



GLOBAL LEAF AREA INDEX Subgroup – Part 2

Co-chairs: Richard Fernandes, Stephen Plummer

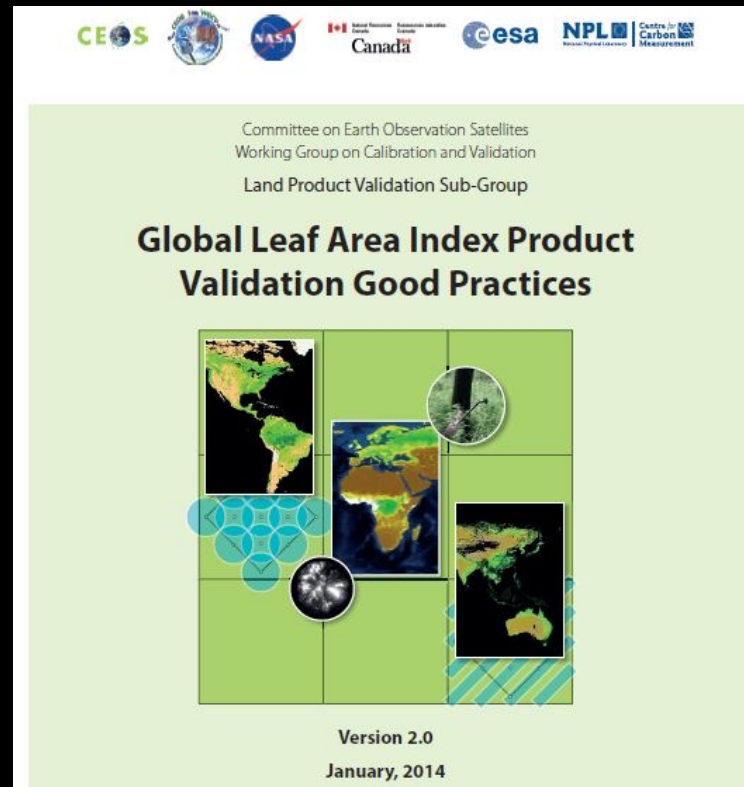


Gabriela's needs

- Main focus should be on exchanging what validation methods are used for different products
- How each group deals with spatial scale (in situ data representativeness at pixel scale, different spatial product resolutions, etc.),
- Global representation of sites, metrics used, etc.

Validation Methods

- See Good Practice Guidelines
- See in situ methods review – Oliver Sonnentag!
- Establish CEOS standard set of sites (common with albedo, fapar, LAI and land cover??)
- Interface with infrastructural networks (NEON, TERN, ICOS, others?)
- Augment with synthetic testing (algorithm intercomparison exercises) - Widlowski

