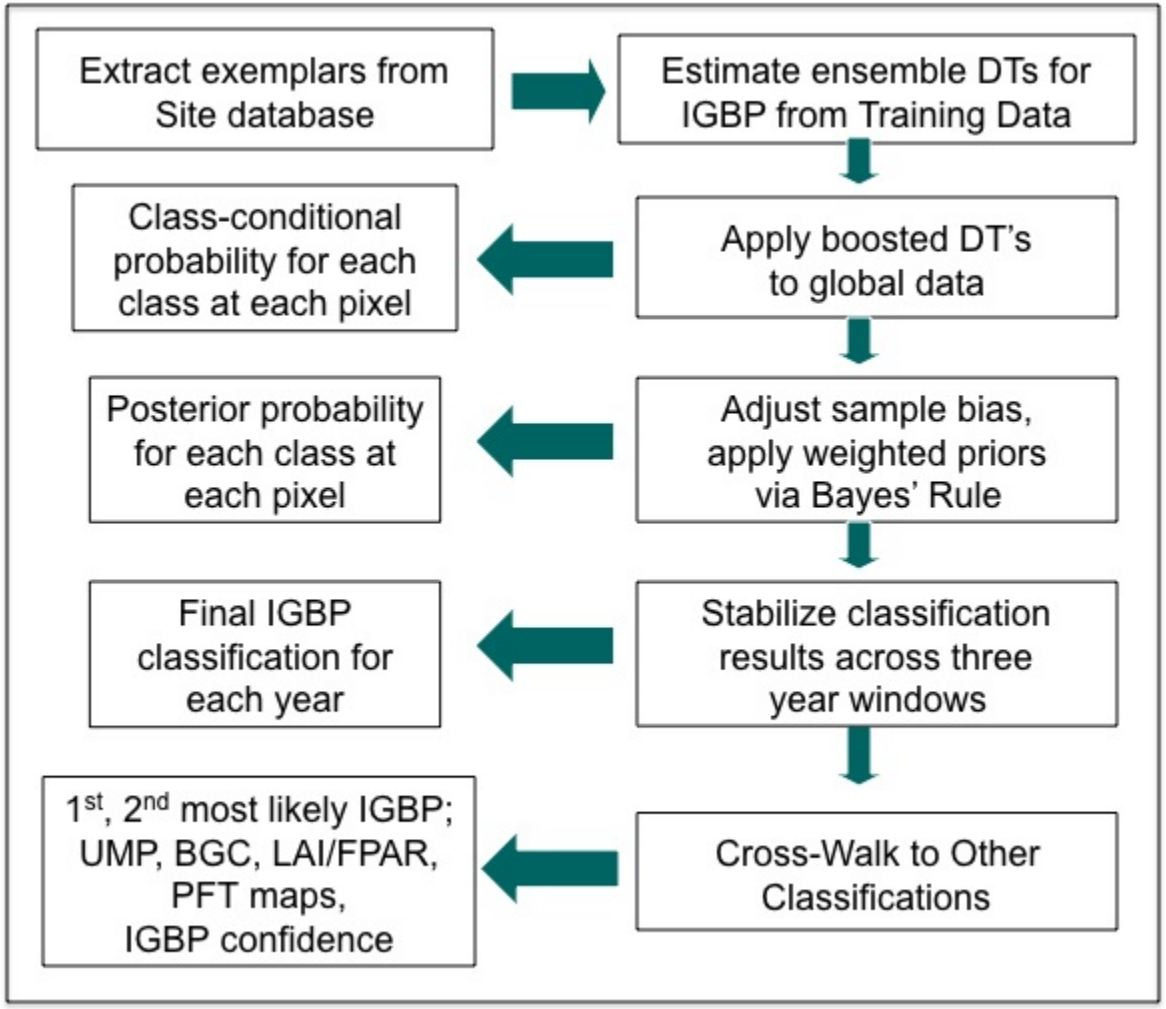
