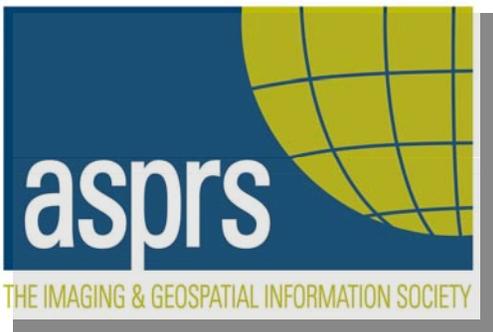


Results from the ASPRS Moderate Land Imagery Survey and Next Steps Forward

*Kass Green
ASPRS President Elect
Presented at the
Civil Commercial Imagery Evaluation Workshop
March 25, 2008*

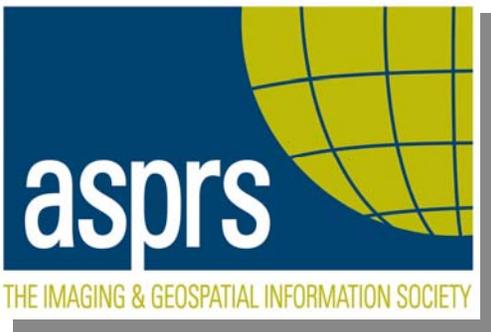
Importance of Landsat

- *The Landsat program has been the most successful satellite remote sensing program dedicated to civilian land remote sensing observations.*
- *Born of civilian rather than military needs, the Landsat family of satellites has provided humanity with 35 years of standardized, moderate spatial resolution, multispectral images of the world.*
- *No other data set allows us to assess the human condition so effectively over such a long period of time.*



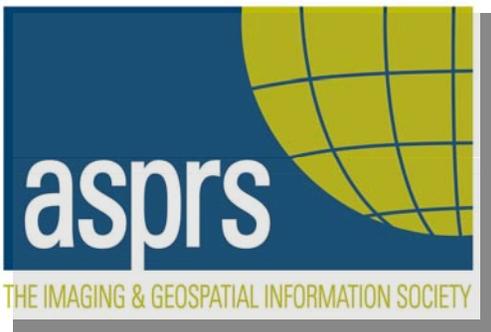
Yet We Continue to Ask

“Why does the U.S. need moderate-resolution land images?” (FLI-IGW, 2006).



To Answer This Question

The American Society for Photogrammetry and Remote Sensing (ASPRS) conducted a survey of the geospatial user and provider communities for the purpose of estimating the societal benefits of moderate resolution imagery.



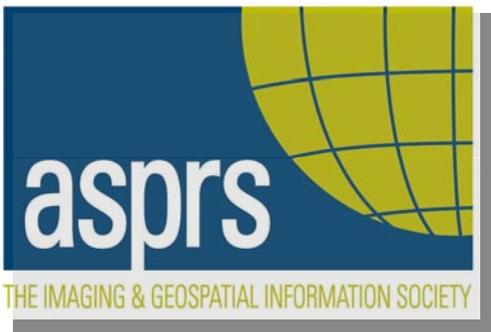
Goals of Survey

- *To estimate the societal benefits of US moderate resolution data*
- *To better understand current operational and research uses of moderate resolution data.*
- *To identify user requirements in moderate resolution technology and data policy*

Presentation Overview

This presentation summarizes the Survey results by

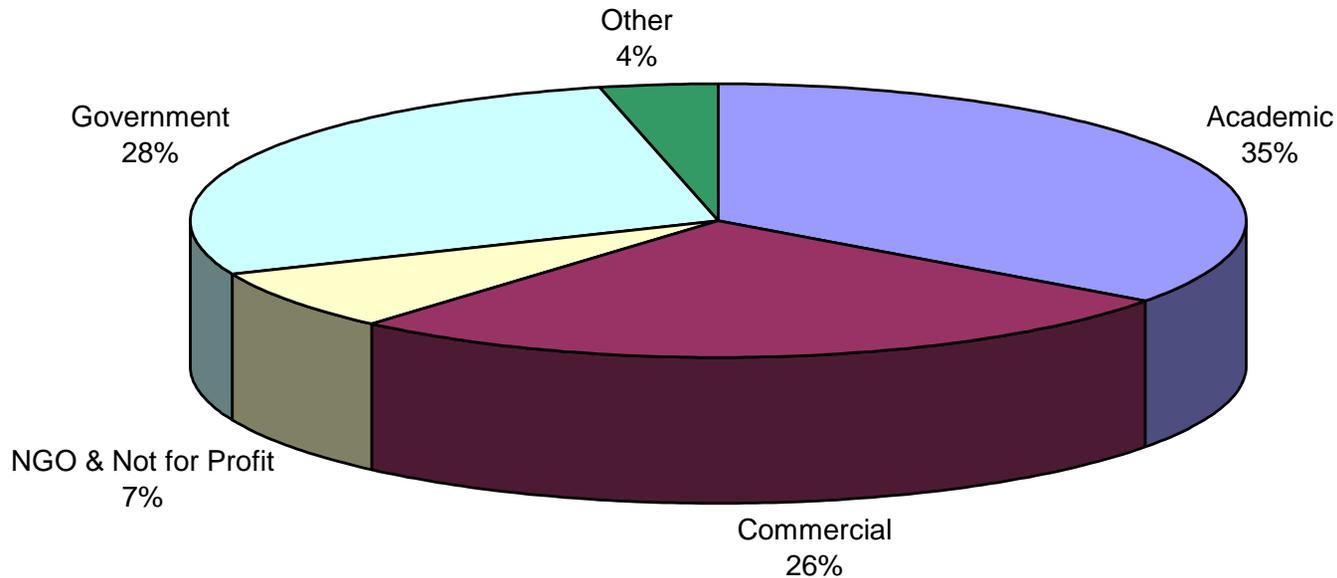
- 1. Providing the survey background*
- 2. Describing the respondents*
- 3. Detailing the results which characterize the value of moderate resolution data*
- 4. Suggesting steps forward*