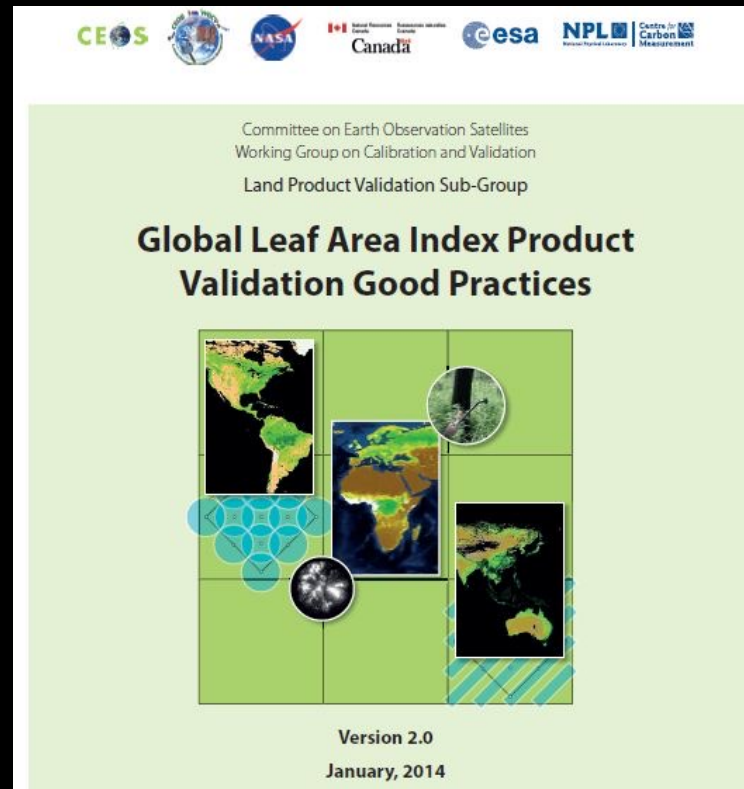


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Contributors: Fred Baret, Fernando Camacho, Hongliang Fang, Sebastien Garrigues, Nadine Gobron, Matt Lang, Roselyn Lacaze, Sylvain LeBlanc, Michele Meroni, Beatriz Martinez, Titi Nilson, Bernard Pinty, Jan Pisek, Oliver Sonnentag, Alexandre Verger, Jon Welles, Marie Wets, Jean-Luc Widlowski, Gabriela Schaeferman-Strub, Miguel Roman, Jaime Nickeson

Validation Methods

- Direct – harvesting
- Indirect – gap fraction determination
 - LAI-2000 (blue diffuse observations)
 - Ceptometer/DEMON/TRAC (PAR direct or diffuse observations)
 - DHP (camera quality)
- Indirect – allometry
- Indirect – spectral reflectance/spectrometry
- Indirect - Lidar
- Planned in situ methods review – Oliver Sonnentag!!
- How to scale up/sampling – see Guideline
- Establish CEOS standard set of sites (common with albedo, fapar, LAI and land cover??)
- Interface with infrastructural networks (NEON, TERN, ICOS, others?)
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Sampling

