite remote sensing and modeling due to sparse ground stations; LANCE has also expedited this information flow. A web browser called the Early Warning Explorer (EWX) helps users judge conditions. Another application is a land data assimilation system (NLDAS), which in November 2013 did some multiple runs and predicted conditions that were important to food security analysts. A new rainfall product (5-day accumulation) is also now available at the EWX. With VegDRI, the USGS is trying to put new information into the hands of drought monitor officers, and to do so has enhanced the national product behind the scenes. In terms of the land fallowing application, in designing the pilot, the DWS communicated a gap in near-real time on rates of fallowing, which was posed as an information challenge to the pilot. The effort received some support from NOAA on field work, and from ASP, but will be completely taken over by DWS eventually. FEWS Net helps USAID make decisions on food aid resources ($1B each year). USAID depends on agroclimatological data as well as information on market conditions to make food insecurity determinations.

Asked about which critical drivers were responsible for successful adoption of NASA science, Dr. Mueller responded that the critical piece was developing an app that can use remote sensing as an unbiased independent indicator. It was also helpful to provide statistics during the growing season, in real time, for different crops in different regions at market-sensitive times. Dr. Verdin, answering the same question, felt that FEWS Net works in parts of the world where remote sensing has been critical since the 1980s. As better sensors and modeling have developed, FEWS has been able to take advantage of support by NASA to make incremental improvements, responding to information gaps identified by users and filling them appropriately with organizations that have the resources. Dr. Davies felt the critical driver was a reliable global algorithm that turned data into useful information to really create uptake, and to provide data latency and an easy-to-use format for non-specialist users.

Dr. Ardanuy commented that prediction will become an important component of these applications, and asked if any of the organizations had considered complementing nowcasting with predictive capabilities. Dr. Mueller noted that forecasting would require a major change in the NASS mandate; however there are groups in USDA that might do this. A participant commented that CDL layers could be critical to crop forecasting/modeling. If there were enough redundancy in satellite systems, such forecasting could reduce ground labor. Dr. Hooke asked how NASS capabilities play into USDA’s embargo of data. Dr. Mueller responded that fallow land data is not market-sensitive information. Given conditions in California, he expected that state mitigation programs could benefit from fallowing reports. He assumed that one probably could not obtain a strategic advantage from fallow land data. Dr. Hooke commented that while mandates help adoption, there should be another avenue for looking into the prediction space.

Directing the question to all presenters, Ms. Green asked how can ASP better convey results. Dr. Mueller replied that the community wants the tables, but conversely, a great visualization tool will draw users. Social media is an avenue for this. The information can also be broadcast at conferences. As an example, NASS received a request from Texas for 1000 wall-sized plots to facilitate communication. Dr. Verdin, in responding, noted that immediate stakeholders are able to see new products immediately. NASA’s Public Affairs Office has been helpful in getting stories into newsletters. Dr. Davies noted that in addition to the US-based FARSITE (a fire behavior and fire growth simulator), fire forecasting is available in select areas in South Africa. In terms of getting the message out, results are getting into the news. Fire imagery from Australia, e.g., came from MODIS data, and was covered well by the BBC. Images are also being posted through blogs.

Dr. Moran commented on the excellence of the presentations, in particular the valuable anecdotal feedback, which can determine the value of applications.

Mr. Friedl canceled Session 11 for the interim and had it re-scheduled for the ASAC’s next telecom on missions and applications.

Discussion

Ms. Green queried members on potential findings. Dr. Hooke commented that Earth science has an urgency to it that other NASA divisions do not, and felt that ESD should support ASP more fully. Dr. Gail observed two big trends that ASP was central to: the increased importance of social science to Earth observations, and how this influences requirements input to NASA. Secondly, the transition from a primarily experimental research organization to a research/monitoring organization with ties to highly relevant applications. This is where things are going. How will NASA respond to these trends? NASA must have the ability to estimate the value of what ASP is doing. Dr. Hooke quoted an IXO statement on closing the widening gap between the advance of science and society’s ability to benefit from it. Dr. Ceccato felt that ASP has a potentially increased impact on decisions that can impact human society; NASA can fill data gaps, and provide data that can influence decision-making. ASP is also leveraging its activities with other organizations to broaden impact on decision-making, measuring success through publications, press releases, and anecdotes. ASP should hire a communications officer to help convey this success, as it shows the importance of training users in how to use tools. Dr. Dickson addressed data access, and recommended that ASP include social sciences through partnerships with other organizations- the grand challenge is how NASA can inform decision makers on balancing economic growth with environmental protection—ASP can write a white paper on this, to help strengthen ties with SEDAC. ASP also needs to a better job at putting out success stories, and must press PIs to do this. ASP urgently needs a communications officer. ASP needs better stories on what SERVIR is doing; this would help US government’s reputation internationally. More information on data products is also needed.