1. *Survey Background*

- *Survey questions created and reviewed by a team of professionals with input from FLI-IWG,*
- *Email blast requesting response sent out by ASPRS, MAPPS, URISA, NSGIC,ACSM,ISPRS, and numerous other organizations.*
- *Survey posted on the ASPRS web site from July 5, 2006 to Sept. 9, 2006.*
- *ASPRS received 1295 responses from users and producers of geospatial data and information around the world.*

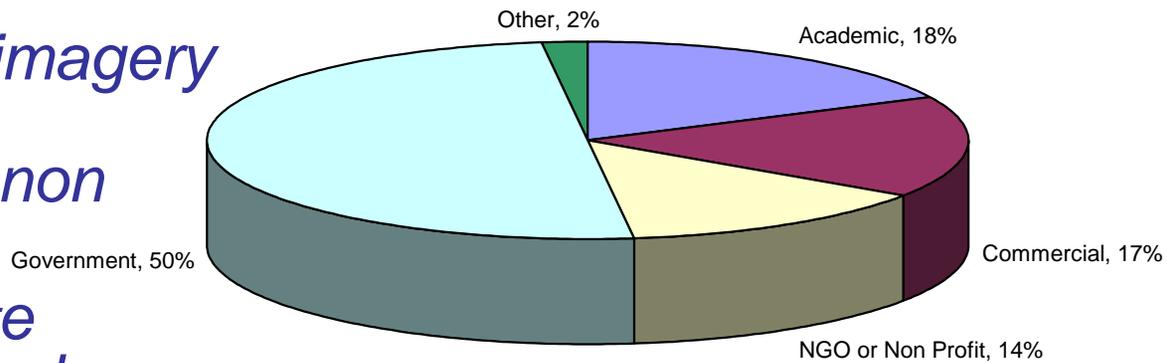
2. Survey Respondents



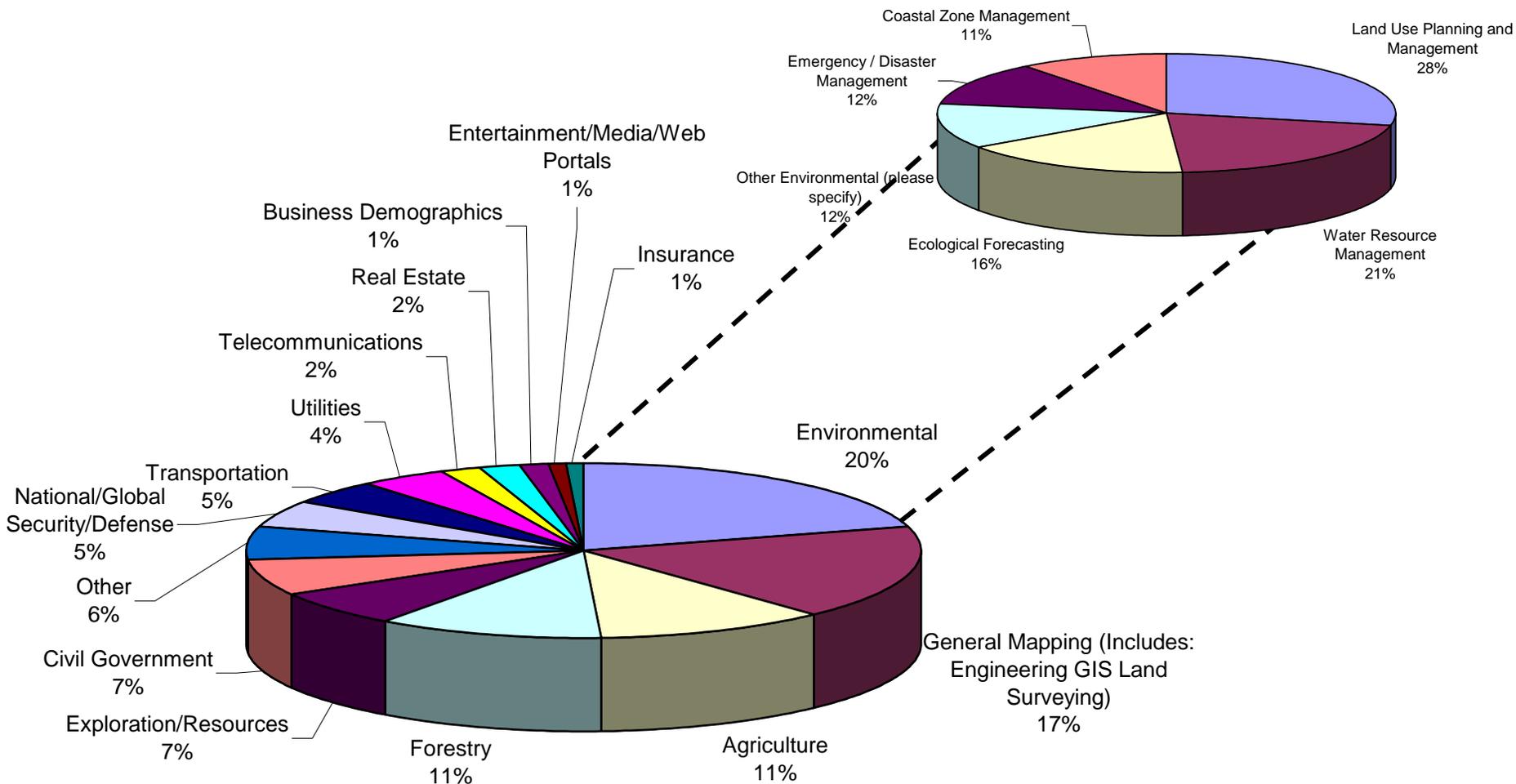
- Respondents were almost equally divided between commercial, academic, and government sectors.