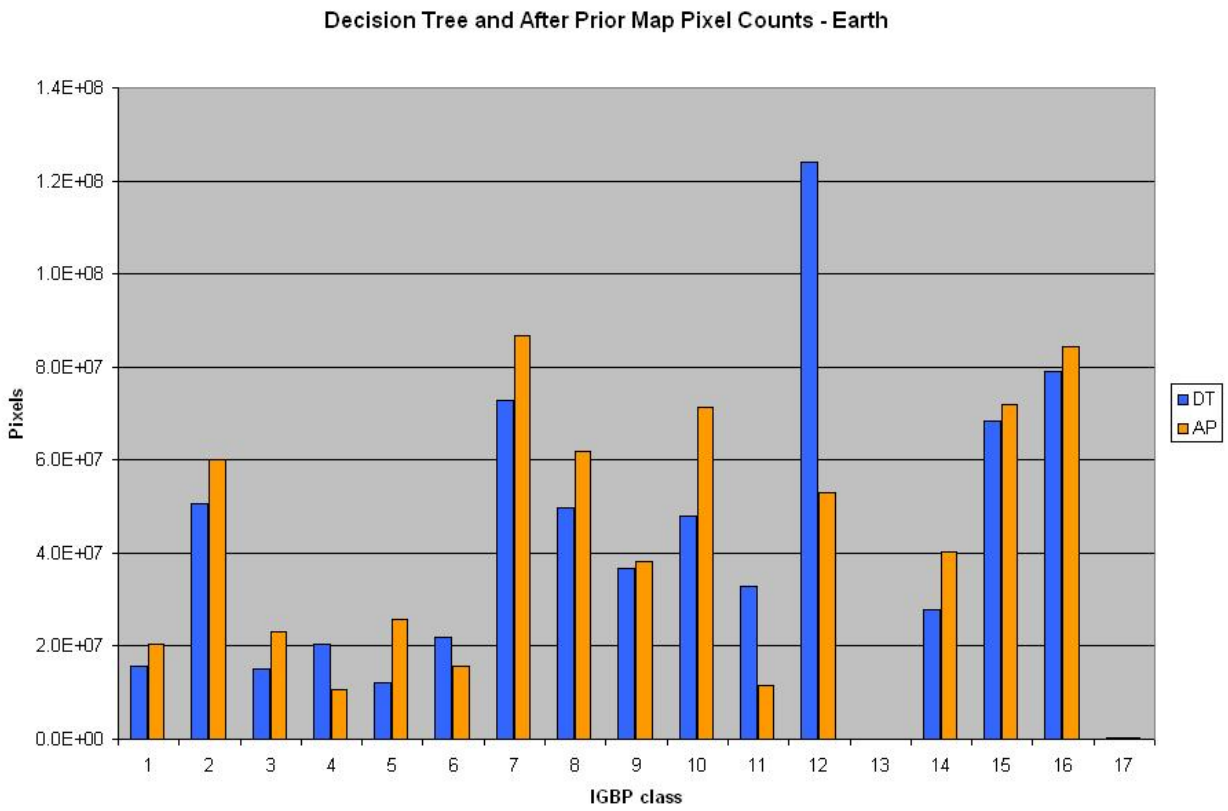
Overview of MODIS LC Processing



