The manuscript by Xie et al. "Landsat-based Irrigation Dataset (LANID): 30-m resolution maps of irrigation distribution, frequency, and change for the U.S." developed new irrigation mapping datasets in the US for both cropland and pasture with high spatial resolution across a relatively long-time span (1997-2017). The irrigation mapping showed high accuracy compared with validation, and other multiyear results revealed interesting regional and local patterns in irrigation changes. This work will be an important contribution to the community. The manuscript is well-written and the presentation is clear.

*** Response: Thank you for your comments, suggestions, and perspectives on our paper. We greatly appreciate the insights you have provided, and have revised the manuscript (highlighted in yellow) based on your comments accordingly, as detailed below.*

Below I have some minor comments:

L65. There are several different irrigation products used in this study. For readers who are am not familiar with each of them like me, it is helpful to add a column in the table to briefly summarize the method for producing each dataset.

*** Response: Thanks for the suggestion. We have added the methods used for each product in Table 1. A copy of the extended table is also provided here (method column is highlighted).*

Table 1. Currently available irrigation maps covering part to the entire CONUS. The boldfaced maps are compared with LANID in the Results section. (RF: random forest; RS: remote sensing)

Products	**Spatial coverage**	**Resolution**	**Update frequency**	**Methods/datasets**	**Citations**
Global Irrigated Area Map (GIAM)	Global	10 km rescaled to 1 km	Single map, 2000	Spectral matching/RS data	Thenkabail et al. (2009)
Global Map of Irrigation Areas (GMIA)	Global	10 km	5-year, 1995, 2000, and 2005	Spatial allocation/sub-nation statistics & maps	Siebert et al. (2005); Siebert et al. (2013)
Synthesized map of global irrigated area	Global	1 km	Single map, covering 1999-2012	Decision tree/RS, GMIA, & land cover maps	Meier et al. (2018)
Global Food-Support Analysis Data (GFSAD)	Global	1 km	Single map, 2010	Spectral matching/RS time series	Teluguntla et al. (2015)
Global Land Cover Map (GlobCover)	Global	300 m	Single map, 2009	Automatic classification/ RS time series	ESA (2015)
Global Land Cover Characteristics (GLCC)	Global	1 km	Single map, 1992	Hybrid compositing techniques/RS data	Loveland et al. (2000)
Global Rainfed, Irrigated and Paddy Croplands (GRIPC)	Global	500 m	Single map, 2005	Decision tree/RS, climate, & ag. inventory data	Salmon et al. (2015)
MODIS-based Irrigated Agriculture Dataset (MIrAD)	CONUS	250 m	5-year interval, 2002-2017	Thresholding/ag. Census & RS data	Pervez and Brown (2010)
MODIS-based Irrigation Fraction (MIF)	CONUS	500 m	Single map, 2001	Decision tree/RS time series	Ozdogan and Gutman (2008)

USDA-NASS Irrigation Statistics	U.S.	County-level	5-year interval, 1997-2017	Surveys	https://www.nass.usda.gov/AgCensus/index.php
USGS-verified irrigated lands	Western U.S.	Field	Vary across states, 2002-2017	Visual interpretation/RS & cropland inventory data	Brandt et al. (2021)
Landsat-based Irrigation Dataset 2012 (LANID 2012)	CONUS	30-m	Single map, circa 2012	RF/RS, climate, & envi data	Xie et al. (2019)
Annual Irrigation Maps – High Plain Aquifer (AIM-HPA)	High Plains Aquifer	30-m	Annual, 1984-2017	RF/RS, climate, & envi data	Deines et al. (2019)
IrrMapper	Western CONUS	30-m	Annual, 1986-2018	RF/RS, climate, & envi data	Ketchum et al. (2020)

L125: What years are those selected reference and validation points?

*** Response: We collected approximately 10,000 samples across the eastern US. Each irrigation sample records a center pivot location and the presence of irrigation infrastructure during the period of 1997-2017; each rainfed sample is a non-irrigated location for each year from 1997 to 2017. We stated the attributes of collected samples in the Section 4.1.*

L264: The authors need to discuss the spatial scale issue when comparing different datasets (points vs. pixel, spatial resolutions). How do different spatial resolutions influence the comparison among different data sources? What is a fair comparison? For example, how to make a fair comparison between irrigation fraction and the binary irrigation map?

*** Response: Thanks for the insights. Given different spatial resolutions of existing maps, we used two ways to compare them: 30 m resolution, pixel-by-pixel comparison using ground truth data (Table 4) and subpixel comparisons (Figure 15). For the pixel-by-pixel comparison, we rasterized the ground truth data to 30 m resolution pixels and overlaid them with our maps and the existing binary ones (i.e., MIrAD, GIAM, AIM-HPA, IrrMapper, and LANID2012) to calculate accuracy metrics shown in Table 4. Because all binary maps tend to show exact locations of irrigated and non-irrigated croplands, we believe this pixel-by-pixel comparison can evaluate the locational accuracy of these maps. We also compared our maps with existing coarser resolution maps (i.e., MIrAD, GIAM, and GMIA) through a subpixel analysis shown in Figure 15. To do this, we aggregated our 30-m LANID maps to match the spatial resolution of each product (e.g., 250-m for MIrAD and 10-km for GMIA). This subpixel comparison shows irrigation fraction of mapped irrigation locations on each binary product (MIrAD and GIAM) and how well fraction products (MIF and GMIA) estimate irrigation proportion within coarse resolution pixels.*

L296 and Fig 14b: Unlike other products which were only compared with one year of NASS data, LANID was compared with multiple years of NASS data. I think this may contribute to the higher R2 of LANID in Fig. 14b. In terms of R2, LANID is better, but I don't understand why it is written that the LANID agreement is weaker than MirAD and GMIA.

*** Response: We stated that our LANID performs better than MIF and GIAM at the state level but worse than MIrAD and GMIA because these later two products used USDA-NASS reported* *area as the reference to downscale to the pixel scale. Given this, MIrAD and GMIA match perfectly with the USDA-NASS reported amount from county to country scales (also showed in Figure 14a at the country scale). To reduce confusion, we added methods each product used in Table 1, which also echoes to the reviewer's first request of adding method summary.*

We plotted all five-year data in the same plot in Figure 14b because each year follows a similar pattern. However, we believe it is not difficult to tell that our data shows higher consistency with USDA-NASS reported areas (along the 1:1 line with no states showing substantial overestimation or underestimation) than MIF and GIAM, which show substantially underestimation and overestimation, respectively.