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# The GEO Forest Carbon Tracking (FCT) initiative

## Coordination of Space based observations

Giovanni Rum,
GEO Secretariat

COMIFAC Regional Workshop
Monitoring Carbon Stocks and Fluxes in the Congo Basin
February 2 – 4, 2010 Brazzaville, Republic of Congo

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# GEO FCT satellite data availability

- First action was to implement the necessary measures in order to ensure satellite data availability over the identified national demonstrators
- CEOS (the Committee on Earth Observation Satellites), committed, in a specific « communiqué » in March 2008, to provide support for the Demonstration phase
- Commercial providers of very high resolution data (Rapid Eye, GeoEye and Digital Globe) have been contacted to provide data over « Verification Sites » and expressed their availability to provide data for "proof of concept" activities.

Data requirements, both for archive data and for new data acquisitions, are specified in a dedicated document

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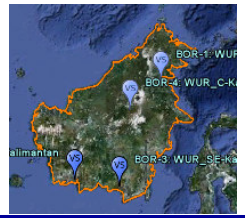
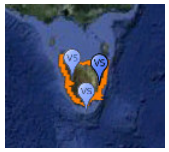
# 2009-10 National Demonstrators

Mexico
500.000

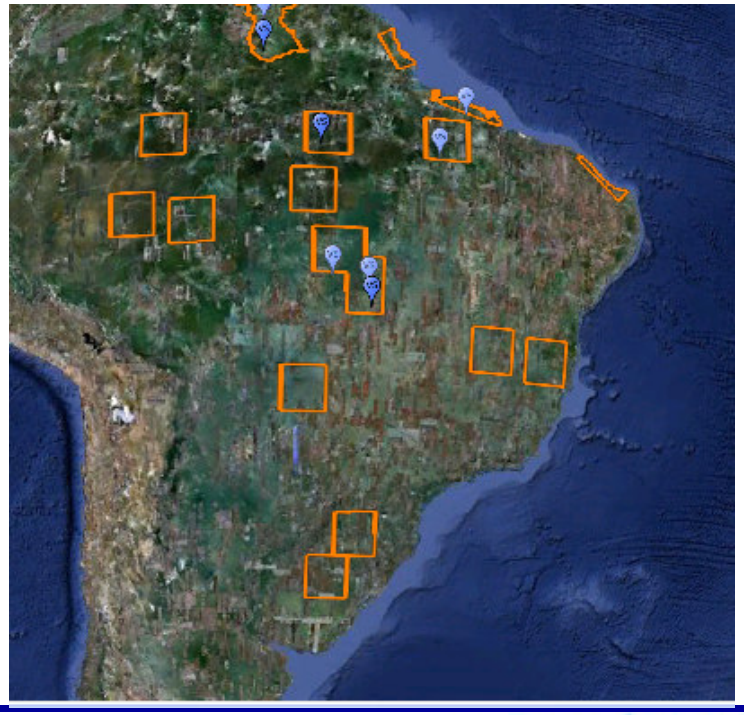
Out of
1.970.000



Borneo
743.000

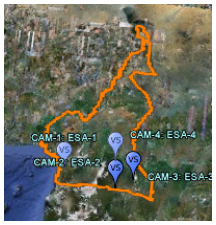


Tasmania
68.000



Brazil
1.400.000

Out of
8.500.000



Cameroon
475.000

Tanzania
945.000

Guyana
215.000

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# CEOS - Optical Satellites Considered

| Satellite | Spectral Bands | Geometric Resolution | Swath Width | Repeat Cycle |
|---|---|---|---|---|
| Landsat 5, 7 | VNIR, SWIR, TIR | 30 m / 120 m (TIR) | 185 km | 16 days |
| IRS: AWiFS | VNIR, SWIR | 56 m | 740 km | 4 days |
| IRS: LISS-III | VNIR, SWIR | 23 m | 140 km | 24 days |
| CBERS 2b: CCD | VNIR, SWIR | 20 m | 114 km | 26 days |
| AVNIR-2 | VNIR | 10 m | 70 km | 46 days |
| SPOT 4, 5 | VNIR, SWIR | 20 m / 10 m | 60 km | 26 days |
| Kompsat-2 | VNIR, SWIR | 1 m / 4 m | 15 km | 28 days |

