Continental Mosaicking over Siberia - GBFM Status Up-Date and Implications for ALOS
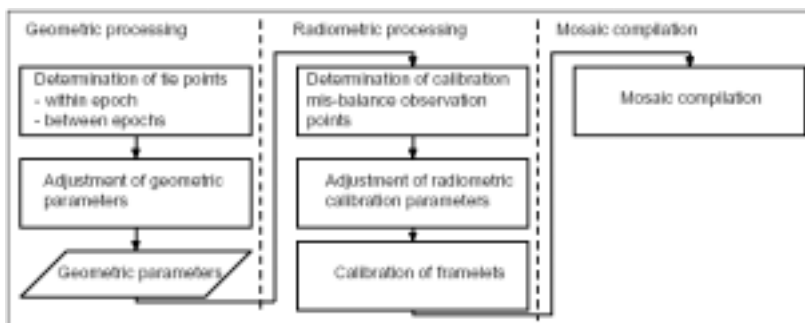
Y. Rauste/VTT, Frank De Grandi/JRC, Mauro Michielon/CSI

Eurasian Mosaic Compilation in GBFM Project

- Mosaicking in JRC, assisted by VTT as a contractor and CS Italia as a sub-contarctor,
- Mosaicking methodology based on that used in the African mosaicking in the GRFM project,
- Data from a new SAR processor (Sigma-SAR): a) long strips of thousands of km, b) all ancillary data different from that used in the GRFM project.
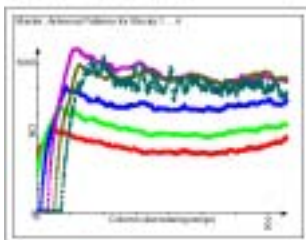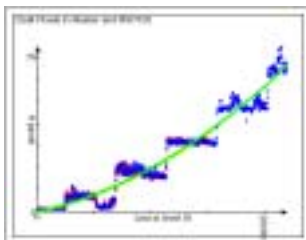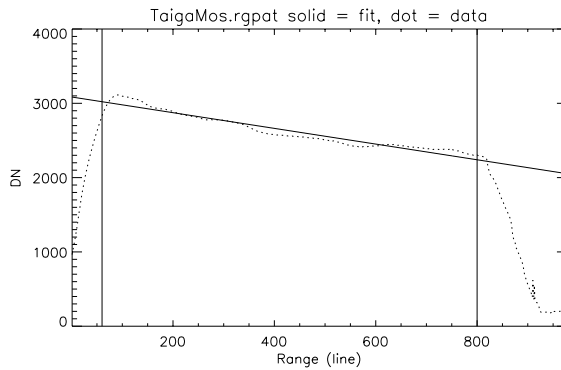
Methodology Development

- The first stage of the project,
- Two test scenes available,
- Conclusions:
  - translation-rotation model not enough for geometry revision of the long scenes
  - 6-parameter affine model suitable
  - a new strategy needed in STC (Sensitivity Time Control) and antenna pattern residual destriping,
  - 4-parameter bi-linear model appropriate in scene-to-scene calibartion revision.

STC/AntennaPattern Residual Destriping

- Changes in range gate delay identified in ancillary data files,
- Range pattern computed over each block between range gate delay changes,
- Block wise range patterns correlated and shifted to the same reference,
- Range patterns averaged over the whole data set.

Full Swath in Long Scenes

TaigaMos.rgpat solid = fit, dot = data

- The drop-off zone of backscatter at near-range margin of the swath was included in the Sigma-SAR processor output at NASDA before the processing of the GBFM JERS SAR data

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Scene-to-Scene Calibration

coeffs: f0xf1xf2xf3
Out = factor*DN where
factor = f0 + x*f1 + y*f2 + x*y*f3 where
x = (Lin - Lin_c)/Lin_c, Lin_c = scene centre line
y = (Col - Col_c)/Col_c, Col_c = scene centre column

- Four parameters per scene appropriate in most cases even for long scenes,
- Temporal anomalies a problem.

Original   Calibrated

A Scene-to-Scene Calibration Problem

Non-calibrated

Calibrated

- In some cases the bi-linear calibration revision is appropriate,
- In connection with temporal change (flooding of marsh/bog areas ?) inhomogeneous mosaic is difficult to avoid.