Dr. Ardanuy commented on the need to transition from monitoring in real time to forecasting/verifying for drought, crop yields, and fires. Secondly, he felt that ASP must develop clear application-driven concepts to feed into next Decadal Survey. Lastly, he wished to see more specific examples where decisions were impacted by Earth science data.

Dr. Moran noted that within the user community, the time is right for more applications from remote sensing. Users have a higher technical ability than in the past and are interested in the information. ASP is capable, and prepared for this, but it is underfunded. The DACS are also ready for this, but they are overextended. ASP has gone beyond providing information and is moving toward ease of use. Anecdotes are valuable. ASP glossy reports need to be circulated more widely through blogs and other social media.

Mr. Friedl and ASAC discussed how ASP might deal with applications activities in other parts of the division, and how to determine the proper balance between research, knowledge utilization, and applied research. A high-level partners meeting was suggested as one venue. Ms. Green supported the idea of ASP hiring or training a communications professional. Dr. Moran suggested making videos of applications users, as has been done at SMAP. Dr. Macauley urged a more comprehensive view of how Earth science can make a difference between good and bad decisions. Dr. Hooke, citing the accuracy of the Hurricane Sandy forecast, recommended highlighting the immense improvements in forecasting that have been made over the long term. Ms. Green agreed that ASP could benefit from more focus. User characterization is more robust, and latency has been lowered. Perhaps an NRC study on scoping effort might be useful in determining where NASA should be doing work in decision-making. What are the applications requirements that should be presented to the Decadal Survey? Mr. Friedl thought ASAC might help guide the terms of reference for the Survey.

Dr. Macauley suggested that NASA co-fund a solicitation with NSF, as it is a prestigious organization that taps into a good social science community. Dr. Ardanuy was unsure whether NASA science data was being used as much as it could be used for analyzing climate-related trends; models that replicate the past the best have the ability to forecast the future and provide validation of climate models.

Discussion with ESD Director Michael Freilich

ASAC debriefed Dr. Freilich on its meeting outcome. Ms. Green praised the meeting as the best the Committee has experienced, referring to the abundant evidence of ASP’s impact in influencing decision-making, as well as to numerous anecdotes, press releases, and blog entries. Dr. Freilich requested that useful presentations be turned into better outward-bound communications; anything in ESD that focuses on accomplishments would be exceedingly useful. Ms. Green felt that ASP was primed to cross the technology gap and to help organizations do things faster, better, cheaper. Referring to ASP’s communications vehicles, such as its annual report Dr. Freilich felt the report was not quite focused from an accomplishment standpoint. For success stories such as MODIS and LANCE, he felt that improvement in latency and data access should be traceable to ASP, focusing on improvements that the ESD program has enabled. ASP has been working closely with the DACS in broadening data availability and lowering latency- this could be a good phraseology to underscore the value of ASP.

Dr. Gail mentioned that Chris Weaver of USGCRP described the transition of data usage as trending from global to regional, and that social science becomes more relevant in this decision space. Dr. Freilich asked if this signified a need to re-focus or expand of ASP, as re-focusing vs. expansion would mean employing different strategies. Ms. Green thought that parts of ASP could be re-focused on social issues incrementally. Dr. Gail commented that if there is a trend toward societal applications, basic science must be informed of what these needs are. Recent OSTP reports seem to reflect a national appetite for addressing societal issues. Dr. Freilich responded that attempts to quantify impact are going on all the time, not particularly compellingly; it is an easy question to ask, difficult to answer, and it does not appear that the horsepower exists anywhere to really address this.

Ms. Green offered ASAC services in helping to write the terms of reference for the next Decadal Survey. Dr. Freilich felt there was no question that consistently linking science and applications together has been helpful and demonstrative of it importance. ESD has many objectives, not all of which are aligned. The division needs management and strategic investment tools for carrying out its present budget, and must use them to bring more activities into the field to be more productive for the nation. It is hard to put these objectives into a single coherent document, and one would not want to distract the present program with a larger program. There are more users, but they do not necessarily provide the road to a mission that can accomplish some things for a little bit of money. The tendency is to bring lots of users in when you have the compromise discussion at the design stage and there are winners and losers; if this discussion takes place post-launch, the question becomes: what can I get out of these data. If we distort a mission by defining it by end-user benefits, we may get diverted from some key mission elements that might unlock understanding in the future. A lot of science might fall off the table—we don’t just respond, we drive and drag. Dr. Hooke noted that the drive and drag balance is changing; there may be fewer opportunities to drive. Responding to a question, Dr. Freilich felt that ARLs have proven to be a good management tool.

