JACIE: A Brief History, Achievements, and Lessons Learned

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What Is JACIE?

- Joint Agency Commercial (Civil) Imagery Evaluation – JACIE

- JACIE informs the U.S. Federal Government about the quality of remotely sensed data sources, including new civil and commercial systems, data, and products

- JACIE data quality parameters: Primarily focused on Geodetic /Geometric accuracy, Spatial performance, and Radiometric performance
  - JACIE partners are also interested in technical factors affecting data quality, usability, and interoperability
JACIE Background

- Began at NIMA CCAP, Feb 3rd, 2000, held first Workshop in 2001
  - Began w/ high-res commercial: IKONOS, then QuickBird
  - Expanded to all commercial and foreign civilian
  - Held every year except 2004 (Hurricane Katrina)
  - ~2005: Leadership transfers from NASA Stennis to USGS

- Current JACIE Team – Stakeholders, Co-Chairs:
  - NASA – Brad Doorn, Kurt Thome
  - NGA – Frank Avila, Dave Case
  - NOAA – Mitch Goldberg, Kevin Gallo
  - USDA – Glenn Bethel, Dath Mita
  - USGS – Tim Newman, Greg Stensaas

- JACIE Meetings:
  - Annual Stakeholders meeting for guidance
  - Monthly Management Co-Chair’s meeting and Technical Team meetings (telecons)
  - Annual JACIE Workshop
Why JACIE?

- Imagery Sources expanding significantly, both Gov’t and Commercial
- Technology continues rapid growth, changing the way things are done
  - Integrated Sensors, data fusion, software and processing, storage, many pieces are coming together to allow many integrated information products
- Decision-makers facing many questions:
  - What to use, what to buy? Will it meet my needs?
- JACIE helps to provide those answers
  - Provides independent assessments of data
- JACIE Also helps Community (Civil/Commercial)
  - Encourages development of new methods for processing, testing, assessing data
  - Work with new players to help them understand what is needed
Multiple data sources from space

Satellites per country and launches per year

55 Countries, incl. ESA (launches thru 9/19)

Planet drives surge to 2018
Primary Focus is Satellite Imaging
- Traditional systems: Landsat, Sentinel-2a/2b, ResourceSat-2, MODIS, ASTER, GOES, VIIRS,
- SmallSats: Deimos, DMC, CBERS, …
- CubeSats: Planet, Astro Digital, …,
- ISS: DESIS, Climate Absolute Radiance and Refractivity Observatory (CLARREO) mission, …,
- Cal/val missions: CLARREO mission and TRUTHS, …,

Have also looked at Airborne
- Hyperspectral and multi-spectral imagery
- LIDAR and SAR
- Thermal
- Combined Lidar/SAR/Optical
JACIE Works with Data Providers

- JACIE works to maintain collegial relationship with Data Providers

- Early JACIEs helped IKONOS, Quickbird/Digital Globe

- Have also worked with: Deimos, DMCii, GISTDA (Thailand), RapidEye, SkySat, AstroDigital, Planet
  - Provide feedback
  - Insight into our analyses, reports

- NGA also works closely with potential providers
JACIE Annual Workshops

- Initially held in Washington, DC area
- Then Co-located with ASPRS Annual Conference
  - Registration fees, travel
- Returned to DC area in 2017
  - Nexus of users and decision-makers
- Focus is on technical talks
  - Pure marketing discouraged, but some talks have both
- Additional Talks
  - Agency representatives tell of their activities and plans
  - Keynote speakers – the View from Above (Industry, Government, Policy)
EROS Calibration Center of Excellence (ECCOE) Workshop collocated with JACIE

- A focused “deep-dive” into a single calibration topic with invited speakers

3rd EROS Cal/Val Center of Excellence (ECCOE) Workshop – Sep 23, 2019
2019 JACIE 18th Annual Workshop Stats

- 143 (free) registrants, 117 attendees
- 38 speakers
  - 17 Gov’t, 20 Commercial, 1 Educational
  - 33 from USA, 1 ea from Australia, France, Italy, S.Korea, UK
  - US Agencies: NASA, NGA, NOAA, NRO, State, USDA, USGS
  - Foreign Gov’t: ESA-ESRIN, GeoScience Australia, KARI, NPL, CNES
  - Commercial: I2R, KBR, L3Harris, Labsphere, MAXAR, Planet, Raytheon, SSAI
- Good cross-section of remote sensing community
The panel session on Moving Toward a Common Reporting Framework by Sam Hunt- NPL, Valentina Boccia, ESA ESRIN, Greg Stensaas, USGS, and Ignacio Zuleta, Planet and associated questions/response from the audience provided session confirmation of the continued need to create common definitions and guidelines for data quality and uncertainty.