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# CEOS - SAR Satellites Considered

| Satellite | Frequency / Polarisation | Geometric Resolution | Swath Width | Repeat Cycle |
|---|---|---|---|---|
| ALOS PALSAR | L-band (23.6 cm) / full pol | 7 m – 154 m | 30 – 360 km | 46 days |
| RADARSAT-1 | C-band (5.6 cm) / HH | 9 m – 100 m | 45 - 500 km | 24 days |
| RADARSAT-2 | C-band (5.6 cm) / full pol | 3 m – 100 m | 20 - 500 km | 24 days |
| ENVISAT ASAR | C-band (5.6 cm) / dual pol | 1 m – 16 m | 5 - 100 km | 35 days |
| TerraSAR-X | X-band (3.1 cm) / full pol | 1 m – 16 m | 5 - 100 km | 11 days |
| COSMO-SkyMed | C-band (3.1 cm) / full pol | 1 m – 100 m | 10 - 100 km | 16 days |

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# SAR sensors - 2009
# data acquired over National Demonstrators

| NDs (wall-to-wall) | Brazil (parts) | Guyana | Mexico | Cameroon | Tanzania | Borneo | Tasmania |
|---|---|---|---|---|---|---|---|
| ALOS - PALSAR | Acquired June/Sept. Fill-in Sept/Oct | Acquired June/Sept | Planned Sept/Oct | Acquired June/Sept | Acquired June/Sept | Acquired June/Sept | Acquired June/Sept |
| Radarsat-2 | partially acquired | Acquired June/Sept | partially acquired (Fill-in ongoing) | Coordinated to be covered by ESA | Coordinated to be covered by ESA | Acquired June/Sept | Acquired June/Sept |
| Envisat ASAR | partially acquired | Acquired June/Sept | Coordinated to be covered by CSA | Acquired June/Sept | Acquired June/Sept | Coordinated to be covered by CSA | Acquired June/Sept |
| COSMO - Skymed | Not planned | partially acquired (mainly VS) | Not planned | partially acquired (mainly VS) | Not planned | partially acquired (mainly VS) | partially acquired (mainly VS) |
| TerraSAR-X | To be requested for parts of ND | Not to be requested | Not to be requested | Not to be requested | Not to be requested | Not to be requested | To be requested / VS |

o.k. | some restrictions | not feasible | under discussion

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# SAR sensors - 2009
# data acquired over National Demonstrators

| ND Sites | Brazil | Guyana | Mexico | Cameroon | Tanzania | Borneo | Tasmania |
|---|---|---|---|---|---|---|---|
| Landsat 5/7: USGS | Acquired | Acquired | Acquired | Acquired | Acquired | Acquired L1T gen. | Acquired L1T gen. |
| Landsat 5/7: IC's | Acquired INPE | Acquired INPE | Feasible CONABIO | Not feasible No IGS | Feasible: CSIR SAC & ASI (Kenya) | Feasible GISTDA | Acquired CSIRO |
| IRS: AWIFS | Feasible INPE | Feasible INPE | Investigated ISRO | Investigated ISRO | Investigated ISRO | Feasible ISRO | Feasible ISRO |
| IRS: LISS-III | Feasible INPE | Feasible INPE | Investigated ISRO | Investigated ISRO | Investigated ISRO | Feasible ISRO | Feasible ISRO |
| CBERS2B: CCD | Acquired INPE | Acquired INPE | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 |
| AVNIR-2 | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP |
| SPOT 4 | Feasible ESA TPM | Feasible ESA TPM | Feasible ESA TPM | Feasible ESA TPM | Feasible ESA TPM | Feasible ESA TPM | Feasible ESA TPM |
| SPOT 5 | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 | Not feasible in 2009 |
| Kompsat-2 | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP | Investigated ESA TMP |

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# CEOS Satellite observations 2009

| Sensor | Brazil | Guyana | Mexico | Cameroon | Tanzania | Borneo | Tasmania |
|---|---|---|---|---|---|---|---|
| ALOS PALSAR | 4541 | 159 | 375 | 116 | 405 | 507 | 86 |
| RADARSAT-2 | 126 | 41 | 243 | acquisition by ENVISAT | acquisition by ENVISAT | 161 | 24 |
| ENVISAT ASAR | 303 | 67 | acquisition by RADARSAT | 107 | 182 | acquisition by RADARSAT | 25 |
| Landsat 5 & 7 | 1665 (+ 3500 INPE) | 107 (+ 88 INPE) | 484 | 115 | 115 | 173 | 41 |
| CBERS-2B: CCD | 3500 | 80 | N/A | N/A | N/A | N/A | N/A |