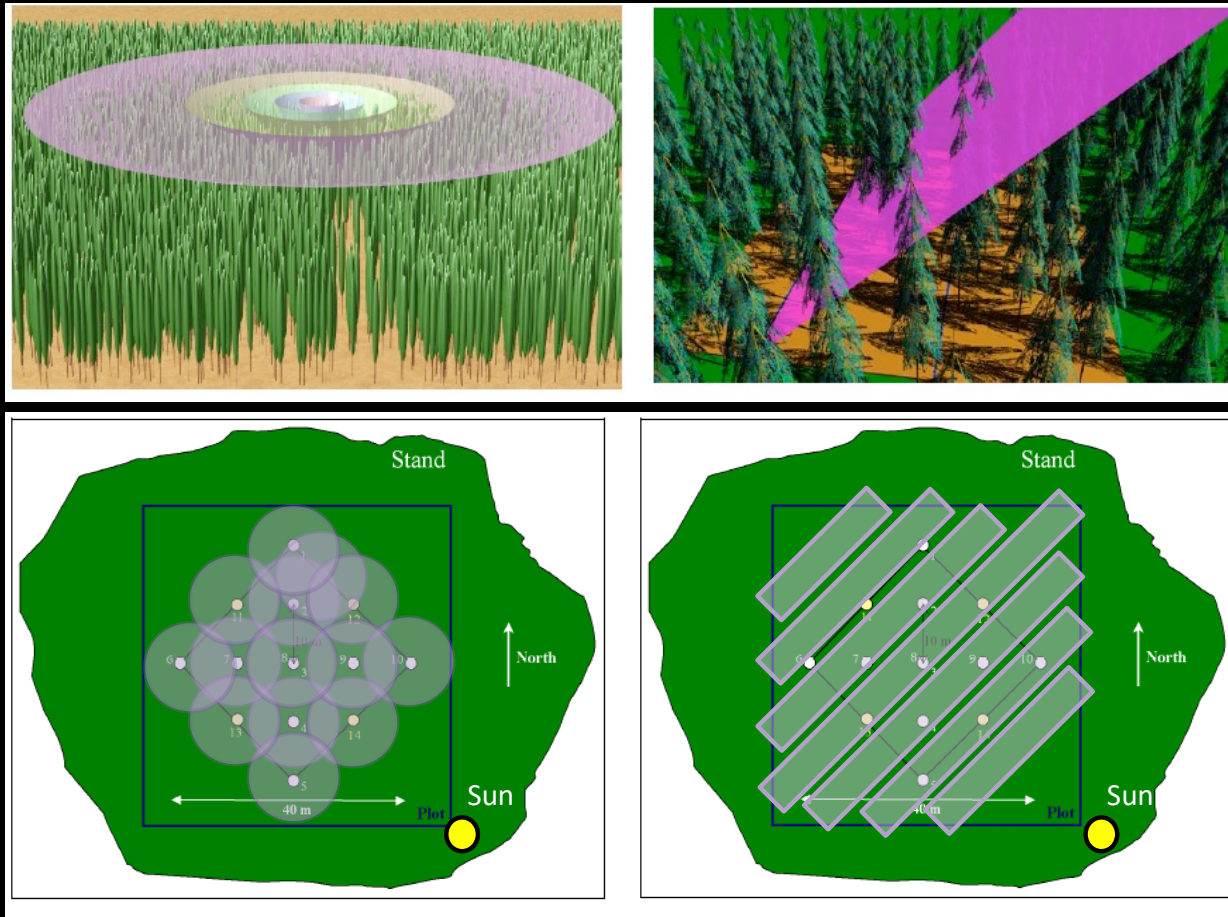


Figure 3: Spatial footprints of LAI-2000 (left) and TRAC (right) measurements following the CCRS sampling scheme (adapted from ([Leblanc 2005c](#), [Leblanc 2008](#))) for overstory LAI for a 40mx40m ESU. LAI-2000 footprints determined by canopy height while TRAC footprints are determined both by canopy height and solar zenith angle. Only every second TRAC footprint shown for clarity.

