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NASA ARSET Air Quality Remote Sensing Training

Organized by:
NASA’s Applied Remote Sensing Training Program (ARSET); the Indonesian Agency for Meteorological, Climatological, and Geophysics (BMKG); and the U.S. Embassy, Jakarta
Tuesday, March 20 – Friday, March 23, 2018
BMKG Headquarters, Jalan Angkasa I, No. 2, Kemayoran, Jakarta

Key = Key = LC: Lecture, HO: Hands-On Exercise, DM: Demonstration,
PP: Participant Presentation, DS: Discussion

Instructors: Pawan Gupta, Melanie Follette-Cook, and Bryan Duncan

**Tuesday, March 20, 2018**
Day 1, Morning Session: Registration, Opening Remarks, and Introduction and First Exposure to Satellite Air Quality Measurements

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
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<tbody>
<tr>
<td>BMKG</td>
<td>08:30 – 09:00 Registration &amp; Logistics</td>
<td>Informal</td>
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<tr>
<td>BMKG</td>
<td>09:00 – 09:45 Opening Ceremony</td>
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<td></td>
<td>09:45 – 10:00 Photo Session</td>
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<td><strong>10:00 – 10:30</strong></td>
<td>Tea Break</td>
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<tr>
<td>BMKG</td>
<td>10:30 – 11:00 Overview of the Indonesian Air Quality Monitoring Program and Future Directions</td>
<td>LC, DS</td>
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<tr>
<td>Pawan, D1P1</td>
<td>11:00 – 11:30 Introduction of ARSET Program and Overview of Satellite Capabilities for Air Quality Monitoring</td>
<td>LC, DS</td>
</tr>
<tr>
<td>Melanie, D1P2</td>
<td>11:30 – 12:30 Fundamentals of Satellite Remote Sensing</td>
<td>LC, DS</td>
</tr>
<tr>
<td><strong>12:30 – 13:30</strong></td>
<td>Lunch Break</td>
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Day 1, Afternoon Session: Satellite Imagery, Data Formats, and Access

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<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
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<tbody>
<tr>
<td>14:45 – 15:00</td>
<td>Level 2 Aerosol Products: Data Access</td>
<td>HO</td>
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<tr>
<td>15:00 – 16:00</td>
<td>Level 3 Aerosol Products: Data Access &amp; Analysis</td>
<td>HO, DS, PP</td>
</tr>
<tr>
<td>16:00</td>
<td>Day 1 Adjourn</td>
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Wednesday, March 21, 2018
Day 2, Morning Session: Satellite Aerosol Data, Tools, and Applications

<table>
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<tr>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
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<tbody>
<tr>
<td>08:30 – 08:45</td>
<td>Q&amp;A, Review of Day 1, Logistics</td>
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<tr>
<td>8:45 – 10:00</td>
<td>Satellite Aerosol Products: Evaluation, Applications, and Limitations</td>
<td>LC, DS, HO</td>
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<tr>
<td>10:00 – 10:15</td>
<td>Tea Break</td>
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<tr>
<td>11:15 – 11:45</td>
<td>Explore Level 2 MODIS Aerosol Data (10 km and 3 km) in Panoply</td>
<td>HO</td>
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<tr>
<td>11:45 – 12:30</td>
<td>Theoretical Basis for Converting Satellite Observations to Ground-Level PM$_{2.5}$ Concentrations</td>
<td>LC, DS</td>
</tr>
<tr>
<td>12:30 – 13:30</td>
<td>Lunch Break</td>
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### Day 2, Afternoon Session: Satellite Aerosol Data, Tools, and Applications