- The majority of participants (71%) use Landsat data as their primary source of moderate resolution data, and 72% state that Landsat is a **primary, critical data** set for their applications.

Who Do They Work For?

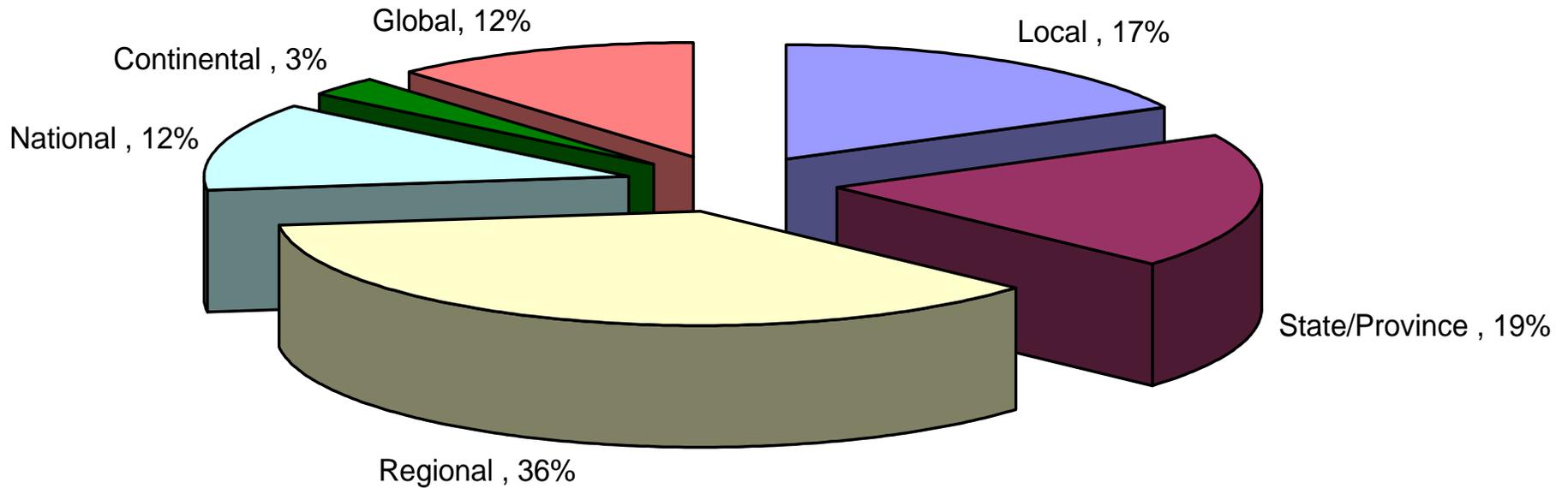
- Respondents work in all sectors, but they use moderate resolution imagery primarily to serve government or other non commercial clients
- 82% of their moderate resolution imagery work performed for the academic, non-profit, or government sectors.
- Fully 50% of their work is performed directly for the government sector alone