Upscaling

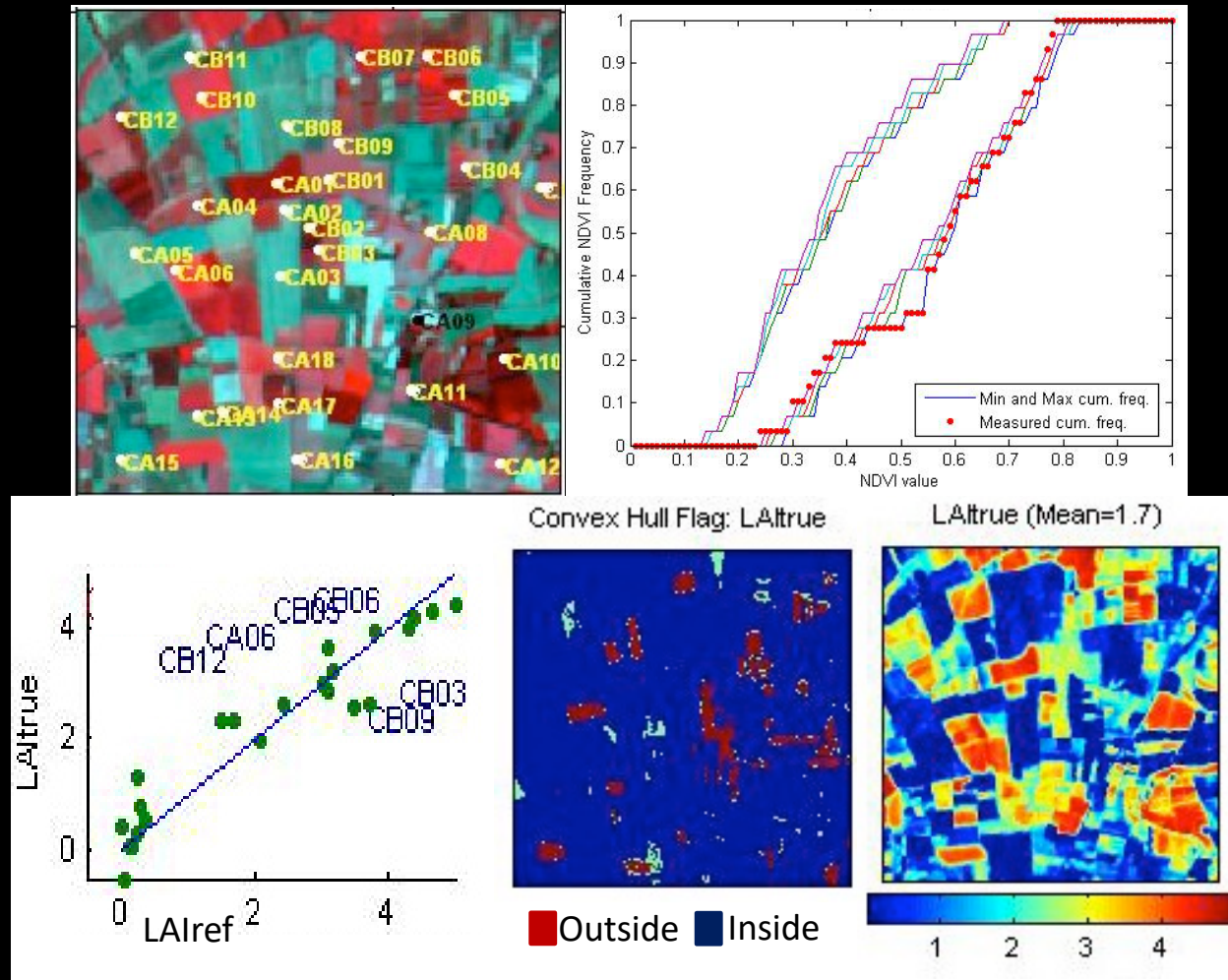


Figure 6: Outputs of VALERI reference LAI mapping process. Left panel shows scatter plot of predicted versus actual LAI based on robust linear regression. Outliers are indicated as alphanumeric symbols. Centre panel shows mask of areas within (blue) and outside (red) spectral convex hull of ESU data. Right panel shows final reference LAI map.

Spatial Scale

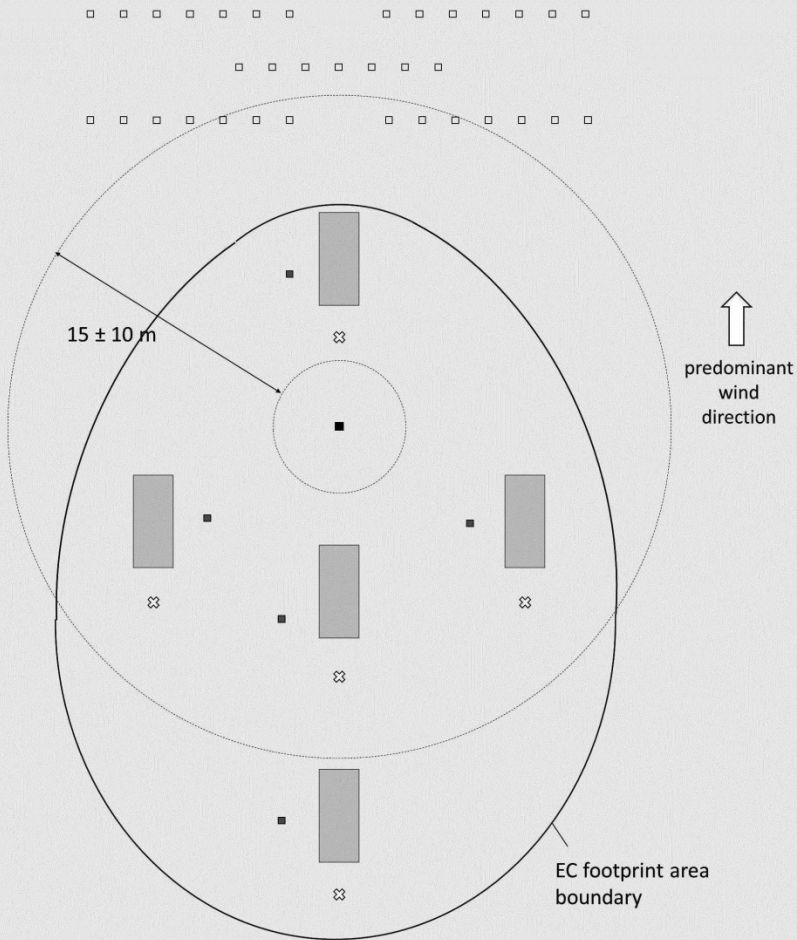
- See Good Practice Guidelines
- How does this relate to ICOS, NEON etc??
- Can we get 'them' to adjust?