<table>
<thead>
<tr>
<th>Material No.</th>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
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<tbody>
<tr>
<td>Pawan, D2P5E</td>
<td>13:30 – 14:30</td>
<td>Reading and Mapping MODIS Level 2 Aerosol Datasets &amp; PM$_{2.5}$ in Python</td>
<td>HO</td>
</tr>
<tr>
<td>Pawan, D2P6E, D2P6_data</td>
<td>14:30 – 15:00</td>
<td>Conversion of Satellite Aerosol Measurements to PM$_{2.5}$ Air Quality</td>
<td>HO, PP</td>
</tr>
<tr>
<td>Bryan, D2P7</td>
<td>15:00 – 15:45</td>
<td>Satellite-Based PM$_{2.5}$ Datasets and Access</td>
<td>DM, HO</td>
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<tr>
<td></td>
<td>15:45 – 16:00</td>
<td>Q&amp;A, Review</td>
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<td>16:00</td>
<td>Day 2 Adjourn</td>
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### Thursday, March 22, 2018

Day 3, Morning Session: Trace Gases & Fire Products

<table>
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<th>Material No.</th>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
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</thead>
<tbody>
<tr>
<td>Melanie, D3P1, D3P1E</td>
<td>08:30 – 08:45</td>
<td>Q&amp;A, Review of Day 2</td>
<td></td>
</tr>
<tr>
<td>Melanie, D3P1, D3P1E</td>
<td>8:45 – 10:00</td>
<td>Satellite-Based Fire Products</td>
<td>LC, HO</td>
</tr>
<tr>
<td></td>
<td>10:00 – 10:15</td>
<td>Tea Break</td>
<td></td>
</tr>
<tr>
<td>Bryan, D3P2E</td>
<td>11:15 – 12:30</td>
<td>Trace Gas Data Access, Tools, &amp; Analysis</td>
<td>HO, DS</td>
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<td></td>
<td>12:30 – 13:30</td>
<td>Lunch Break</td>
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</table>

Day 3, Afternoon Session: Vertical Profiles and Reanalysis

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<thead>
<tr>
<th>Material No.</th>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
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</thead>
<tbody>
<tr>
<td>Melanie, D3P3</td>
<td>13:30 – 14:30</td>
<td>CALIPSO and CATS</td>
<td>LC, DS, HO</td>
</tr>
<tr>
<td>Pawan, D3P4</td>
<td>14:30 – 15:15</td>
<td>Near Real-Time (NRT) Volcanic SO$_2$, Himawari, and the MERRA-2 Reanalysis</td>
<td>LC, DS, HO</td>
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<td>15:30 – 15:45</td>
<td>Air Quality Case Study Groups and Discussion</td>
<td>DS</td>
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<td></td>
<td>15:45 – 16:00</td>
<td>Discussion, Q&amp;A, and Review of Days 1, 2, and 3</td>
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<td></td>
<td>16:00</td>
<td>Day 3 Adjourn</td>
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**Friday, March 23, 2018**
Day 4, Session: Air Quality Case Studies by Participants

<table>
<thead>
<tr>
<th>Material No.</th>
<th>Time</th>
<th>Topic</th>
<th>Format</th>
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<tbody>
<tr>
<td>D4CS</td>
<td>08:00 – 08:30</td>
<td>Additional Tools and Resources for Case Studies</td>
<td>LC, DM</td>
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<tr>
<td>D4CS</td>
<td>08:30 – 10:30</td>
<td>Case Study Analysis in Groups</td>
<td>HO</td>
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<tr>
<td>D4CS</td>
<td>10:30 – 11:30</td>
<td>Case Study Presentations and Discussion</td>
<td>PP</td>
</tr>
<tr>
<td>D4CS</td>
<td>11:30 – 13:00</td>
<td>Lunch Break</td>
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</tr>
<tr>
<td>D4CS</td>
<td>13:00 – 13:30</td>
<td>Training Review, Feedback, and Moving Forward</td>
<td>HO, DS</td>
</tr>
<tr>
<td>D4CS</td>
<td>13:30 – 13:45</td>
<td>Closing Remarks by Director of Center for Applied Climate Information Services</td>
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</tr>
<tr>
<td>D4CS</td>
<td><strong>13:45</strong></td>
<td>Day 4 Adjourn</td>
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