



**TWO DAYS TRAINING - REMOTE SENSING**

**November 9 and 10, 2011**

**8:30 to 17:00**

**by Richard Kleidman and Ana Prados**

**NASA**

**Location: SNC-Lavalin Inc.  
455 René-Lévesque Blvd. West, 3<sup>rd</sup> floor  
Montreal, Quebec  
H2Z 1Z3**

**All participants must bring a laptop for hands-on activities – Hi-fi connection provided**

**Day 1**

**November 9, 2011**

| <b>Time</b> | <b>Activity</b>  | <b>Activity Type</b>   | <b>Comments</b>   |
|-------------|--|------------------------|---|
| 0:15        | Introductions and Course Goals   | Lecture                | Overview of the pieces needed to understand and use a remote sensing product  |
| 0:20        | Overview of remote sensing capabilities with air quality applications. | Lecture                | A general inventory of remote sensing products and capabilities with air quality applications for aerosols and trace gasses |
| 0:20        | Satellite product organization   | Lecture                | The levels of organization of a remote sensing product using MODIS as an example  |
| 0:20        | Remote Sensing Dictionary - Part I                                     | Lecture                | Essential terms used in remote sensing of aerosols  |
| 0:15        | Break  |                        |   |
| 0:40        | A first exposure to remote sensing aerosol data                        | <b>HANDS-ON</b>        | The Giovanni on-line tool which allows easy access to and analysis of remote sensing data at coarse resolution              |
| 0:20        | Evaluating data  | Lecture/<br>Discussion | Review of Giovanni Exercise and discussion of common mistakes in remote sensing data analysis                               |
| 0:30        | Introduction to Satellites and the MODIS Sensor                        | Lecture                | Important details to understand about satellite orbits and capabilities and how this relates to satellite products.         |
| 1:00        | Lunch  |                        |   |

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|      |  |                 |  |
|------|--|-----------------|--|
| 0:25 | The MODIS Aerosol product in detail                              | Lecture         | Important parameters within the MODIS aerosol product and how to properly understand and use them.   |
| 0:25 | Exploring the MODIS-atmos site                                   | <b>HANDS-ON</b> | Exploring the reference web site for MODIS atmosphere products   |
| 0:40 | MODIS Aqua and Terra coverage and data availability              | <b>HANDS-ON</b> | Using the MODIS image archive. This exercise will also illustrate the relationship of orbits and data availability                                       |
| 0:15 | <b>Break</b>   |                 |  |
| 0:20 | Fire products  | Lecture         | A brief overview of some remote sensing fire products and where to obtain them   |
| 0:25 | Rapid Fire Site  | <b>HANDS-ON</b> | Exercise to explore the images and products available at the rapid fire site.  |
| 0:30 | Past, present and future techniques in remote sensing and PM 2.5 | Lecture         | Why satellite data is important for assessing ground PM 2.5, the limitations of satellites for assessing PM 2.5 and possible solutions to these problems |
| 0:25 | OMI Aerosol products   | Lecture         | An overview of OMI aerosol products and their information content and utility  |
| 0:35 | Examining Air Quality with Giovanni                              | <b>HANDS-ON</b> | Giovanni Tool exercise which makes use of MODIS, OMI and ground based PM 2.5 data.   |

## Day 2

November 10, 2011

|      |  |                  |  |
|------|--|------------------|--|
| 0:20 | Angular Information in Remote Sensing  | <b>Lecture</b>   | What we learn about aerosols from angular information and how this is used in satellites and ground sensors. |
| 0:20 | MISR Overview  | <b>Lecture</b>   | The MISR sensor which makes use of angular and spectral information to derive information about aerosols     |
| 0:40 | Introduction to the Aeronet System   | <b>Lecture</b>   | An introduction to the ground based network of aeronet sensors and an introductory exercise                  |
| 0:15 | Break  |                  |  |
| 0:40 | Aeronet Synergy Tool   | <b>HANDS-ON</b>  | An Aeronet web tool which also makes available coincident satellite and model data.                          |
| 0:20 | Comparing aerosol products   | <b>Lecture</b>   | Comparing and contrasting the aerosol products from four primary sensors                                     |
| 0:40 | Validating aerosol products  | <b>Lecture</b>   | New Giovanni on-line tools for comparing satellite products and ground data. The MAPPS data set and exercise |
| 1:00 | Lunch  |                  |  |
| 0:40 | Trace Gas Product Overview and OMI Products                                  | <b>Lecture</b>   | The most useful sensors and products for trace gases and an overview of OMI trace gas products.              |
| 0:40 | OMI NO2 and SO2 Imagery  | <b>HANDS-ON</b>  | A more detailed look at the NO2 and SO2 products.  |
| 0:20 | Break  |                  |  |
| 0:45 | Access to Trace Gas Products: NASA AVDC, KNMI and UMBC SO2 Site              | <b>HANDS-ON</b>  | Websites which provide quick access to real time and archival trace gas imagery and products                 |
| 0:40 | The European World Data Center Site and the NASA Science Mission Directorate | <b>Lecture</b>   | Starting locations for finding mission and product information for trace gases and aerosols.                 |
| 0:40 | On line resources for Air Quality - The Smog Blog,                           | <b>Lecture /</b> | A brief of overview of the most frequently used  |

IDEA and Air NOW

**HANDS-ON**

web resources for air quality information.

NOTE: This lecture is fairly U.S. specific

NOTE: For audiences already familiar with these resources we will substitute content on RSIG (see below)

0:40

The EPA's Remote  
Sensing Information Data  
Gateway

**Lecture /**  
**HANDS-ON**

A web based tool that allows rapid integration of satellite data sets from many sources and model data

## Additional topics that can be covered during the training

|      |  |                 |  |
|------|--|-----------------|--|
| 0:25 | The Calipso (CALIOP) sensor and products   | <b>HANDS-ON</b> | Determining aerosol heights. Calipso and lidar.  |
| 0:20 | A-Train data depot   | Lecture         | Giovanni On-line site to access A-Train satellite data corresponding to Calipso data   |
| 0:35 | Final case study pieces - FLAMBE and NEO   | Lecture         | FLAMBE aerosol model product available from the NRL and NEO higher resolution products for visualization                             |
| 1:30 | Putting all the pieces together. Google Earth case study of an air quality event | <b>HANDS-ON</b> | A guided case study which provides an opportunity to review and apply many of the concepts and data sources presented in the course. |