



Meeting agenda

- Overview of the NPOESS/HDF5 project (Mike)
- Accessing NPOESS products with netCDF-4 (What we learned so far)
- NPOESS/JPSS metadata (most of the following slides)
- Demo
- Discussions



The HDF Group



Accessing NPOESS product files with netCDF-4



Objectives

- Access NPOESS/JPSS data with the netCDF-4 library and tools
 - Achieved through an augmentation process of the NPOESS/JPSS product files by:
 - Modifying internal HDF5 structures to conform to the netCDF-4 standard
 - Adding metadata information stored in
 - NPOESS/JPSS Product XML files
 - NPOESS/JPSS geo-location product files
 - Corresponding XML geo-location product files
 - Others?



Objectives (continued)

- Augmentation process can be carried in several different ways
 - Using tools
 - HDF5 command line utilities (existing and under development - h5edit)
 - HDFView
 - Special augmentation tool
 - Using Python (H5Py) scripts
 - HDF5 Programming in C, C++, Java, Fortran
 - Jury is still out because.....

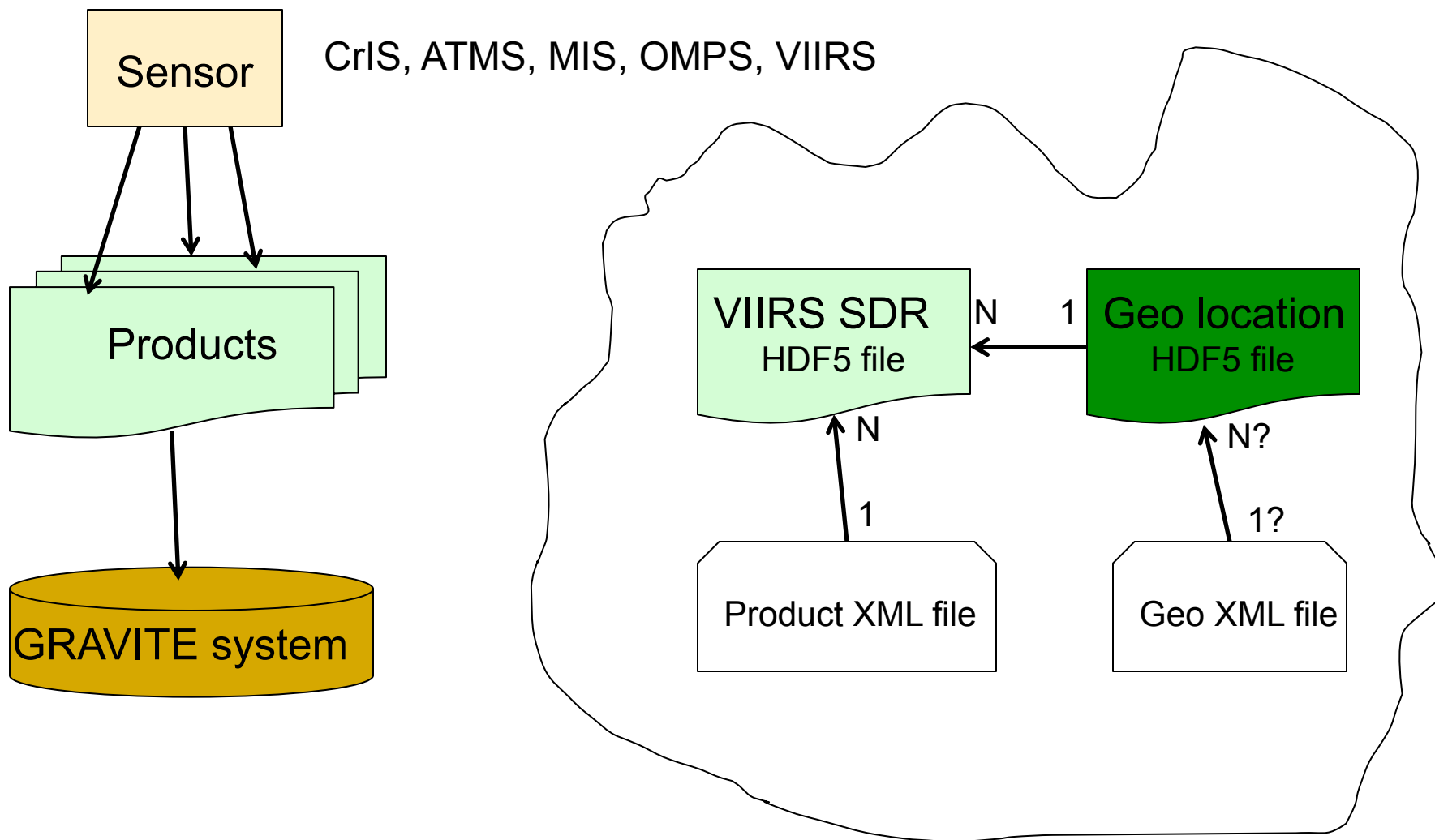


NPOESS/JPSS Metadata

WE NEED HELP!



