

Agricultural Land Cover Change

Break-out group

Charge

- What observing systems are currently being used
- Are they adequate – pick the criteria which are most appropriate e.g coverage, timeliness spatial resolution, data accessibility
 - How good or bad are they?
- What are the prospects for their continuity/enhancement.
- Are there critical gaps/shortfalls in the current system to meet task needs?

What observing systems are currently being used

- Coarse
 - MODIS, AVHRR, SPOT VGT, FY 1 and 3.
- Moderate
 - Landsat, CBERS, AWIFS, SPOT-HRV, LIS, ASTER?, BEIJING 1
- Ultra-fine
 - IKONOS etc
- Radar
 - Palsar, Radarsat (locally?), ASAR, Unclear how much interferometric SAR is currently available (use lack of coherence)

Are they adequate – pick the criteria which are most appropriate e.g coverage, timeliness spatial resolution, data accessibility How good or bad are they?

- Coarse
 - Daily, free and accessible, appropriate spectrally and radiometrically. Would be good to have all the bands at 300m (is coming with VIIRS, Proba-V and Sentinel and FY series + Indian?). MERIS does not have global acquisition.

Are they adequate – pick the criteria which are most appropriate e.g coverage, timeliness spatial resolution, data accessibility How good or bad are they?

- **Moderate**
 - Many not free, only Landsat has a systematic global acquisition strategy, no coordination in acquisition strategies, Wide field (AWIFS, DMC, HJ) improve temporal frequency but challenges of off-nadir viewing still not completely understood.
 - Many data are not readily accessible for all users.
 - Repeat cycle needs improvement – it is typically a week plus, and ideally we need daily.
 - Lack of responsiveness of providers to agricultural needs, but appears to be improving (e.g. FEWS) but requires intensive interactions.
 - Problems of too many systems only giving DNs rather than geophysical quantities (e.g. TOA or surface reflectance) thereby hindering integration.
 - Need long term continuity of sensors.
 - Data policy issues are sometimes restrictive.
 - Almost complete absence of thermal and SWIR needs to be more widely available.
 - Orthorectification is essential. International standards need to be established.
 - Unvalidated data sets should not be made available.

Are they adequate – pick the criteria which are most appropriate e.g coverage, timeliness spatial resolution, data accessibility How good or bad are they?

- **Ultra-fine.**
 - Spatial resolution sufficient for some validation and also for area frame sampling
 - Radiometry at least for some sensors seems fine
 - Too expensive for many applications.
 - Unresponsive to orders.
 - Policy issues make the data availability restrictive.
 - Low repeat cycle at nadir.
 - Ordering from multiple sources is an overhead for users.

Are they adequate – pick the criteria which are most appropriate e.g coverage, timeliness spatial resolution, data accessibility How good or bad are they?

- **Radar**
 - All weather
 - One day coherence may provide useful z information.
 - Useful for rice – paddy.
 - Lack of discrimination between many crops, but some useful discrimination for crop groups (e.g. in Belgium) but requires dense time series.
 - Programming unhelpful because of need for consistent time series and it is not possible to get enough acquisitions
 - Only Palsar has a systematic global acquisition strategy but even that is inadequate for agricultural monitoring purposes.
 - Costs, but costs not necessarily high.
 - Time series often need to be denser than is currently possible.

What are the prospects for their continuity/enhancement.

- **Coarse**
 - Looks good overall, but could be some gaps.
 - For some systems reductions in capability (e.g. VIIRS).
 - Better spatial resolution – 300m throughout.
 - All sorts of improvements feasible but the space agencies are slow in implementing plans developed years ago.
 - Unclear whether systematic acquisitions will be applied for all systems.
- **Moderate**
 - Multiplicity of systems becoming available permitting much higher frequency of coverage in principle.
 - Overall lack of coordination but LSI could help a lot.
 - Responses to LSI prototype request have been disappointingly modest.
 - Increasing number of portals, ordering systems, charging systems making life difficult for the user.
 - Adoption of standards – grids, formats etc. e.g. as in GLS is highly desirable.

What are the prospects for their continuity/enhancement.

- Ultra-fine
 - Quite good likelihood of enhancements, but it's all commercial so uncertain exactly what will be available (note Rapid Eye, daily at 5m in principle).
 - But unclear whether desirable frequency of acquisition will be achieved.
 - Lack of compatibility
- Radar*
 - Looks OK for Sentinel
 - But unclear whether we will have sufficiently frequent imaging for ag purposes.
 - Unclear whether there will be multi-polarizing multi-frequency systems which should give better results but experience with these data sets is limited.
 - Some new systems are really expensive e.g. TerraSar

*"Perhaps the Golden age is over." (Matt Hansen 2009)

Are there critical gaps/shortfalls in the current system to meet task needs?

- See many points from above.
- Much more use could be made of existing space-borne sensors.
- Acquisition strategies often inadequate or non-existent.
- Integrated use of different assets is made very difficult by the multiplicity of delivery mechanisms so that often data are simply unavailable.
- Too many experimental one-off missions which do not support long term needs.
- Too much concern by space agencies with nominal specs of sensors which do not have the capability to deliver useful products for agriculture.

USER ISSUES

- Need for more robust methods of information extraction.
- Need for better validation data sets especially of change- ag agencies and researchers who collect such data should be encouraged to make them available.
- Maps may be produced when not always necessary especially where field areas change little from year to year.
- Do we really know where are the areas of changes in agricultural extent? (e.g. China where there is a lot of change.)
- Do we know reliably the distribution of field sizes so we need which type of sensor should be used – should impact the acquisition strategy.
- Often requirements for improvements are vague and not quantitative.
- Should link work on land cover change to others working on productivity and related properties.
 - What are the implications of changes in ag, area on these properties
- Research should also be focusing on the causes of changes in ag extent.