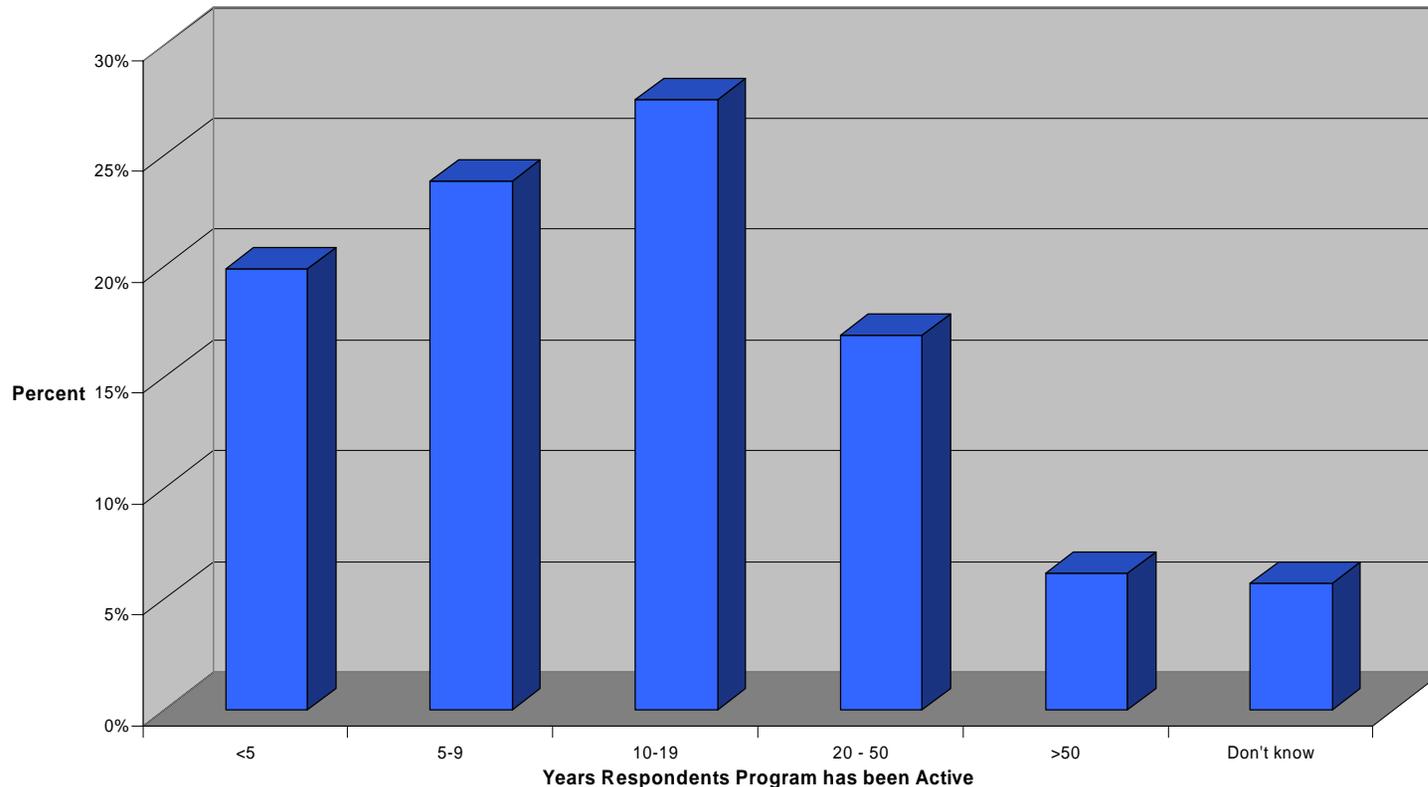
Activities are Diverse



Geographic Scope of Projects



Operational Programs are Numerous and Long Established



44 percent of the operational programs started within the last 9 years which coincides with the 1999 launch of Landsat 7 and the increased accessibility of the imagery and dramatic reduction of prices resulting from the Land Remote Sensing Policy Act of 1992 .