Some Obvious Lessons

- "Automated" algorithms are not automated
  - More importantly, incompatible data & goals cannot be overcome by "better" algorithms



Some Obvious Lessons

- Validation is not very interesting & expensive but it matters and users (should) care

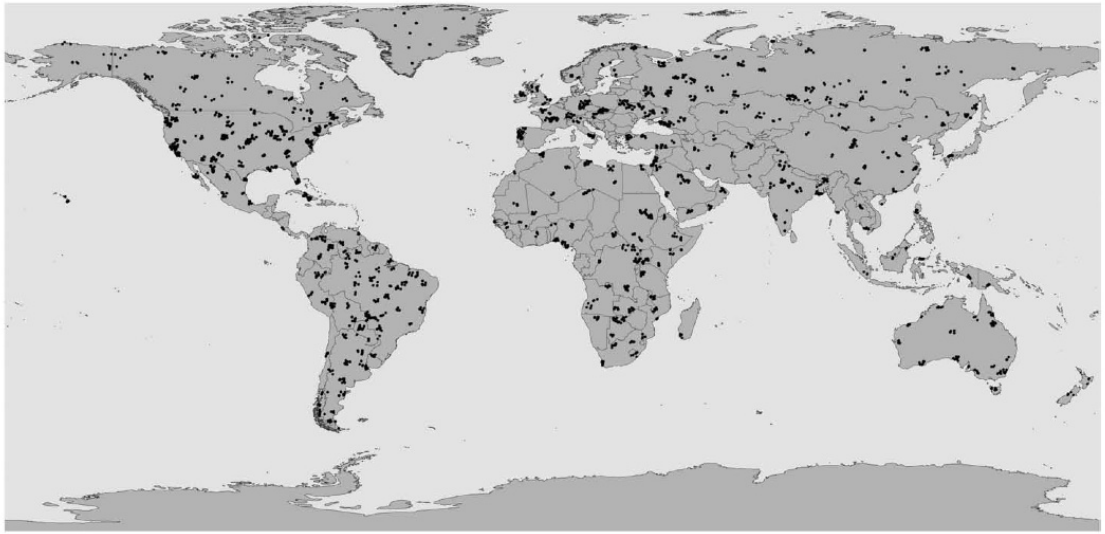


Fig. 2. Map of training sites (identified by dots) used to create the MODIS land cover type product.

Table 3
User and producer accuracies, standard errors, and 95% confidence intervals for Collection 5 IGBP classes based on cross-validation.

IGBP land cover class	Producer's accuracy (%)				User's accuracy (%)			
	PA	Std. err.	CI−	CI+	UA	Std. err.	CI−	CI+
1.	89.8	2.3	85.3	94.4	78.0	5.3	67.5	88.6
2.	92.6	2.4	88.0	97.2	83.1	3.2	76.8	89.5
3.	67.3	10.9	45.8	88.7	90.4	4.6	81.4	99.4
4.	68.9	6.2	56.7	81.0	75.9	5.3	65.6	86.3
5.	76.2	5.7	65.1	87.3	53.1	6.1	41.1	65.1
6.	63.4	5.9	51.9	74.9	47.0	5.5	36.1	57.8
7.	48.3	6.2	36.1	60.5	74.1	5.2	63.8	84.4
8.	45.2	4.1	37.2	53.3	34.3	4.5	25.4	43.2
9.	22.6	4.4	13.9	31.3	39.0	6.0	27.2	50.8
10.	73.6	4.1	65.7	81.6	55.9	4.2	47.6	64.2
11.	70.6	4.2	62.4	78.7	96.4	1.8	92.7	99.9
12.	83.3	2.0	79.4	87.1	92.8	1.5	89.8	95.8
14.	60.5	5.7	49.3	71.7	27.5	3.6	20.5	34.6
15.	75.6	10.9	54.4	96.9	96.8	2.3	92.2	100.0
16.	95.8	1.4	93.1	98.4	92.7	2.1	88.5	96.8
17.	96.6	1.9	92.8	100.0	99.3	0.4	98.6	100.0

Some obvious lessons

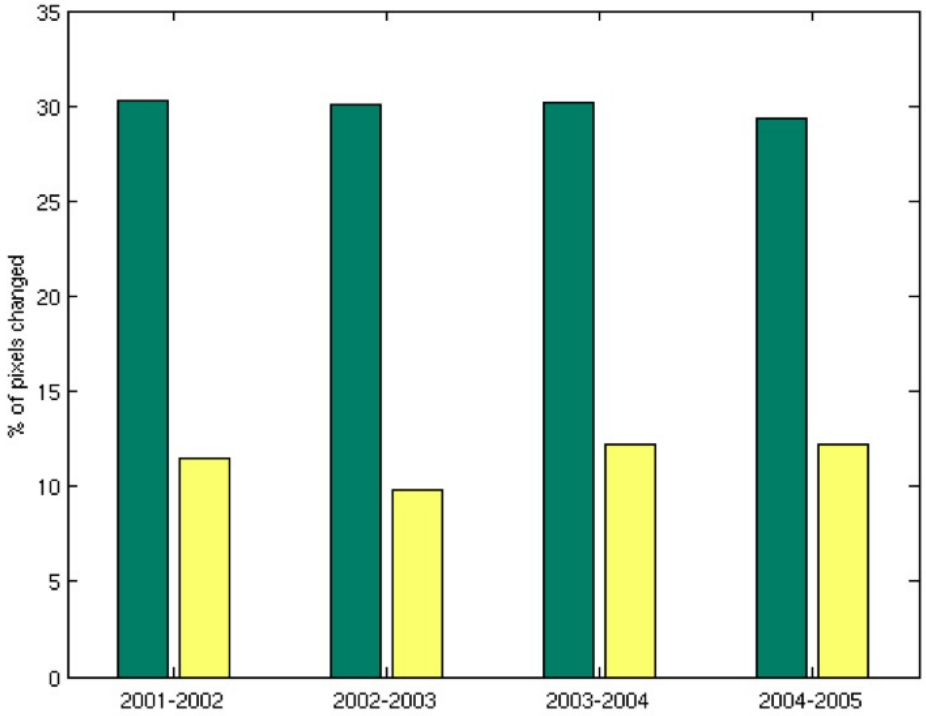
- Data need to support desired target
  - Avoid mixture/mosaic classes…?

