Table S1: Description of management activities at all five sites during the measurement periods.

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| **Site** | **Date** | **Activity** |
| MMTN | July 11, 2012 | Flux tower installation, field in winter wheat (*Triticum aestivum*) |
| Aug 12, 2012 | Harvest |
| Aug 31, 2012 | Fire, removal of flux tower instrumentation |
| Sept 4, 2012 | Flux tower reinstallation |
| Oct 2012 | Tillage with chisel plow |
| April 3, 2013 | Herbicide roundup |
| April 29, 2013 | Cultivation with harrow |
| May 1, 2013 | Fertilization, ~160 kg N ha-1 |
| May 2, 2013 | Seeding of spring barley |
| June 5, 2013 | Herbicide roundup |
| Aug 20, 2013 | Harvest, residue retained in the field |
| Oct 17, 2013 | Tillage with chisel plow |
| April 30, 2014 | Cultivation with harrow |
| May 1, 2013 | Fertilization |
| May 2, 2014 | Seeding of peas |
| Aug 5, 2014 | Harvest |
| Aug 13, 2014 | Tillage |
| Sept 29, 2014 | Seeding of winter wheat |
| Early Mar, 2015 | Fertilization |
| Apr 28, 2015 | Herbicide roundup |
| Aug 3, 2015 | Harvest |
| Apr 20, 2016 | Spraying, roundup |
| Apr 24, 2016? | Harrowing |
|  |  |
| CAF-NT | Aug 19, 2011 | Flux tower installation, field in spring garbanzo (*Cicer arietinum*) |
| Oct 22, 2011 | Seeding of winter wheat (*Triticum aestivum ssp. compactum*) at a rate of 92 kg ha-1  Fertilization (120-N/10-P/15-S) |
| Aug 22, 2012 | Harvest, residue retained in the field |
| May 2, 2013 | Seeding of garbanzo beans (*Cicer arietinum*) at a rate of 168 kg ha-1  Herbicide roundup (~1.4 kg ha-1) |
| Aug 22, 2013 | Spraying of herbicide (~3.4 kg ha-1) roundup to dry crops for harvest |
| Sept 15, 2013 | Harvest, residue retained in the field |
| Oct 5, 2013 | Herbicide roundup |
| Oct 10, 2013 | Seeding of winter wheat (*Triticum aestivum L.*) at a rate of 112 kg ha-1  Fertilization (120-N/10-P/15-S) |
| Aug 7, 2014 | Harvest, residue retained in the field |
| April 18, 2015 | Seeding of canola at a rate of ?? Variety- “Roundup Ready HyClass 930”, 6 lbs./ac |
| May 30, 2015 | Fertilization to a depth of ??m, rate? ~3” deep, 80-N/ 25-P/ 25-S |
| Aug 14, 2015 | Harvest, residue retained on the field |
| Oct 16, 2015 | Seeding of winter wheat (rate?) Variety- “Puma” 85 lbs./ac.  Fertilization: depth?, 177 kg/ha N, ?P, ?K, type? ~3” deep, 158-N/ 39-P/ 38-S |
| CAF-CT | June 13, 2012 | Flux tower installation, field in winter wheat (*Triticum aestivum ssp. compactum*) |
| June 21, 2012 | Pesticide for red stripe |
| Sept 17, 2012 | Harvest, residue retained in the field |
| Oct, 2012 | Tillage to a depth of about 0.15-0.2 m |
| May 1, 2013 | Light cultivation with harrow to a depth of 0.05-0.08 m  Seeding of garbanzo beans (*Cicer arietinum*) at a rate of 168 kg ha-1 |
| Aug 22, 2013 | Spraying of herbicide roundup to dry crops for harvest |
| Sept 15, 2013 | Harvest, residue retained in the field |
| Oct 5, 2013 | Seeding of winter wheat (*Triticum aestivum L.*)  Fertilization to a depth of 0.15-0.2 m, ~63.5 kg of N (NH3), ~14 kg of phosphate, and ~14 kg of thiosol sulpher |
| April 11, 2014 | Fertilization, 4.5-6.8 kg of potassium chloride |
| Aug 6, 2014 | Harvest, residue retained in the field |
|  | April 8?, 2015 | Seeding canola |
|  | Aug 12, 2015 | Canola harvested |
|  | Oct, 2015 | Seeding of winter wheat |
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| LIND | Nov 21, 2011 | Flux tower installation, field was fallow |
| April 14, 2012 | Herbicide roundup |
| May 9, 2012 | Fertilization  Cultivation |
| July 10, 2012 | Rod weeding |
| July 25, 2012 | Rod weeding |
| Aug 29, 2012 | Seeding of winter wheat (*Triticum aestivum*)  Fertilization |
| Oct, 2012 | Tillage with chisel plow |
| Aug 1, 2013 | Harvest |
| Oct 22, 2013 | Tillage with chisel plow |
| April 11, 2014 | Cultivation |
| Aug 26, 2014 | Seeding of winter wheat  Fertilization |
| MSLK | June 19, 2013 | Flux tower installation, field in spring wheat |
| Aug 10, 2013 | Harvest |
| Aug 12, 2013 | Seeding of mustard and arugula  Fertilization |
| Oct 17, 2013 | Harvest |
| Nov 2013-March, 2014 | Tillage |
| April 9, 2014 | Cultivation |
| April 10, 2014 | Seeding of potato  Fertilization |
| May 8, 2014 | Cultivation with harrow |
| Oct 1, 2014 | Herbicide roundup |
| Oct 3, 2014 | Harvest |
| Oct 13, 2014 | Tillage |
| Oct 20, 2014 | Seeding of wheat (spring wheat species planted as winter wheat) |
| Aug 17, 2015? | Harvest |
| Aug 19, 2015 | Tillage |
| Sept 17, 2015 | Undercut |