Dr. Gail mentioned unresolved tension over word “operational”- maybe call it exploratory. Dr. Freilich agreed that language consistency would prevent straying into the wrong area. There needs a flexible bridge between knowledge and measurement, and the needs of the user community (i.e., identify, develop and demonstrate). Dr. Macauley felt that ASP is providing information every bit as viable as that coming from the Census Bureau, Bureau of Labor Statistics, and Energy Information Administration, and recommended that NASA confer with these agencies’ leadership, as they also deal with constrained budgets.

Dr. Gail brought up the notion of reviving the US weather research program. Dr. Freilich preferred to avoid interagency bureaucratic struggles, as NASA is highly sensitive to accusations of encroachment and duplication; this causes an unreasonable amount of tension. NASA continues to address gaps to see if it can fill them without diminishing NASA’s perceived mission to help others. Recently there has been a trend of offloading data acquisition responsibilities onto NASA that do not come with money. There are tensions associated with risk management in interagency collaborations, as in the relationship with USGS.

Dr. Hooke noted that with national security issues, price is an object but not the only one. Perhaps a similar case could be made for the application of knowledge for food security, et al. Dr. Freilich responded that the politicization of absolutely everything has gotten in the way, and that food security might be a logical leap but he was not sure humans are emotionally ready for such a concept. He did feel however that it is thrilling to see the close connections between the ASP and the ASAC, and was very proud of ASP’s accomplishments.

Committee Discussion

The committee discussed next steps, and generally accreted findings around a recommendation for a communications officer or team, greater use of success stories that focus on accomplishments. Ms. Green felt there was little support for greater engagement in social issues, but was very encouraged that there have been real results. Mr. Friedl noted that ESD has been bringing in users from other agencies and sectors in the pre-formulation stage for missions. This interaction affects ground systems and data formats. There are key parts during the mission life cycle where users can play different roles, which ASAC can address when re-visiting Session 11 at the next telecon. It might be useful to hold a Mission Applications Review before the Mission Concept Review, where applications can become part of the mission concept.

Ms. Green agreed to write up a letter based on her notes. One of the participants urged allowing more time for discussion by sending slides out prior to the next meeting. Ms. Green adjourned the meeting at 3:48 p.m.

Appendix I

Attendees

**ASAC Membership**

Kass Green, ASAC Chair

Phil Ardanuy

Pietro Ceccato

Nancy Dickson

Bill Gail

Bill Hooke

Molly Macauley (via Webex/Telecon)

Susan Moran (via VITS)