Table 4
Confusion matrix for Collection 5 IGBP classes based on cross-validation.

Training site label	Classification output label																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1426	13	40	16	74	1	3	225	0	0	31	0	0	0	0	1	0
2	19	2550	0	90	52	18	0	46	0	0	276	6	0	11	0	0	0
3	2	0	508	2	19	0	3	10	10	0	7	0	0	0	0	0	0
4	0	23	11	1611	64	24	0	217	30	3	100	14	0	23	0	0	0
5	103	24	143	250	723	3	0	21	5	2	68	5	0	8	2	0	3
6	0	21	11	0	1	1086	519	149	98	225	70	116	0	5	8	7	0
7	0	0	1	0	0	179	1351	9	23	116	1	32	0	5	0	104	0
8	35	44	22	291	14	131	64	997	691	77	202	246	0	82	0	16	0
9	0	0	11	5	0	53	27	276	367	95	31	54	0	20	0	0	0
10	0	3	0	0	0	140	430	66	213	1938	40	414	0	26	111	77	0
11	2	48	7	0	2	0	0	2	4	5	2406	19	0	0	0	0	0
12	0	0	0	0	0	9	64	52	25	118	60	6963	0	84	66	2	61
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	28	1	73	0	47	22	134	130	22	105	498	0	402	0	0	0
15	0	0	0	0	0	0	1	0	0	13	0	0	0	0	580	4	0
16	0	0	0	0	0	20	314	0	27	14	0	4	0	0	0	4802	1
17	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	1831

Some obvious lessons

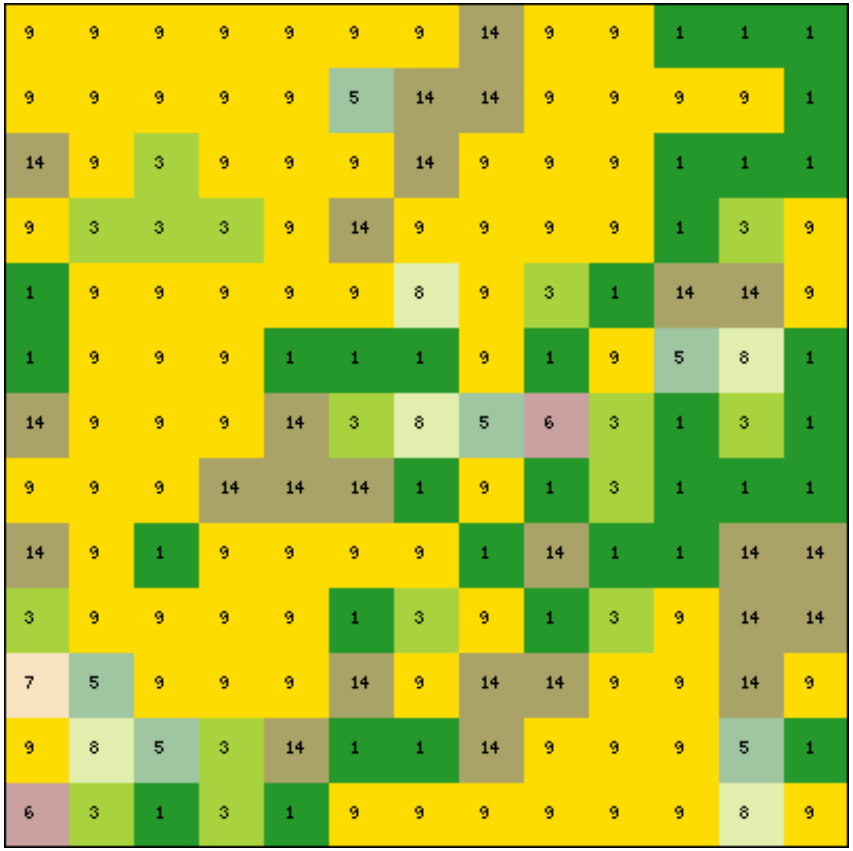
- People will make change maps from sequential classifications
- Seasonal, interannual variability is a core property of land cover
  - Need me cover simultan