NPOESS Product Data and Metadata



Need clarification on data and metadata dependencies



NPOESS Product Data and Metadata

- We have access to VIIRS data products from NOAA's GRAVITE system and products XML files from Richard
- *Problem: we do not know how they correspond to each other and cannot proceed with the augmentation process*
 - *Where is product XML?*
 - *Where is a geo-location file and XML file (see demo after the slides show)?*
- Caution: next two slides are not intended to be read, you were warned 😊



NPOESS Product Data and Metadata

- VIIRS products XML files (about 50 files)

D34862-04-01_NPOESS-CDFCB-X-Vol-IV-Part-1_D_VIIRS-IMG-GEO-TC-PP_ECR 959A.xml
D34862-04-01_NPOESS-CDFCB-X-Vol-IV-Part-1_D_VIIRS-MOD-GEO-TC-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-IMG-GTM-EDR-GEO-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CTP-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CIMSS-EDR-GEO-TC-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CTH-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-OMPS-TC-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-Aeros-EDR-GEO-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-Aeros-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CBH-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CCL-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CEP-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-COT-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CTH-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CTP-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-CTT-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-I1-IMG-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-I2-IMG-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-I3-IMG-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-I4-IMG-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-I5-IMG-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M10TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M11TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M12TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M13TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M14TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M15TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M16TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M1ST-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M2ND-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M3RD-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M4TH-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M5TH-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M6TH-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M7TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M8TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-M9TH-EDR-PP_ECR.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-MOD-GTM-EDR-GEO-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-NCC-EDR-GEO-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-NCC-EDR-PP_ECR 959A.xml
D34862-04-02_NPOESS-CDFCB-X-Vol-IV-Part-2_D_VIIRS-SusMat-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-IST-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-LST-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-NHF-EDR-GEO-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-NHF-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-OCC-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-SCD-BINARY-SNOW-FRAC-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-SCD-BINARY-SNOW-MAP-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-SIC-EDR-PP_ECR 959A.xml
D34862-04-03_NPOESS-CDFCB-X-Vol-IV-Part-3_D_VIIRS-SST-EDR-PP_ECR 959A.xml

- VIIRS files on GRAVITE (> 1000000 files)

23730897 GCRSO_met_d20101209_t1320080_e1320380_b12345_c20101209151432130445_grav_dev.h5
eff547b0b585006cb2eaa11bbcef188a 46792
23730894 SVM13_ter_d20101209_t1249322_e1250421_b000000_c20101209151428711019_grav_dev.h5
db99a4b9110ec59e81ef237f46deae7 22219520
23730893 SCRIS_met_d20101209_t1319360_e1320060_b12345_c20101209151428466329_grav_dev.h5
040ef69cb20894c67bf27317196cd04 17088168
23730892 GCRSO_met_d20101209_t1319360_e1320060_b12345_c20101209151428100323_grav_dev.h5
64d4903961c7385d0973502c56f64824 46792
23730891 SVM01_ter_d20101209_t1248213_e1249312_b000000_c20101209151427688592_grav_dev.h5
3270a1334c24248e59b0441662762e6c 12400069
23730890 SCRIS_met_d20101209_t1319040_e1319340_b12345_c20101209151424852545_grav_dev.h5
15da1e600d03cd50a541b874bef0fee0 17088168
23730889 GCRSO_met_d20101209_t1319040_e1319340_b12345_c20101209151424465379_grav_dev.h5
391e95ef78b54b9fbc229c72409188e 46792
23730888 SVM12_ter_d20101209_t1249322_e1250421_b000000_c20101209151423611103_grav_dev.h5
5e4ab56f4e7bf7cb25e43d0fbee13f7 12400375
23730887 SVI02_ter_d20101209_t1247104_e1248203_b000000_c20101209151422853357_grav_dev.h5
0fc141f010ece008fc9771298ec8caa8 41892037
23730886 SVI05_ter_d20101209_t1245595_e1247094_b000000_c20101209151422139519_grav_dev.h5
111122e3777b814a0f326c1661efd0e 41892343
23730885 SCRIS_met_d20101209_t1318320_e1319020_b12345_c20101209151421105952_grav_dev.h5
c57b943f474ed8737351762c056b4c4f 17088168
23730884 GCRSO_met_d20101209_t1318320_e1319020_b12345_c20101209151420739341_grav_dev.h5
260dabae5a2c34dc0719626ab6b075fc 46792
23730883 GMODO_ter_d20101209_t1248213_e1249312_b000000_c20101209151418784560_grav_dev.h5
35b55afd5e5a53db2c98864f6a7b36b7 81245545
23730882 SCRIS_met_d20101209_t1318000_e1318300_b12345_c20101209151417822675_grav_dev.h5
2c12c45f34f6ab1bb4573280b3b79224 17088168
23730881 GCRSO_met_d20101209_t1318000_e1318300_b12345_c20101209151417494301_grav_dev.h5
bb71347411c364feb63a6bd4682e6556 46792
23730880 btpostcache_23730444 66081bb9b32fa52ee382f1c072a83099 2888704
23730879 SVI01_ter_d20101209_t1247104_e1248203_b000000_c20101209151413857620_grav_dev.h5
c093217ea96ee1454ac8c84c397c5ec6 41892037
23730878 SVI04_ter_d20101209_t1245595_e1247094_b000000_c20101209151413407124_grav_dev.h5
83ffe84b91ced3e8e2e529f535569df 41892343
23730877 SVM11_ter_d20101209_t1249322_e1250421_b000000_c20101209151411383454_grav_dev.h5
4b4b6c4a21fba3d076335f8a3c8c57a5 12400069
23730876 SVI05_ter_d20101209_t1248213_e1249312_b000000_c20101209151410905412_grav_dev.h5
bd686f211685b8bfcc6ffa910691a290 41892343
23730875 SVM10_ter_d20101209_t1249322_e1250421_b000000_c20101209151405702487_grav_dev.h5
e25b792dadd84b120e284dbc1c320846 12400045
23730874 SVI03_ter_d20101209_t1247104_e1248203_b000000_c20101209151402517051_grav_dev.h5
bd8984c1e226168e7ea88b17f117954 41892037
23730873 SVI04_ter_d20101209_t1248213_e1249312_b000000_c20101209151402227570_grav_dev.h5
a209c117661e52ecc03a1f72d45a5527 41892343
23730872 SVI02_ter_d20101209_t1245595_e1247094_b000000_c20101209151400094769_grav_dev.h5
82b2409af3f2aeb26bf9b017cb5c65f1 41892037
23730871 SVM08_ter_d20101209_t1249322_e1250421_b000000_c20101209151400042285_grav_dev.h5
881312dd3e096824632c81b69c9a7ae1 12400045
23730870 SVM04_ter_d20101209_t1249322_e1250421_b000000_c20101209151355995683_grav_dev.h5
f8a65dd347679c51241ac99c773bc159 17310704
23730869 SVM03_ter_d20101209_t1249322_e1250421_b000000_c20101209151352314873_grav_dev.h5
6bc1006cd1f73ec2845fdfe1aace1e8 17310704