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yrbigv230x30.mos

Pixel spacing 9 km

Summer mosaic:

273 scenes used (of 373):

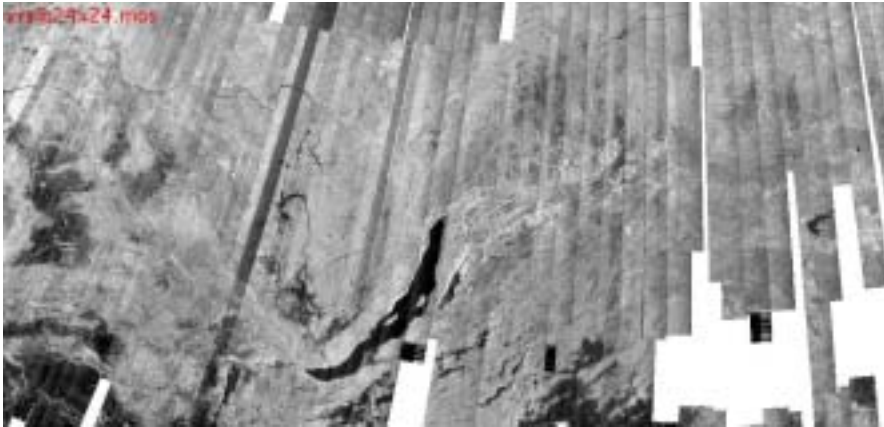|	
1993	1
1994	5
1995	28
1996	7
1997	198
1998	48

Data from all months included

No scene-to-scene calibration

No Ground Control Points

Krasnoyarsk-Irkutsk
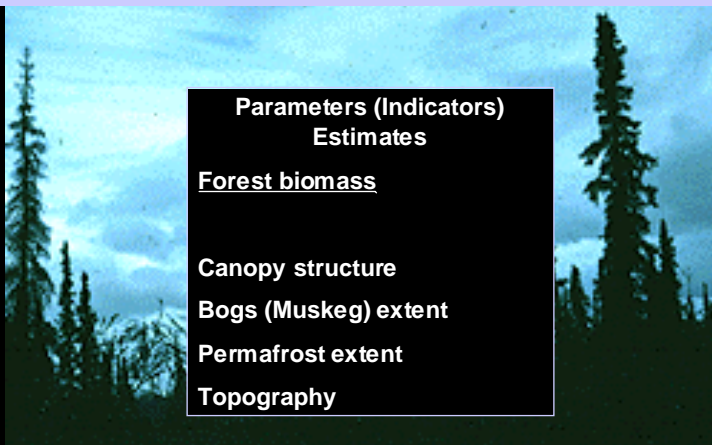
- Pixel spacing 2400 m

City of Krasnoyarsk

- Pixel spacing 100 m
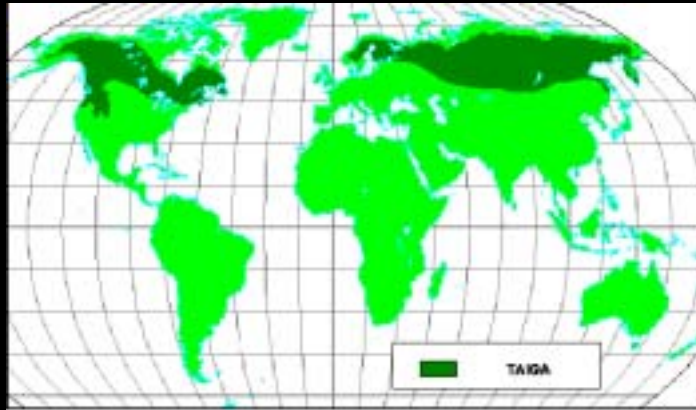- a 400-by-400 pixel extract from the 100-m mosaic

Implications for ALOS PALSAR Mosaics

- Good geometry in geo-location ancillary data needed in order to avoid time consuming (even if automatic) tie-point production,
- Temporally coherent acquisition is very important for the homogeneity of mosaics,
- Narrow-swath mode is essential for the homogeneity of mosaics (in order to avoid anomalies caused by incidence angle variation within the mosaic),
- An extremely high number of looks in the GBFM mosaics is an advantage of the product (this can be achieved using narrow-swath data in mosaicking).

Vegetation Structural and Biophysical Parameters Estimates and Indicators in the Eurasian Taiga at Regional-Continental Scale Using Orbital Instruments

Parameters (Indicators) Estimates

Forest biomass

Canopy structure

Bogs (Muskeg) extent

Permafrost extent

Topography

Challenges: Resolution and Extent

TAIGA

Challenges: Estimates or Guestimates

Biomass estimation can be an ill-posed problem if not enough observations are available to constrain the parameters in the model inversion

JERS-1
ALOS PALSAR
ENVISAT ASAR

SPOT VGT
ENVISAT MERIS
ADEOS GLI

TOPOGRAPHY

BACKSCATTER

CORRELATION

CONTEXTUAL

MODEL

INVERSION

GROUND DATA

VALIDATION

Vegetation structural types

ESTIMATED BIOMASS VALUE AND VARIANCE