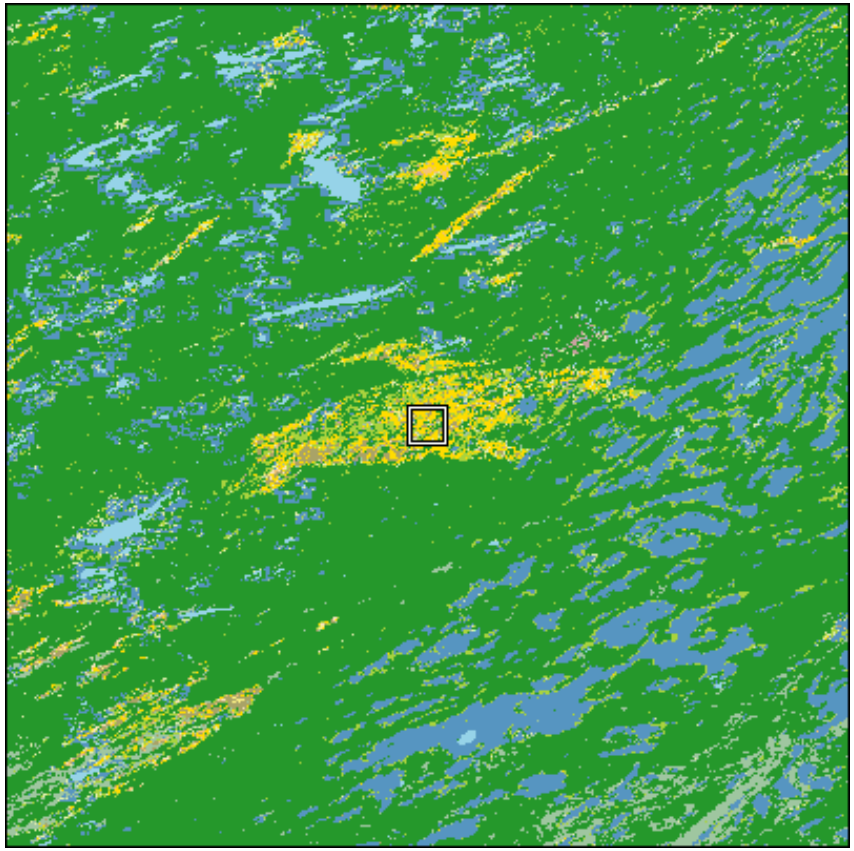


Some Obvious Lessons

- To address this, need coordination across products
  - e.g. land cover, disturbance, change