NPOESS Product Data and Metadata

D34862-03_NPOESS-CDFCB-X-Vol-III_D_VIIRS-M7-SDR-PP.xml

SVM07_ter_d20101206_t2009584_e2011083_b0000-1_c20101206231443705497_grav_dev.h5

<Field>

```

<Name>Radiance</Name>
<Dimension>
  <Name>AlongTrack</Name>
  <GranuleBoundary>1</GranuleBoundary>
  <Dynamic>0</Dynamic>
  <MinIndex>768</MinIndex>
  <MaxIndex>768</MaxIndex>
</Dimension>
<Dimension>
  <Name>CrossTrack</Name>
  <GranuleBoundary>0</GranuleBoundary>
  <Dynamic>0</Dynamic>
  <MinIndex>3200</MinIndex>
  <MaxIndex>3200</MaxIndex>
</Dimension>
<DataSize>
  <Count>2</Count>
  <Type>byte(s)</Type>
</DataSize>
<Datum>
  <Description>Calibrated Top of Atmosphere (TOA) Radiance
for each VIIRS pixel</Description>
  <DatumOffset>0</DatumOffset>
  <Scaled>1</Scaled>
  <ScaleFactorName>RadianceFactors</ScaleFactorName>
  <MeasurementUnits>W/(m^2 μm sr)</MeasurementUnits>
  <DataType>unsigned 16-bit integer</DataType>
  <FillValue>
    <Name>NA_UINT16_FILL</Name>
    <Value>65535</Value>
  </FillValue>

```

.....
</Field>

Output of h5dump command to display metadata

```

h5dump -H -d /All_Data/VIIRS-M7-SDR_All/Radiance
SVM07_ter_d20101206_t2009584_e2011083_b0000-1_c20101206231
443705497_grav_dev.h5

```

HDF5

```

"SVM07_ter_d20101206_t2009584_e2011083_b0000-1_c20101206231443705497_gra
v_dev.h5" {
DATASET "/All_Data/VIIRS-M7-SDR_All/Radiance" {
  DATATYPE H5T_IEEE_F32LE
  DATASPACE SIMPLE { ( 768, 3200 ) / ( 768, 3200 ) }
}
}

```

- NO ATTRIBUTES
- NO DIMENSION NAMES
- Attributes on the left can be add during the augmentation process



Solutions for augmenting with metadata

- Possible solutions
 - Bring all metadata into HDF5 product file according to the XML/HDF5 mapping (TBD)
 - Use some heuristic for mapping
 - Use well-defined rules for each product
 - Leave mapping to a user and provide tools to do the job



Questions (not all of them)

- For each product
 - How can we find XML files?
 - How can we find geo-location files?
 - How can we find XML geo-location files?
 - How can we identify metadata in those files that is relevant?



Questions (not all of them)

- If we do augmentation for one product, will the same approach work for other products?
- How stable NPOESS/JPSS files are now? Will they change in the future?
- Who could be our “alpha” testers for possible prototypes?



Demo

- Show how different HDF5 tools and programs can be used now to
 - Modify VIIRS product data with metadata found in XML and geo-location file
 - Access it with ncdump



Thank you !