- There are many efforts moving in a similar direction and they need to be combined to support the community.
- There is a strong effort evolving among JACIE (USGS, NASA, NGA, NOAA, and USDA) and the JACIE community partners, including European Space Agency (ESA), National Physical Laboratory (NPL), Committee on Earth Observation Satellites (CEOS), Global Space-based Inter-Calibration System (GSICS), and others, to move forward as a combined effort in this area.
- Agreement that JACIE would work with CEOS (Space Agencies) to help bring data quality definitions, measures, and best practices together.
JACIE Achievements

- Helped the US Gov’t to become more aware of data and opportunities
- Aided growth in the community
- Improved Data Quality
- Facilitated Information Sharing
- Helped to Build Trust – in all directions
- Helped promote new calibration methods and resources
- Spurred collaboration and opportunities

Reference: USGS RCA-EO Earth Observing Systems Database
JACIE Exposes Us...

- To New Systems, and assessments of those systems
  - WorldView Legion – multiple 500kg-class sats w/ 30cm resolution
  - CO3D – Effort to develop worldwide elevation map by CNES (France)
  - Planet’s SuperDoves – 8 bands now, 14 bands coming. UberDoves to have 32 band max?
  - DESIS – German-made hyperspectral sensor aboard ISS
  - This JACIE included 1st public presentation on new data purchasing by NRO!

- To new calibration ideas, methods, tool, techniques, and partners
  - Automated Spatial MTF assessment tool (KARI)
  - ESA - Earthnet Data Assessment Pilot, EDAP – Joint Quality Reporting
  - ESA VH-RODA Conference– being modeled after JACIE process and workshop

- To new ideas – ideas, plans, and players that shape our world
  - Enhanced data partners being developed for cross calibration
  - Calibration/Validation and Interoperability definitions and standards
    - Industry wants necessary Gov’t standards to be imposed
JACIE Lesson Learned
(and things we should be doing!)

- JACIE is a volunteer effort and expectation needs strong leadership
- Trust in the JACIE community is important
  - Working with global partners across Government and Industry
  - Work with partners to present information together
- Coordination across multiple Agencies is Challenging
- Prioritization is Difficult
  - Different agencies, different priorities
  - Easy to get distracted by the many opportunities
- JACIE provides a wealth of information, but is becoming unwieldy
  - Becoming difficult to obtain the information needed
  - There are over 600 presentations made on calibration, characterization, and application assessment
- Results need to be presented in a more consistent, useful manner
Assessments of higher-order products
Error and Uncertainty traceability
Big Data, the “Cloud”
Hyperspectral data assessments
Spectral characterizations
Build toward interoperability
More opportunities for Government and Industry to work together
Work to “operationalize” some of JACIE work (Data Buys, reporting, etc.)
Questions?
New Calibration Sites and Processes

- Nice to see thoughts of ca/val/verification over different sites (bright, dark)
  - BDRF
  - Hyperspectral over sites
  - Lets continue to support and push this!!!
  - Work with on-going efforts
- Help establish common definitions and documents to build upon
- Very exciting to see common test sites and definitions; RadCalNet; Keep this moving!!!
Cooperation in Commercial Data

Frank Avila NGA, Peter Meund, NRO

- Joint NGA-NRO agreement directs NRO to be IC and DoD primary acquirer of commercial GEOINT imagery and NGA to be primary acquirer of commercial GEOINT analytic services and data

- Commercial GEOINT Activity (CGA) - A joint NGA and NRO effort designed to ensure that the US Government takes full advantage of legacy and emerging commercial GEOINT capabilities to satisfy mission needs and maximize the efficiency and effectiveness of the overhead architecture
  - CGA includes capabilities and application assessment (JACIE-like)
  - Global Enhanced GEOINT Delivery (G-EGD): Replaces Enhanced View Web Service (EVWS) for users including civil users
  - Studies and market research will inform next phase (2020+) of acquisition
Robbie Schingler, Planet Co-founder

- Operating ~148 satellites currently
  - 5 RapidEye, 15 SkySats, 110+ Doves,
  - 20 SuperDoves
  - 25+ ground stations
- Currently downlinking 6-8 TB/day
- Agriculture is ~40% of their market, but others are growing
- He sees Planet primarily as Data Managers, foundation for the rest of their work
- Looking at Ship-to-ship transfer
- Telecom Mega Constellations could change the CONOPS for remote sensing
- "Data is the new Oil" (some economist said) - has yet to be priced well

Leadership in Earth Observation coming from ESA and China (panel question)
Orla Dermody, MAXAR/Digital Globe (Product Development Lead)

- They are being driven by new technologies
  - Autonomous Navigation is a huge driver, so is 5G
  - Also by NGOs: For the Bill & Melinda Gates foundations: Took 3 weeks to make a million km², >90% accurate map, millions of buildings, in Tanzania to help spread mosquito nets and fight disease
  - Mapping is a huge trend - "Google Maps poised to be an $11B business in 4 years" (said in 2019)
  - Africa is a huge underserved area, wide-open to opportunities
- WorldView Legion - first launch in 2021-22, Q1-Q3 timeline; will triple Maxar’s 30cm resolution collecting capability
- Timeliness (low-latency) is key
- What Gov’t can do to help the EO Community: Grow the people pipeline, Reward holistic innovation, Collaborate and attack the problem of scale