Operational Programs Are Varied

- *Inventorying toxic releases*
- *Monitoring grant performance*
- *Emergency response*
- *Coastal change analysis*
- *Support of DoD operations*
- *Mineral exploration*
- *Water rights monitoring*
- *Land use and land cover change*
- *Crop estimates*
- *Forest management*
- *Space cartography*
- *Wildlife reintroduction*
- *Design of defense systems*
- *Range management*
- *Invasive species monitoring*
- *Deforestation monitoring*
- *Recreation planning*
- *Soil analysis*
- *Ecosystem mapping*
- *Water resource planning and administration*
- *Snow and ice monitoring*
- *Detecting and monitoring volcanic activity*
- *Wetlands rehabilitation*
- *Weather prediction*
- *Wildland fire risk assessment*
- *Irrigation management*
- *Carbon cycle monitoring*
- *Mapping groundwater discharge zones*

3. *Value of Landsat Data*

- *The landsat data gap has already occurred*
- *81 percent of the respondents with an opinion about Landsat stated that current Landsat 5 and 7 data **do not** meet all of their needs given the current scan line corrector problems of Landsat 7 and coverage limitations of Landsat 5.*
- *Approximately 78 percent of the same respondents stated that if the scan line corrector failure on Landsat 7 had not occurred, that Landsat 7 data **would** meet their current needs.*

Landsat Data Are Important

The top 5 reasons why participants use Landsat data rather than other remotely sensing data are (in order of importance)

- 1. Landsat data are more accessible*
- 2. There is a large Landsat archive containing over 30 years of consistent data*
- 3. Landsat data is relatively less expensive*
- 4. The extent of Landsat scenes is more appropriate for the respondent's project*
- 5. Landsat has more repetitive coverage*

Barriers to Using Other Types of Moderate Resolution Data

- 1. Cost barriers*
- 2. Insufficient historic data available*
- 3. Lack of repetitive coverage*
- 4. Lack of coverage over area(s) of interest*
- 5. Lack of spectral band(s)*

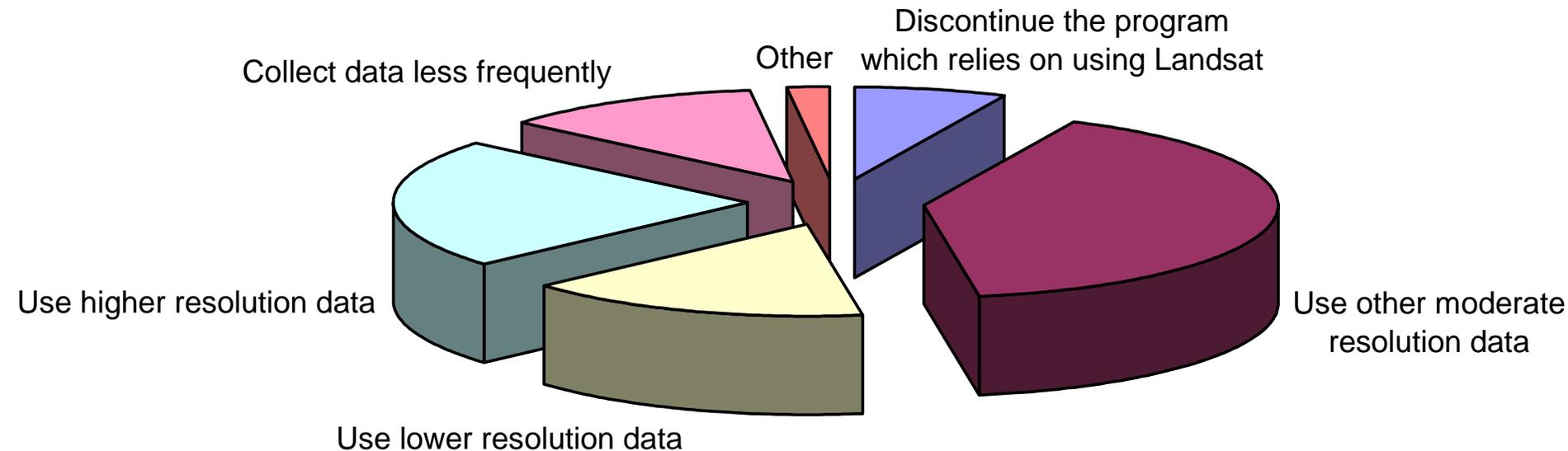
What Data Characteristics Impacts Procurement Decisions?