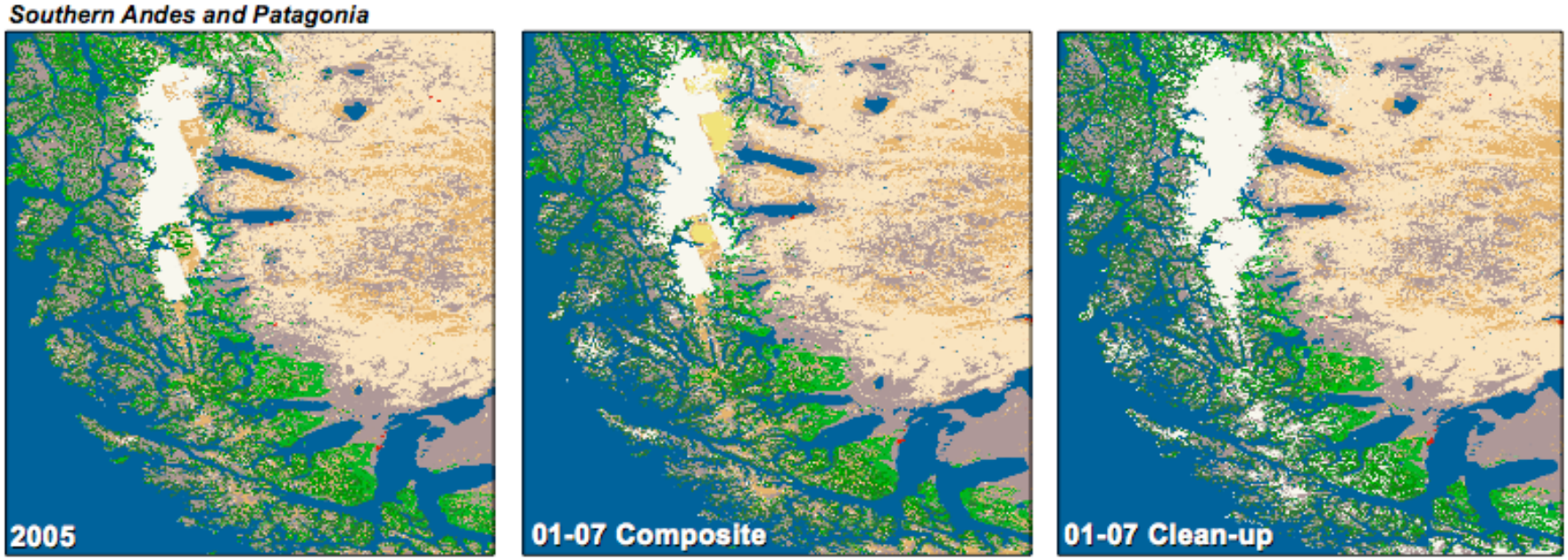
MODIS LC 2005





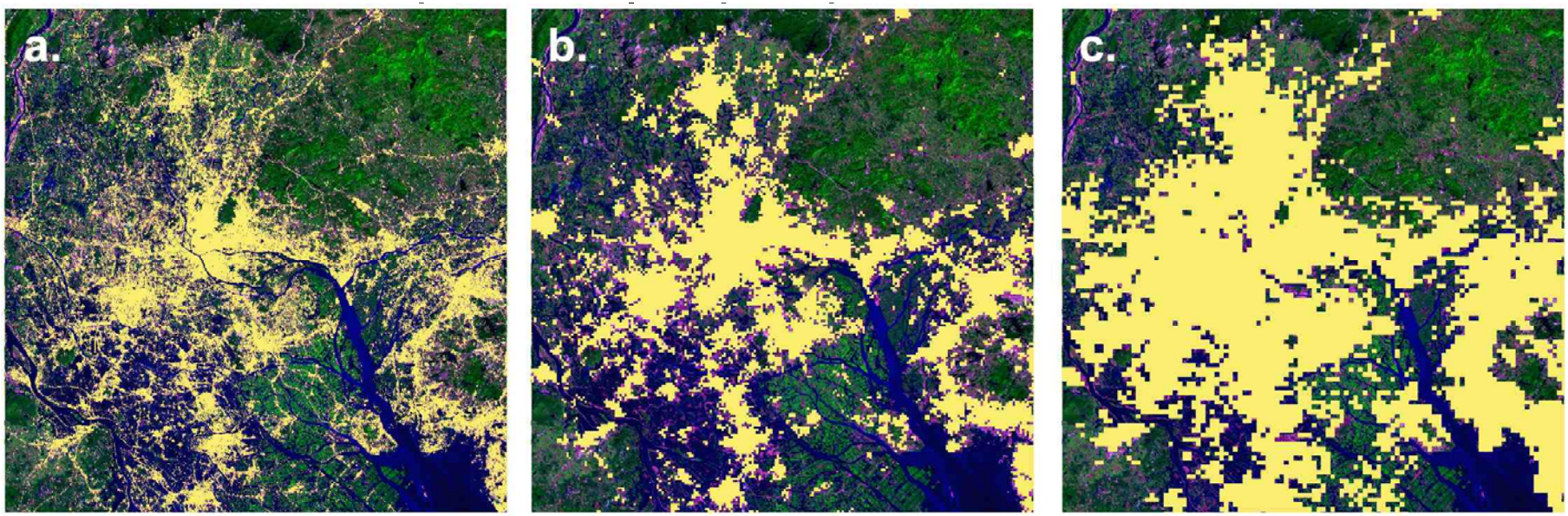
Some Obvious Lessons

- Upstream products matter to downstream products – cloud screening, L/W mask, ….



