MODIS Collection 6 BRDF/Albedo: Status and Updates

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Outline

- Collection 6 updates
- Validation
- NEON sites
- Conclusion
Updates: Eight Day -> Daily

Collection 5  eight day product

oldest  Dynamic observation stream  newest

day 1, day 2  ...  day 9, ...  day 16, day xxx  ...  day 24, day 25  ...  day xxx+15  ...  ...

Collection 6  daily product

oldest  Dynamic observation stream  newest

day 1, day 2  ...  day 9, ...  day 16, day xxx  ...  day 24, day 25  ...  day xxx+15  ...  ...

Observations weighted
	Temporal, observation coverage, band quality
Updates: Capture Disturbance

2007245 shortwave WSA
2007248 shortwave WSA
2007251 shortwave WSA
2007254 shortwave WSA
2007257 shortwave WSA
2007259 shortwave WSA

Anaktuvuk River Fire location in 2007
Updates: Magnitude Inversion

Back-up Database

• Collection 5:
  Land cover based

• Collection 6:
  Pixel based
  Updated from the latest full inversion

C6 backup database Fiso

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Updates: Number of input observations increased

- Collection 5:
  The first 4 layers

- Collection 6:
  All the available observations

Tile h16v01 Number of observations, DOY 240
Updates: Snow status

- Snow cover MOD10A1 product as input -- separate 100 % snow cover and partly snow cover
Updates: Snow /non snow status

• Collection 5:
  Majority snow/non snow status

• Collection 6:
  Current day snow/non snow status

Barrow C6 2007 SW WSA DOY 157
Barrow C5 2007 SW WSA DOY 145 (input from 145 to 160)

Snowmelt
Updates: Climate Modeling Grid (CMG) Albedo

• Collection 5:
  Aggregated from 500 m albedo

• Collection 6:
  Redo the retrieval using all the clear sky observations within 1km grid for MCD43D.

MCD43B is discontinued.

H12v04 true color  DOY 2011204
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## Updates: Quality

<table>
<thead>
<tr>
<th>Collection 5</th>
<th>Collection 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Quality</td>
<td>Overall Quality</td>
</tr>
<tr>
<td>Snow status</td>
<td>Snow status</td>
</tr>
<tr>
<td>Ancillary</td>
<td>Ancillary</td>
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<tr>
<td>Band Quality flag</td>
<td>Valid observations for each day</td>
</tr>
<tr>
<td></td>
<td>Quality flag Band 1</td>
</tr>
<tr>
<td></td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>Quality flag Band 7</td>
</tr>
<tr>
<td></td>
<td>Uncertainty</td>
</tr>
</tbody>
</table>
Updates: Adjust the Quality Threshold

**Figure 1.** Histograms of RMSE at Red and NIR bands for different tiles.

**Figure 2.** Histograms of WoD-WDR at Red and NIR bands for different tiles.

*Shuai et al., 2008 GRL*  
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Validation: Compare with *in situ* measurements
In general, the satellite derived estimates met the accuracy requirements established for the high-quality MODIS operational albedos at 500 m (the greater of 0.02 units or ±10% of surface measured values).

Evaluation at NEON sites: Location

Continue to expand our validation sites beyond Surfrad, BSRN, and Flux sites to include NEON sites.

NEON core sites location Courtesy of http://www.neoninc.org

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NEON sites: Spatial Representativeness

Domain 17: San Joaquin Experimental Range

Domain 18: Toolik Lake

Xiaoyuan Yang
10m (left), 20m (center) and 30m (right) albedometer heights are applied to each sites to evaluate the changing of $R_{se}$ parameter with respect to 0.243.
NEON sites: Fused MODIS and Landsat NBAR
Conclusion

• C6 daily BRDF/albedo product can now capture rapid land surface changes – snowmelt, fire etc.

• More high quality output is produced because of the increase in the number of observations (especially over high latitude areas).

• The MODIS albedos agree well with ground and airborne measurements.

• The fusion of MODIS and Landsat produces vegetation index that track dynamic land surface characteristics with high temporal/spatial resolution.