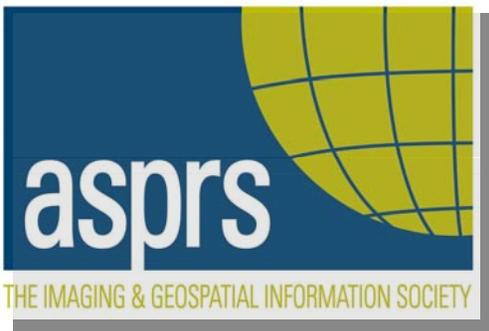
- *the importance of cost to their decisions of what type of imagery to use,*
- *the importance of spectral and spatial resolution to their decisions of what type of imagery to use, and*
- *the high value placed on the existence of repetitive coverage and an archive of historical data.*

The Value of Moderate Resolution Imagery

- *Thirty eight percent of the users of moderate resolution imagery believe it would not be possible to provide the same level of service to their clients if Landsat or other moderate resolution imagery were not available.*
- *The remaining respondents estimate the economic impact to their clients if moderate resolution data were not available to be **\$1.278 billion/year.***
- *Of that, the value attributable to the loss of Landsat imagery alone is estimated to be **\$935.8 million/year.***

Program Management Options if Landsat is not Available





The Sectors Most Economically Impacted by the Loss of...

Landsat

- 1. Land Use Planning and Management*
- 2. Agriculture and Forestry*
- 3. Water Resource Management*
- 4. Ecological Forecasting*
- 5. National / Homeland Security*
- 6. Emergency / Disaster Management*
- 7. Coastal Zone Management*
- 8. Transportation Management and Infrastructure Planning*

Other Moderate Resolution Imagery

- 1. National / Homeland Security*
- 2. Emergency / Disaster Management*
- 3. Land Use Planning and Management*
- 4. Water Resource Management*
- 5. Agriculture and Forestry*
- 6. Ecological Forecasting*
- 7. Coastal Zone Management*
- 8. Transportation Management and Infrastructure Planning*

Data Policy

- *Respondents were asked to rate their level of agreement with several statements on moderate resolution data policy.*



Landsat and future moderate resolution land imaging data are a national asset and should become a sustained operational program of the U.S. Government.



The U.S. government should distribute Landsat and future moderate resolution land imaging data at little or no cost.



It is important for the U.S. satellite industry to regain its strategic advantages in the world marketplace.



The world would be better off by flying many different nations' satellites and cooperating in data exchanges.



The U.S. satellite industry has lost its edge in the world marketplace.



RADAR data are essential to the U.S. land imaging program.



Taxpayer funds are better spent on increasing the spectral and radiometric quality of one moderate resolution satellite rather than on adding to the number of satellites to increase repeat coverage.



Having additional spectral data bands is more important than having RADAR or LIDAR information.



It is more important for the US to advance the science of moderate resolution space remote sensing than it is to ensure that moderate resolution data gaps are minimized.





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It is more important for the US to advance the science of moderate resolution space remote sensing than it is to ensure that moderate resolution data gaps are minimized.

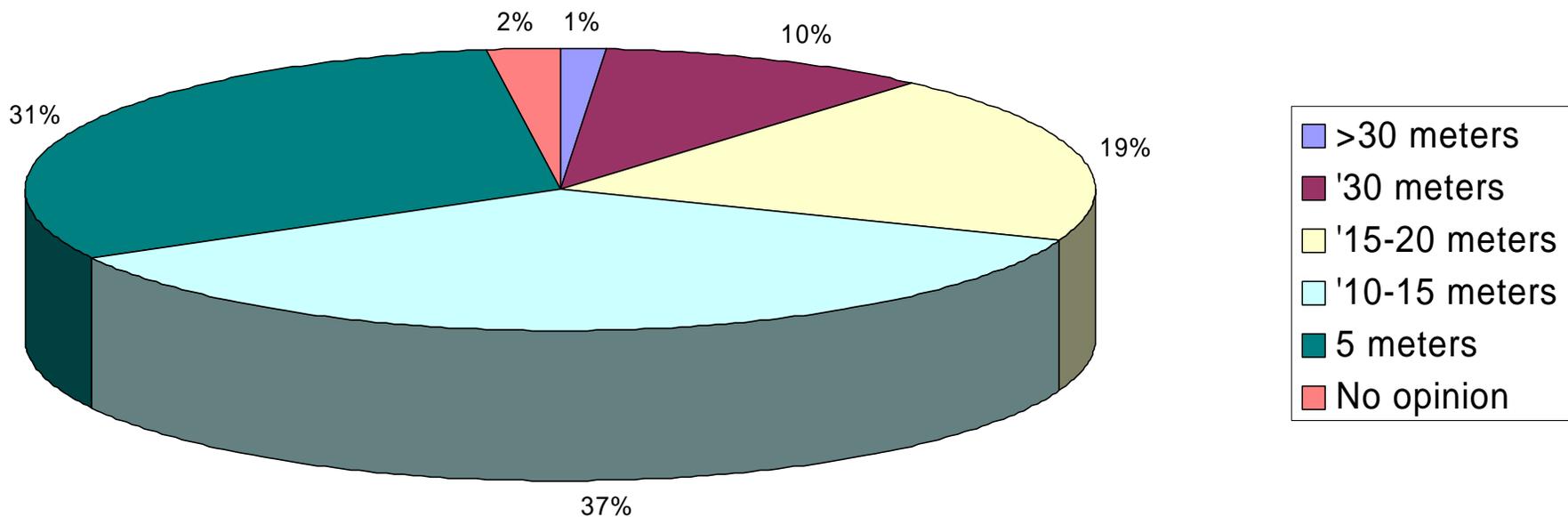
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5. Steps Forward: Increasing the Utility of Moderate Resolution Imagery