Some Obvious Lessons

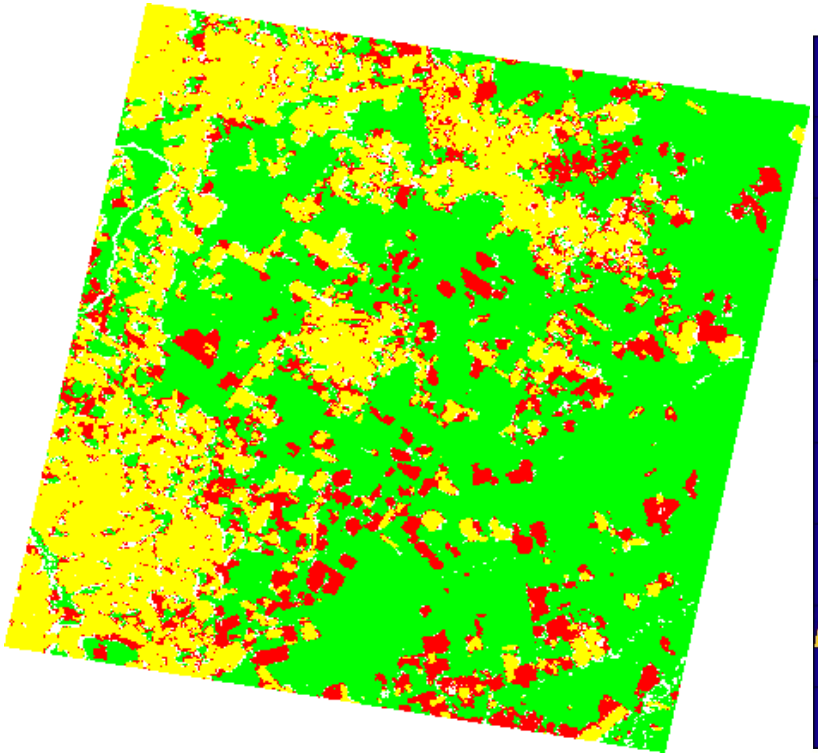
- One size fits all algorithms don’t always work very well
  - Some classes require specialized solns (in case of

