SMOS L1 Project Status

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- What is Level 1?
- Algorithm
- Prototype vs Operational Processor
- Project status
- L1 Products
- Output to user
- Calibration and Validation
- L1 data Usage and Tools
What is a Level 1?

1. Science Source Packets
2. Acquisition and FEP
3. L0 Processing
4. L1 Processing
5. L2 Processing

Source packet on File
Consolidation and splitting

10 Mb data segments of:
1) CORR-TM (Correlator Output)
2) I-HKTM (Ancillary TM):
APID1, APID2, APID3 etc

2 Steps:
Correlation to Visibility to Brightness Temperature

Users

Brightness Temperature to SM and OS

1) L0 (time)
2) L1a (time)
3) L1b (time)
4) L1c (space)
5) L2 OS (space)
6) L2 SM (space)
What is Level 1 (part 2)
SMOS L1 Prototype definition

- Stand alone SW running on single computer to perform processing from ISP to Brightness Temperature including production of any intermediate engineering data product and ingestion of all needed external data
- Test Bench for Science and Algorithm development
- Distributable
L1P Baseline algorithms

• L0 to L1a
  
  \((UPC/HUT)\)

• L1a to L1b :
  
  - Flat Target Transformation \((ESA)\)
  - On-ground G-Matrix \textit{on-line} generation \((UPC)\)
  - In-orbit G-Matrix \textit{off-line} generation \((OBS-MIP)\)
  - G-Matrix \textit{on-line} inversion \((OBS-MIP)\)

• L1b-L1c
  
  - Geocoding on DGG \((TSEA)\) \((DEIMOS)\)
L1P Operational vs Prototype

- L1P Operational high performance L1 processing within SMOS GS.

- Validated against L1 Prototype.

- Science Update flow:
  - ESL or Science community propose update
  - Tested on L1PP by ESA/ESL
  - Modification transferred to L1 Operational Processor
Who is who

- L1 Processor Prototype System
  \textit{DEIMOS}/\textit{CRITICAL}
- L1 Prototype ESL \textit{IFREMER}(N. Reul), \textit{OBS-MIP}
  (E. Anterrieu) *
- SEPS \textit{CASA}/\textit{UPC}
- SEPS-GS \textit{DEIMOS}/\textit{CRITICAL}
- MIRAS HW/SW Prime/Design and Manufacturer \textit{CASA}
- L1 Operational Process \textit{GMV}

* As per Phase 3 it is expected that 2 further institutions will join the L1P ESL: \textit{UPC} and \textit{IECC}
L1 Prototype Schedule

PLM
Aug 2003 - Dec 2003
Phase B

L1PP
Phase 1

L1OP

GS

L2PP
Dec 2004
Phase 1
Phase 2
Phase 3

Phase C/D
Sep 2004 - Dec 2005

Phase 2
Oct 2005

Phase 3
Launch

L1 Operational Processor

GS Development
L1P Prototype Status

• The Past (Phase 1):
  - Preliminary, prototype of the prototype. Ended

• The Present (Phase 2):
  - L1PP Executable (Linux, MacOS X)
  - ADF and Format specification
  - Tools for R/W products
  - Sensitivity analyses

• Future (Phase 3):
  - Update of L1PP
  - Support of Ground Test (IVT)
  - Development of SEPS-GS

• Where:  www.smos.esa.int
L1P Operational Status

• The Past:
  - L1 PDR April 2006

• The Present:
  - L1 CDR June 2006:
    • A) recoding
    • B) reuse

• The future:
  - L1 OP V1 Dec 2006
  - L1 OP V2 June 2007
L1 measurements, what are they?

L1c snapshot:

- 1 polarisation
- 1.2 second
- 15 km (ISEA)
- Single angle
L1c what do they look like?

- 2500 snapshots
- Multiple polarisation
- 50 minute
- 15 km (ISEA)
- Multi angle
Calibration

• L0-L1a
  - Impact to user (instrument unavailability)
  - Internal Calibration or External target (NIR+Noise injection)
  - Baseline exists but to be tested/adjusted in orbit

• L1a-L1b
  - Impact to user (instrument unavailability due to NNA*)
  - FTT (external target)
  - In-orbit G-Matrix off-line generation

* Non Nominal Attitude
Validation

• What:
  - L1c only (I.e. BT)

• How:
  - To be defined during L1PP Phase 3
  - AO
  - In-situ measurement (Desert, Dome C)
  - ??

• But:

  *L1c is TOA --> need to derive ground BT value (not L1)!*
L1 Product Usage

- **L1c -->**
  - Ground Interpolate (space and or time) from DGG.
  - Assimilate
  - Process to higher level

- **L1b -->**
  - New! Re-synthesise! (change grid) for special applications.

- **L1a -->**
  - PLM or Microwave Radiometer specialist
## L1 Data Tools and Compatibility

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<th>Tool</th>
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<th>L1PP</th>
<th>L1OP</th>
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