ICOS - Examples of the location of sampling areas at sites without a predominant wind direction (upper panels) and at sites with a predominant wind direction (lower panels)



ICOS Continued

Fig. 2: Example of a spatial sampling design for a Class I site with a predominant wind direction and with 4+1 sampling areas.



- : EC tower
- ⊗ : soil plot
- : subplot for indirect measurements of PAI and AGB (ceptometer, spectral reflectance, rising plate meter)
- : subplot for direct measurement of PAI and AGB (destructive sampling; once/year)
- : calibration subplot for indirect PAI and AGB methods

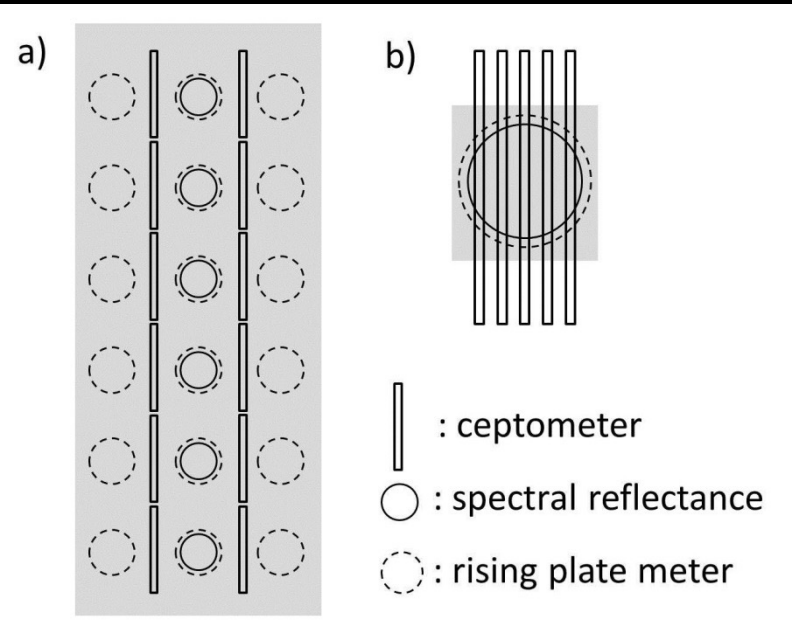


Fig. 3: Spatial sampling pattern in a subplot (a) for regular indirect measurements, (b) for regular direct measurements and calibration measurements.

ICOS Continued

“Regular” indirect measurements (see Fig. 3a)

12 ceptometer measurements in two parallel transects spaced 1 m apart. 6 measurements of spectral reflectance along a transect parallel to the ceptometer transects. The measured patches of vegetation fall within the vegetation sensed with the ceptometer.