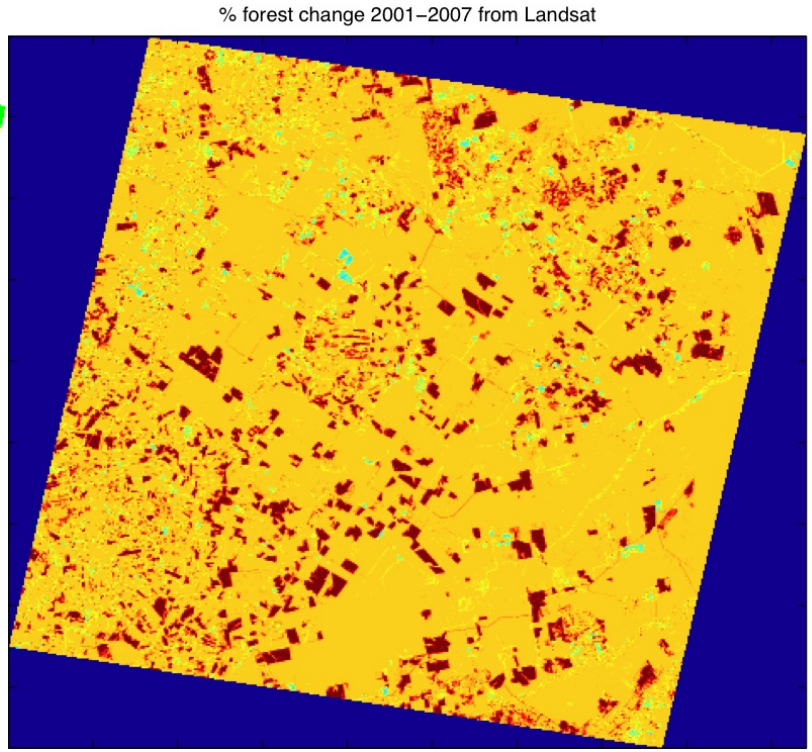


Some Obvious Lessons

– MODIS/VIIRS can provide useful information

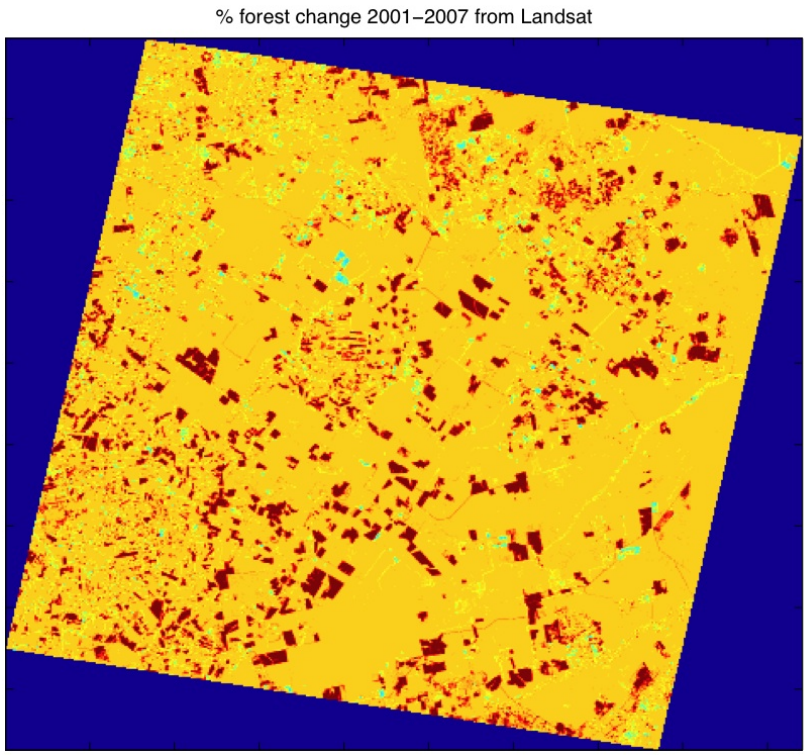
- Can be used to identify areas to focus on/ignore….

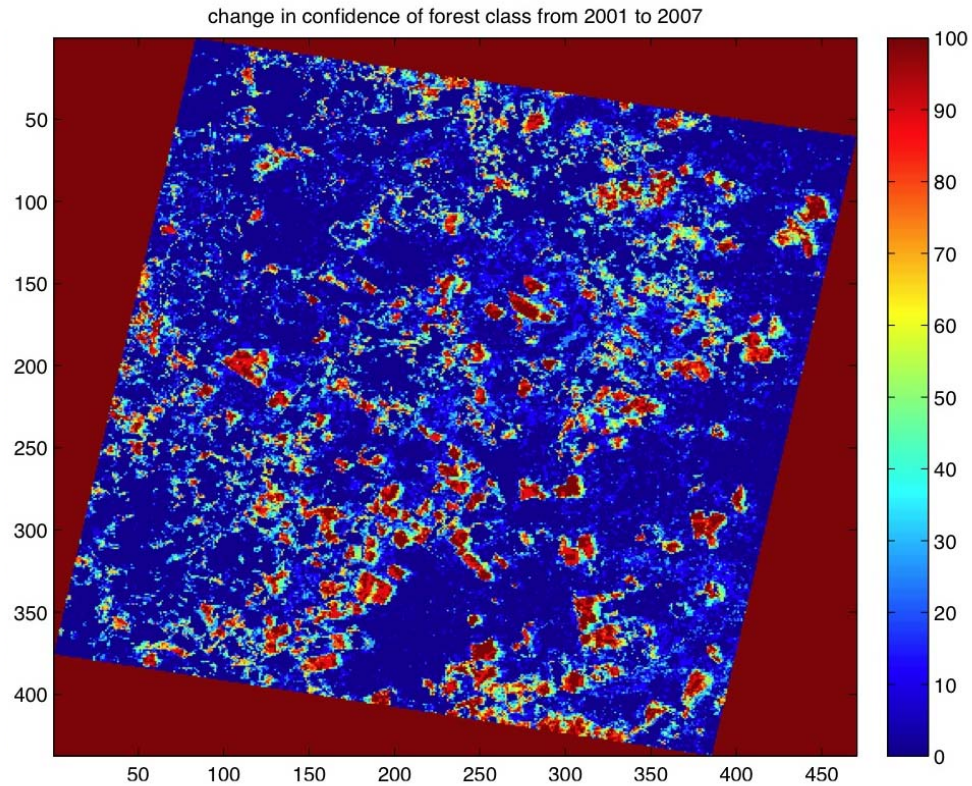




Some Obvious Lessons

- Sub-pixel information from moderate





Final Thoughts

- WRT Land Cover
  - Surface reflectance
  - Phenology helps
    - Leaf on/off
    - Snow?
  - Sensible land cover units that can be mapped
  - Global stratification – stable/not stable LC
  - Treatment for disturbance/change/variability
  - Validation