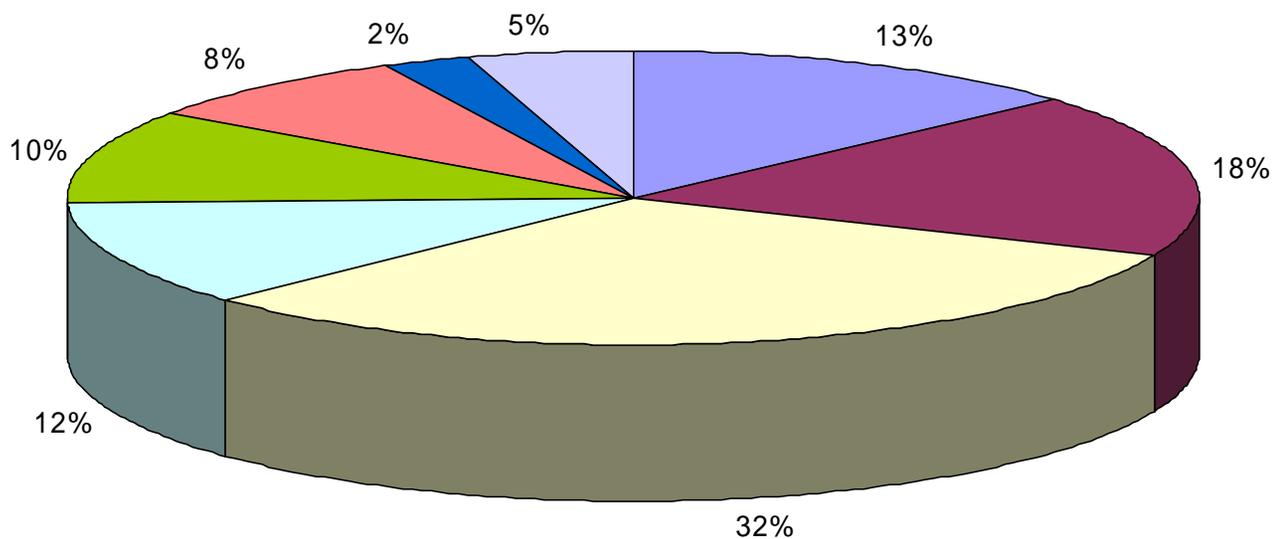
Top five factors for increasing the utility of moderate resolution imagery in order of importance

- 1. Lower cost data*
- 2. More frequent temporal coverage*
- 3. Greater spatial resolution*
- 4. More spectral resolution*
- 5. Easier access to data*

Desired Spatial Resolution



Desired Revisit Frequency

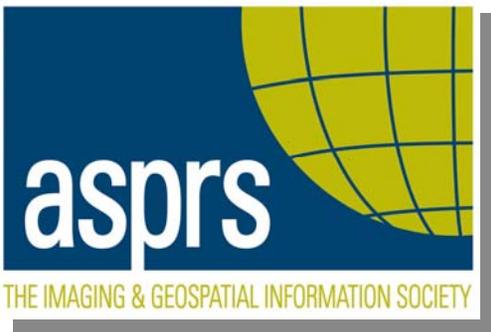


5. Steps Forward Making it Happen

- *The operational uses of moderate resolution data are global, extremely diverse, and rich in creativity and impact.*
- *Discontinuation of a U.S. managed moderate resolution program would cost society and humanity almost **1 billion dollars per year** in beneficial activity.*
- *While users of moderate resolution data come from all sectors, they serve primarily public agencies and non profit organizations.*

The Provision of Moderate Resolution Satellite Imagery Must Be a Government Function

- *If there was a commercial market of the size required to support the design, construction, launch, operation and archiving of moderate resolution data, then the commercial sector would be providing it and there would be no role for the government in the provision of moderate resolution data.*
- *However, commercial satellite remote sensing at any resolution is not and will not soon be a viable commercial venture, independent of the need for substantial government investment.*



The Provision of Moderate Resolution Satellite Imagery Must Be a Government Function