Regular direct measurements + calibration measurements (see Fig. 3b)

Yearly direct measurements and the calibration measurements are approximately 0.5 by 0.5 m = 0.25 m². The vegetation destructively sampled after one measurement of spectral reflectance and five parallel ceptometer measurements

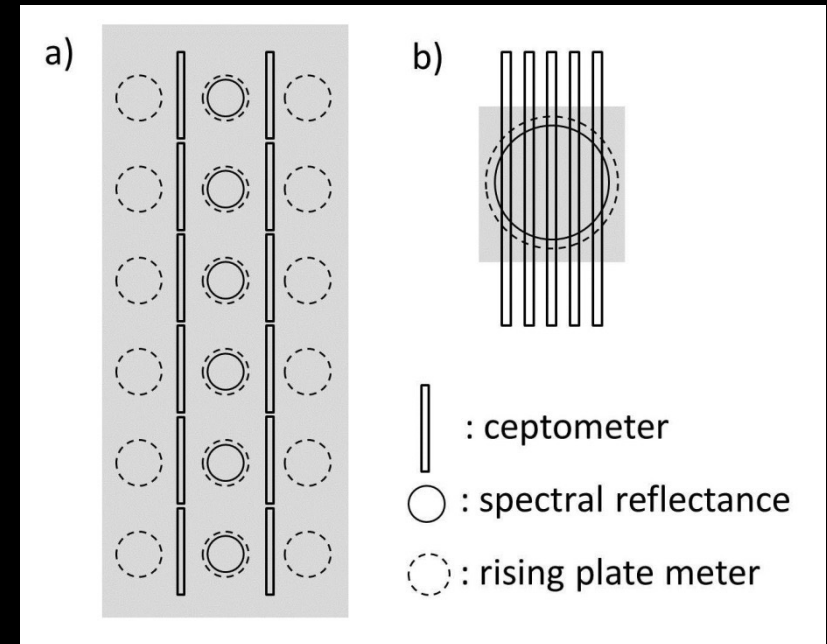
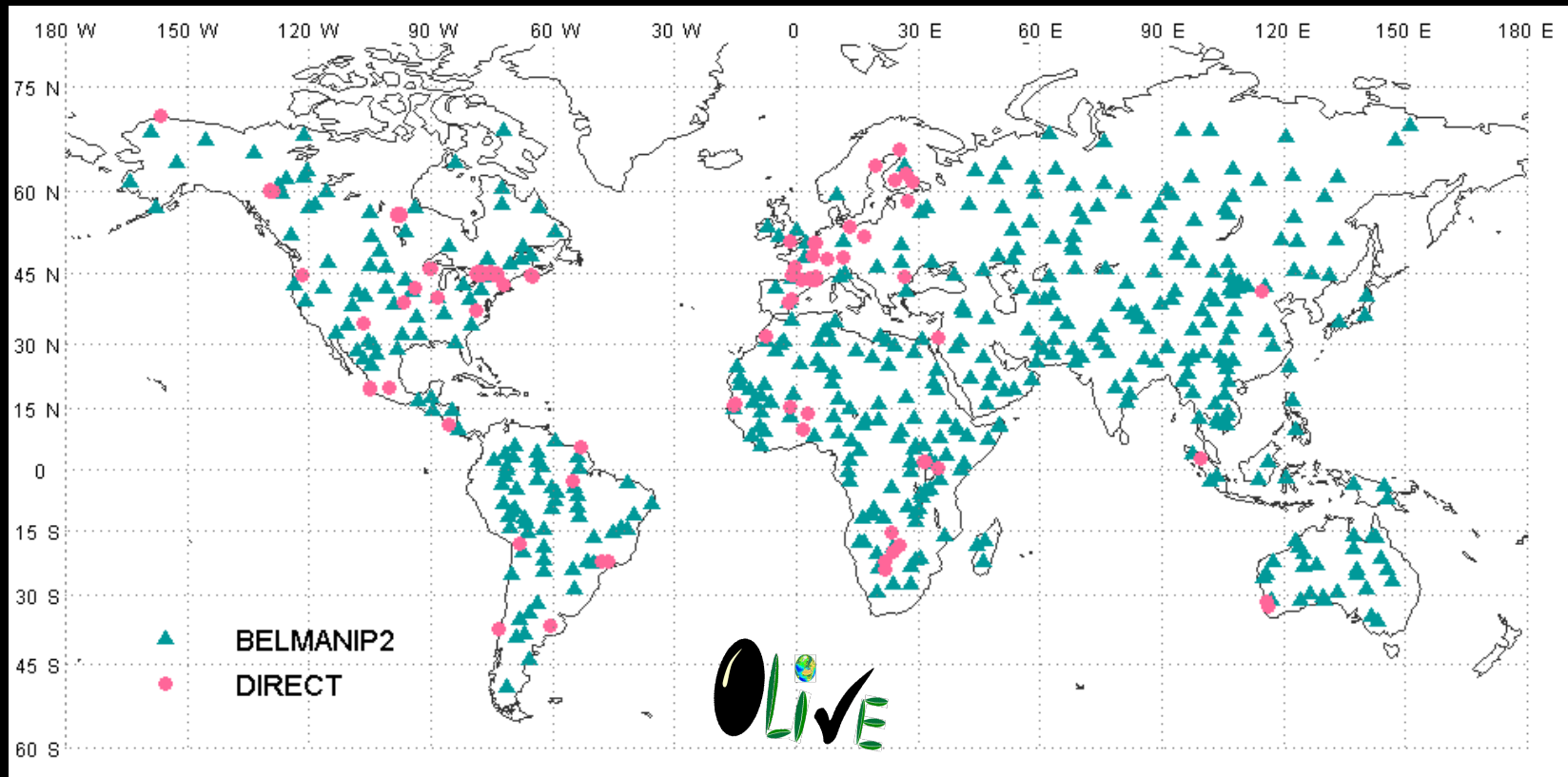


