

Q&As from the  
The Art and Science of Imagery Change Detection  
Webcast  
1:00 – 2:00 PM (Eastern)  
Wednesday, 21 October 2015

Q: Where can we get more information on what the PCM database is all about? And more examples of its change detection applications?

A: PCM is a commercially available product offered MDA Information Systems LLC. PCM is not available within ArcMap's toolbox Please visit: <http://www.mdaus.com/Products-0024-Services/Geospatial.aspx>. For information and pricing specific to your areas of interest, please contact [info@mdaus.com](mailto:info@mdaus.com) .

Q: Did you combine NOAA images with Landsat images?

A: For this demonstration we were only using Landsat image data. PCM can created from any multi-spectral image source – existing projects have used Landsat, RapidEye, FORMOSAT, and SPOT.

Q: This MDA product looks very similar to the plans for the process USGS will use in their new LU change products. Can you explain how these differ?

A: PCM, unlike the USGS approach, uses a patented pattern recognition algorithm that pinpoints persistent change within a vast collection of 2-date change results.

Q: Will PCM detect urban center change such as gentrification?

A: Not directly. If one defines gentrification as the change in who inhabits a structure, rather than creation of new structures, then PCM would be of little use. If, however, there are areas of demolition and rebuilding, these changes would be readily detected.

Q: Is PCM a useful way to detect and quantify forest changes and fragmentation as a result of natural resource development? And in combination with other land use changes?

A: Absolutely. This is an excellent application of the PCM database. By querying the PCM attributes to show vegetation, rather than cultural, change the data can be very useful in mapping the date and areas of forest change and fragmentation.

Q: As imagery acquisition cameras improve, have any tools/processes developed to statistically compare imagery captured at different resolutions?

A: PCM was designed for use with space-borne sensors. Aerial systems with greater than 1-meter resolution and large convergence angles are more appropriate for spatial-object oriented change rather than the spectral-object oriented change design of PCM.

Q: Is the presenter doing this in ArcMap Desktop or ArcGIS Online?

A: The presentation is done in a story map using ArcGIS Online. The displayed shapefiles were created in ArcMap.

Q: Where can I find PCM under the toolbox list of tools in ArcMap?

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A: PCM is currently not available within ArcMap's toolbox. MDA Information Systems LLC is currently discussing the possibility of having PCM available via ArcGIS Online.

Q: Perhaps the question will be answered in the presentation, but is PCM a plugin for Arc, or a standalone tool?

A: PCM is a commercially available product offered MDA Information Systems LLC.

Q: Is PCM only for Landsat or can I use any raster time series satellite data?

A: PCM was designed for use with space-borne sensors. . PCM can be created from any multi-spectral image source – existing projects have used Landsat (30m), RapidEye (5m), FORMOSAT (8m), and SPOT (10m).

Q: For PCM natural features change: Is forest loss due to agriculture picked up?

A: The initial transition from forest to agriculture is easily detected. Monitoring subsequent oscillations associated with crop cycles could establish the changes as having gone to agriculture.

Q: Have C CAP been used for a freshwater wetland mapping?

A: Yes, C-CAP maps several categories of wetlands, including both estuarine and palustrine types. We map freshwater forested, shrub, and herbaceous wetlands. We also map some palustrine aquatic bed, and unconsolidated shore. See a full list of our classes, and their definitions at [http://coast.noaa.gov/digitalcoast/\\_pdf/ccap\\_class\\_scheme.pdf](http://coast.noaa.gov/digitalcoast/_pdf/ccap_class_scheme.pdf)

Q: Is the threshold empirically defined only?

A: When dealing with a single pair of dates, the issue becomes one of "teasing out" a faint signal that is sitting just above the "noise" of natural, unrelated, change. Using a multi-temporal stack of images, as with PCM, allows the application of statistical techniques that permit the use of fixed, objectively derived, thresholds.

Q: Is there a free version of Arcmap for educational purposes?

A: Esri encourages the use of GIS in educational institutions. To support this, Esri makes available software to educational institutions at affordable prices with special licensing options. Educational prices for software products are offered to accredited educational and research universities, colleges, K-12 schools, libraries, museums, youth organizations, and the administrative offices of these institutions. For additional information you can contact [ajachim@esri.com](mailto:ajachim@esri.com).

Q: Will C CAP work in shallow water to detect change? In this coastal project I mean...

A: C-CAP does map intertidal wetlands, sediments, and shallow-water areas but does not map benthic habitat, so shallow sediment (commonly referred to as unconsolidated bottom, and similar benthic environment, are not included as part of NOAA's mapping). C-CAP products do map change in our

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categories for these coastal areas, and often clearly captures sediment movement along the coast, but as you may imagine shallow water areas can be a challenge in Landsat scale imagery (due to the size of the pixels, and the dynamic nature of tidal areas, compared to when the Landsat sensor may have acquired the data).

Q: When you say stack ...do you really mean multi pairwise data creation that is stored in database?

A: The “stack” is a collection of multi-spectral satellite images, acquired at a different dates, over the same ground area (e.g. for Landsat is might be a collection of 20 scenes over a given path/row, collected in the summers of 1996 through 2015). From this stack, the PCM algorithm calculates the 2-date change for all the pair-wise date permutations. These are then passed through the patented PCM pattern recognition algorithm for the detection of “persistent change”.

Q: How can we access PCM? Is it an Esri tool built in?

A: PCM is a commercially available product offered MDA Information Systems LLC.

Q: Which tools does C-CAP use to detect the change?

A: In order to take advantage of current technology C-CAP has used many different change detection methods as part of each update cycle, and there has been general improvement through time as computational power, data quality, and methods have improved. Past methods have included: MDA’s Cross Correlation Analysis (CCA), a precursor to their PCM product, USGS’ Multi-Index Integrated Change Analysis (MIICA), as well as other standard methods... and the combination of multiple methods. The success of each is dependent on region/type of change being seen.

Q: Have you compared the PCM and CCAP products or do you leverage each other’s efforts?

A: Currently these two products do not leverage one another, but PCM is a newer method and has not been available for much of the timeframe when C-CAP data were in production. They will be compared more closely as part of NOAA’s 2015/2016 land cover update (which MDA has current task orders related to). It is, however, important to understand that the two products do have slightly different goals. PCM is focused on persistent change (primarily associated with development), while C-CAP is also interested in changes to vegetated areas that may not be associated with development, or other permanent vegetation loss (think forest stand cut and regrowth).