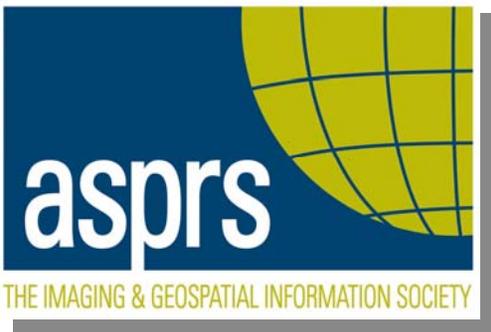
- *While commercial ventures will surely benefit from the public provision of moderate resolution satellite data, they are merely spin-offs, and not a reason to fund the program.*
- *The program must be funded by the government because the **public** needs it – both the people of the United States and our global community.*
- *Therefore, it should be jointly supported – by the US taxpayer and our international partners*

Societal Benefits

- *Because of technological barriers, continual policy changes and ill attempts at commercialization, the demand for moderate resolution support has been shallow, narrow, and fragmented.*
- *It is only since 2000 that the use of moderate resolution data has broadened widely to embrace many sectors, including the military, because solution to a myriad of societal problems can be addressed with moderate resolution data.*
- *Be it food security, disaster preparedness, urban planning, endangered species protection, water quality or battle field situational analysis, the uses of Landsat data, and particularly Landsat in combination with high resolution data has exploded.*

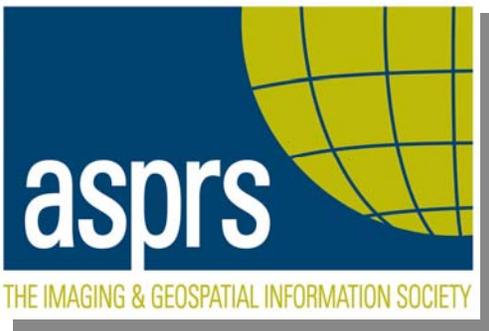
Societal Requirements

- *To expend our resources on global issues, we must know that the information is **timely, objective, reliable, and consistent***
 - *Can our food security rely on information gathered by our biggest agricultural competitors?*
 - *Can our homeland security and defense depend on other governments monitoring economic and environmental change world wide?*
 - *Can our disaster response rely on the availability and timeliness of satellites controlled by other governments?*
 - *Can we afford to put so much of our resources and security in the hands of other countries?*
 - *Do we want to capitulate leadership in moderate resolution remote sensing to the rest of the world?*



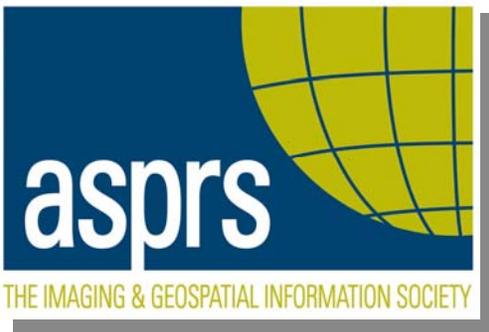
ASPRS Believes

- *That the answers to these questions is a resounding no.*
- *To that point we have developed draft legislation which would authorize the creation of a National Land Imaging Program within the Department of Interior*
- *We are looking to work with a wide assortment of organizations to gain support for this legislations*



The National Land Imaging Program

- *Represents a monumental commitment to land remote sensing and global change monitoring.*
- *Actively takes the Landsat Program from a launch by launch scientific program to an operational program.*
- *The Program will be within the Department of Interior, reporting at the Secretary or Assistant Secretary level. NLIP will “provide focused leadership and management for the nation’s land imaging efforts.”*
- *As such, NLIP will focus on maintaining a “core operational capability to collect moderate-resolution land imagery through the procurement and launch of a series of U.S. owned satellites,” thereby ensuring the continuity of U.S. collected and managed Landsat-like moderate resolution data well into future decades.*



NLIP Responsibilities

- *Acting as the lead organization for coordinating and planning future U.S. civil operational moderate resolution imaging,*
- *Ensuring that all U.S. needs for civil moderate-resolution land imagery data are met,*
- *Working closely with other federal agencies to assess U.S. moderate resolution imagery needs by convening a multi agency Federal Land Imaging Council,*
- *Maintaining ongoing assessments of user needs and advanced technologies in remote sensing, and*
- *Negotiating international agreements to augment U.S. civil operational moderate resolution land imaging capabilities.*

Conclusions

- *The political support for Landsat has suffered from its biggest strength – its broad base of users who tend to focus on the very diverse problems of the globe rather than organizing to support the underlying satellite program*
- *The survey and the FLI have been instrumental in developing a focused constituency passionately committed to the future of a Landsat like program.*
- *Yes, we are wide and thin, but we are now focused and together.*