Lawrence Friedl, ASP Program Director

Peter Meister, ASAC Executive Secretary

**Other attendees**

Brian Banks

Steve Berrick

Bob Chen

Lucien Cox

Brad Doorn

Michael Freilich

Michael Goodman

Sarah Hemmings

Sarah Burgess-Herbert

Meredith Lane

Christine Lee

Frank Lindsay

Chris Lynnes

Ethan McMahon
Nancy Searby

Jeff Stehr

Woody Turner

Chris Weaver

**Other – Via Webex/Telecon**

Gale Allen

Christine Lee

Shannon Valley

Lauren Childs

Mark Carroll

Diane Davies

Patrick Mahir

Richard Kleidman

Amita Mehta

Lindsay Rogers

Mike Ruiz

Joan Zimmermann

Appendix II

**Applied Sciences Advisory Committee**

*Summary Agenda – v10*

**Day 1: January 22, 2014 – Room 3P40**

***Gathering and Set-up 8:00* – *8:30***

**Session 1: Welcome and Meeting Objectives**

**Welcome and Opening Remarks** *(Green, Friedl, Meister)* **8:30 – 8:40**

**Introductions** *(All)* **8:40 – 8:45**

**Agenda and Meeting Overview** *(Green, Friedl)* **8:45 – 8:50**

**Summary of Recent ASAC Meetings** *(Green)* **8:50 – 9:00**

**Session 2: ESD and Applied Sciences**

**Overview of ESD and Program Activities** *(Friedl)* **9:00 – 10:00**

***Break 10:00 – 10:15***

**Session 3: Applications Areas & Capacity Building**

**Major Result, User Characterization, Boundary Organizations 10:15 – 12:15**

 **Applications Areas** *(Haynes, Doorn, Lindsay, Turner)*

 **Capacity Building** *(Searby)*

 **Discussion**

***Break 12:15 – 12:30***

***Working Lunch with Session 4***

**Session 4: Data Latency**

**Summary of ESD Data Latency Study** *(Lindsay, Brown, Carroll)*  **12:30 – 13:10**

**Session 5: Capacity Building Assessment**

**CB Assessment Close-out** *(Searby, Dickson, Ceccato)* **13:10 – 13:40**

**Session 6: Data Access and Applications**

**Introduction of Topic** *(Friedl, Hemmings)* **13:40 – 13:45**

**Speakers: 13:45 – 14:30**

 **Improving Data Accessibility for Applications Users***(Lynnes)*

**Improving Community Engagement** *(Berrick)*

 **Leveraging Applied User Research for the US Water Partnership***(Banks, Chaitovitz)*

**Discussion** *(Led by Hemmings, Friedl, and/or Green)* **14:30 – 15:15**

**Session 7: Public Comments**

**Open Period for Public to Make Statements for the Record 15:15 – 15:30**

***Break (or extra time for Session 7) 15:30 – 15:45***

**Session 8: FACA and Ethics**

**Ethics Training** *(NASA Office of General Counsel)* **15:45 – 16:45**

**FACA Review** *(NASA OIIR Advisory Committee Office)* **16:45 – 17:45**

***Adjourn for Day 1 17:45***

***Dinner for ASAC & Others (No Host, No Telecom, No WebEx) 18:00 – 20:30***

Location To Be Announced

**Day 2: January 23, 2014 – Room 3P40 (TBC)**

***Gathering and Set-up 8:00* – *8:15***

**Session 9: Earth Science, Human Dimensions, Societal Challenges**

**Introduction & Global Challenges** *(Friedl, Burgess-Herbert)***8:15 – 8:30**

**Speakers: 8:30 – 9:30**

 **USGCRP, Social Science, and Inform Decisions** *(Chris Weaver, USGCRP)*

 **NASA Socioeconomic DAAC** *(Bob Chen, CIESEN & SEDAC)*

 **NRC Board on Environmental Change and Society** *(Meredith Lane, NRC BECS)*

**Discussion** *(Led by Friedl and/or Green)* **9:30 – 10:00**

***Break 10:00 – 10:15***

**Session 10: Long-term Sustained Applications**

**Introduction** *(Friedl, Doorn)* **10:15 – 10:20**

**Long-term Sustained Applications: 10:20 – 11:20**

**FIRMS/GFIMS** *(Diane Davies), via WebEx*

**USDA Crop Production Assessment** *(Rick Mueller, USDA-NASS)*

 **FEWSNET and NIDIS** *(Jim Verdin, USGS), via WebEx*

**Discussion** *(Led by Doorn, Friedl and/or Green)* **11:20 – 12:00**

***Break 12:00 – 12:15***

***Working Lunch with Session 11***

**Session 11: Missions & Applications**

**Summary of Activities** *(Friedl, Bonniksen)* **12:15 – 13:00**

**Session 12: Discussion with ESD Leadership \***

**Internal ASAC Discussion of Key Findings** *(Green)* **13:00 – 13:30**

**Summary of ASAC Key Findings to ESD Leadership** *(Green)*  **13:30 – 13:40**

**Discussion with ESD Leadership** *(Led by Green)*  **13:40 – 14:30**

**Session 13: ASAC Meeting Synthesis**

**Synthesis & Discussion of Meeting, Findings, Recommendations** *(Green)*  **14:30 – 15:00**

**Review Meeting, Actions, Next Steps** *(Green, Friedl, Meister)*  **15:00 – 15:20**

***Adjourn ASAC 15:20***

*Note: The room is available until 17:00*

*\* Freilich/Luce are scheduled to arrive at 13:30, which follows time for ASAC members to discuss and identify key topics, questions, and findings to raise with ESD Leadership.*

Appendix III

Presentations

1. Earth Science Division and Applied Sciences Overview, *Lawrence Friedl*
2. Applications Areas and Capacity Building;

Health and Air Quality, *John Haynes*

Water Resources, *Brad Doorn*

Capacity Building, *Nancy Searby*

Disasters, *Francis Lindsay*

Ecological Forecasting, *Woody Turner*

1. Data Latency Study, *Mark Carroll, Francis Lindsay*
2. Data Access and Applications;

Improving Data Accessibility for Applications Users*, Christopher Lynnes*

Improving Community Engagement*, Steve Berrick*

Leveraging Applied User Research for the US Water Partnership*, Brian Banks*

1. Capacity Building Program Assessment, *Nancy Searby*
2. Earth Science, Human Dimensions, Societal Challenge;

USGCRP Science Task Force, *Chris Weaver*

Human Dimensions and Societal Challenge and SEDAC, *Bob Chen*

Board on Environmental Change and Society, *Meredith Lane*

1. Long Term Sustained Applications;

Fire Information for Resource Management System, *Diane Davies*

USDA Crop Production Assessment, *Rick Mueller*

FEWSNET and NIDIS, *Jim Verdin*