Fig. 3: Spatial sampling pattern in a subplot (a) for regular indirect measurements, (b) for regular direct measurements and calibration measurements.

Global representation of sites



Location of reference LAI sites available for direct validation and BELMANIP2 sites for inter-comparison

How does fitting in ICOS, TERN, NEON sites help us?

Other sites to improve DIRECT

Is BELMANIP2 (based on GlobCover2005) correct/representative?

How can we include inputs from JLW and co?

Next Steps

- Guide now on website along with links to supporting material:
 - Reviewer comments (*anonymous*)
 - Recommendations for future work
 - All in situ data collection “protocols”
- Action: Wait for fall out
- Discuss with TERN, NEON, ICOS
- Develop OLIVE – joint with FAPAR co-chairs
- Update the website
- Act on recommendations
- Address some of the missing elements e.g. in situ methods (Oliver Sonnentag welcome!!)
- Update of the Guide - based on community feedback and scientific advancement (aaaaargh NO!!!)

Website

- Should it be common structure across all pages??
- Are we reaching the community – check mailing lists
- Old proposal for LAI/FAPAR:
- Page 1
 - Who we are as it is currently - do not know if you want to do short bios here.
 - Biophysical Focus Area Objectives - can we have some long-term text here on what CEOS-WGCV-LPV-Biophysical does
 - Separate section current activities - each of the current activities should then lead to a web page
 - Latest news
- Page 2
 - Clarify definitions - can we put the definitions up and add the letter in response from GCOS/Antonio. Letter was on LAI only so we need to do the same with fAPAR (Nadine?). This is what LAI is rather than what we measure from space.
- Page 3
 - Extraction of the text for each of the components/actions T3, T28, T29, T30 in GCOS IP10 and Sat Supp and CEOS Response (from recently produced doc)
- Page 4
 - Contribute to establishment of a global network - put under here all the information on biophysical product validation with emphasis on the most recent information so - OLIVE and Nadine's work.
 - We need to downgrade now the old stuff. Refer to T3 and T28.

Website 2

- Should it be common structure across all pages??
- Are we reaching the community – check mailing lists
- Old proposal for LAI/FAPAR:
- Page 5
 - Document activities - Protocol, status paper. This should also have associated key papers on validation.
- Page 6
 - Products list - Separate page with Products listed
- Page 7
 - Page on climate-carbon and DGVM issues - currently a blank page but should be an objective to gather information here. Should include info on assimilation exercises and on model intercomparisons.
- Page 8
 - GFOI and FCT links - again currently blank but we should be looking at this.
- Page 9
 - General Links pages/active projects dedicated to LAI/fAPAR