**Scenes acquired over the 7 NDs during June-Sept 2009**

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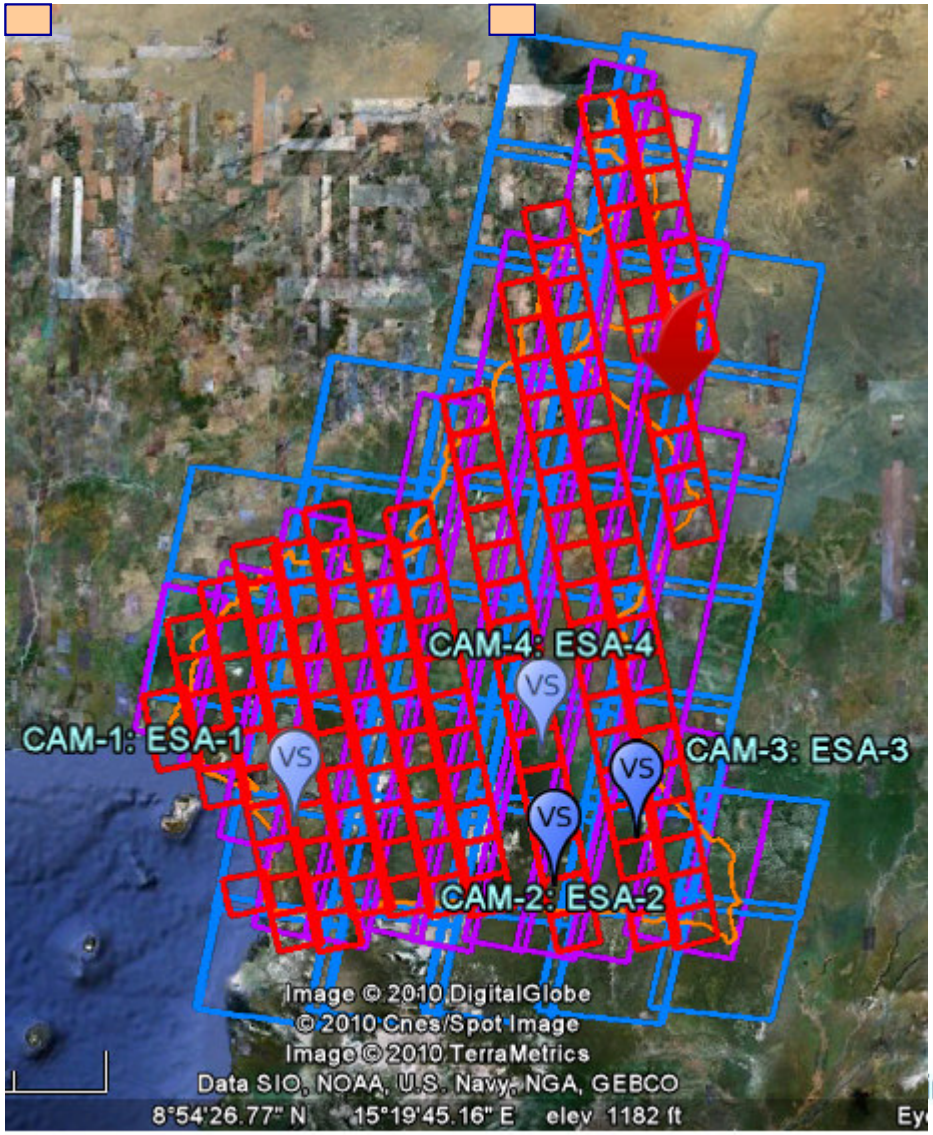
# Cameroon 2009

ASAR Data  Landsat Data  PALSAR Data




ASAR 2009

| | Name | Links | Date | Orbit |
|---|---|---|---|---|
| 1 | row-1-34 | Outline | 2009/08/12 | 38953 |

ESA | ASAR

LANDSAT 2009

| | Image | Name | Links | Date | Cloud Cover |
|---|---|---|---|---|---|
| 1 |  | LE71830542009133ASN00 | Outline \| Full metadata | 2009/05/13 | 35.9% |

USGS | LANDSAT | Dataset Information

ASAR 2009 | LANDSAT 2009 | PALSAR 2009

| | Name | Links | Date | Orbit | Row | Comment |
|---|---|---|---|---|---|---|
| 1 | ALPSRP195150160 | Outline | 2009/09/22 | 648 | 160 | Observation Mode: FBD, 34.3, A |

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# Conclusions

- GEO FCT has put in place the mechanism to made available satellite data over the Countries participating to the Demonstration phase
- New Countries, progressively joining the task, will be included in the coordination mechanism
- Data will be made available for free to participating Countries
- Involvement of Regional Organizations as distributors of the data within a certain region is fully compatible with the FCT task approach
- GEOSS data sharing principles will be applied for access to the data (few restriction may apply)




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# Conclusions

- This is considered as an "interim" mechanism, being confirmed only for the demonstration phase (currently 2009-2012)
- The process for the definition of the pre-operational and operational mechanisms covering the overall FCT approach, here included satellite data, will be kicked off next week and is expected to produce a reference architecture and recommended implementation steps by end of 2010.