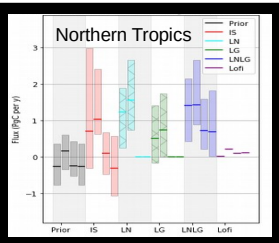
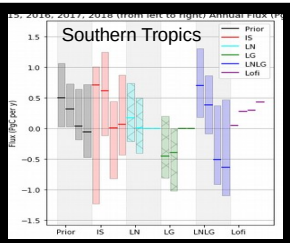
Four years of global carbon cycle observed from OCO-2 v9 and in situ data, and comparison to OCO-2 v7

Peiro et al., 2021 ACP *submitted*

- **Idea of the MIP v9 paper:**
  - ➔ Update of MIPv7 paper using OCO-2 v9 inversions and compare both versions

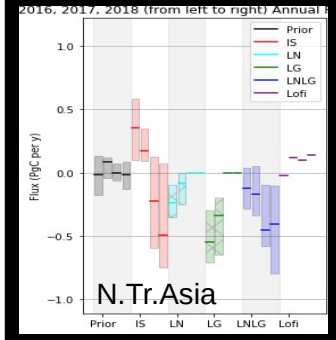
- With v9, observation of El Nino period and recovery period (stronger sinks)
- Ens spread smaller with v9 than with v7
- Difference of carbon budget between v7 and v9 over some regions such as tropics → conclusions over tropical regions change according to the retrieval used

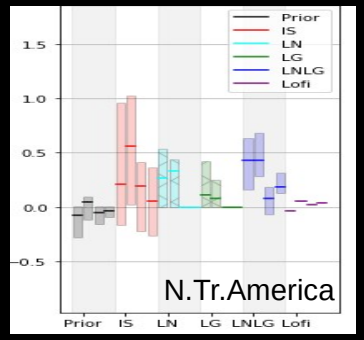


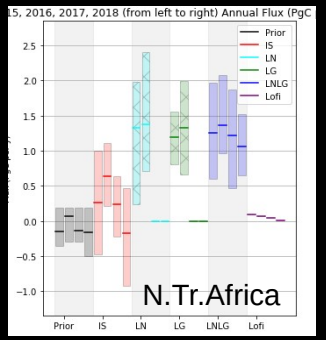


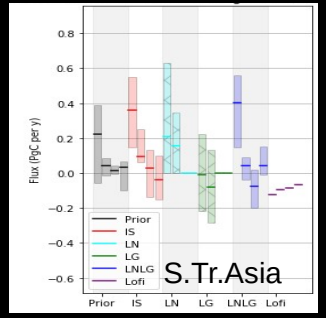
	2015			2016		
	OCO-2			OCO-2		
	UoE	LSCE	CSU	UoE	LSCE	CSU
S.Tr.America	−0.31	−0.19	−0.21	0.12	0.14	−0.15
S.Tr.Africa	−0.36	−0.06	0.04	−0.23	−0.20	−0.12
S.Tr.Asia	0.26	0.09	0.42	0.14	0.10	0.10

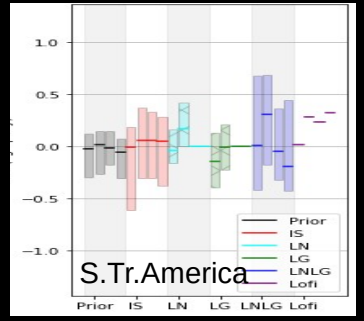
Palmer et al., 2019

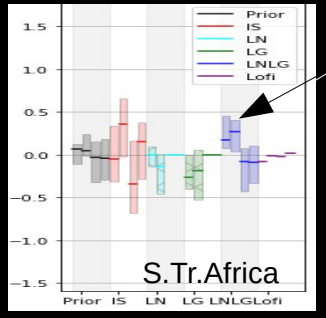




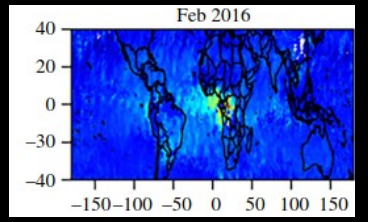








CO_2 sources observed with in situ data (Gloor et al., 2019) but sinks observed with OCO-2 v7 (Liu et al., 2017, Palmer et al., 2019)



Gloor et al., 2019
Total column CO anomalies (MOPITT)

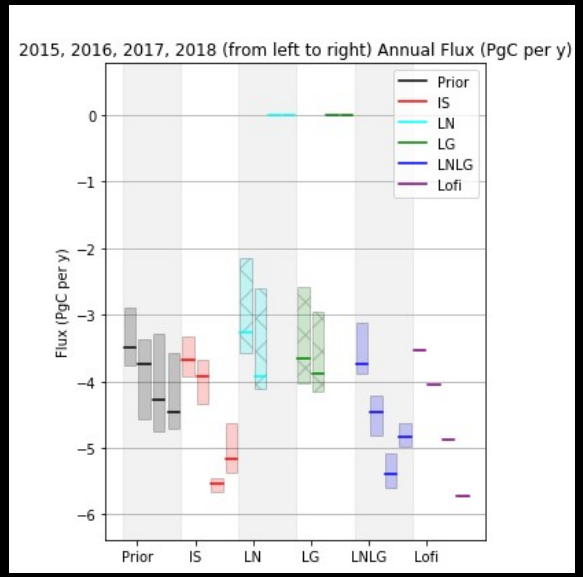
OCO-2 v9 released in 2019 with updates compared to v7

- Meteorology resample fix
- Improvement in geolocation and aerosol treatment
- Different spectroscopy

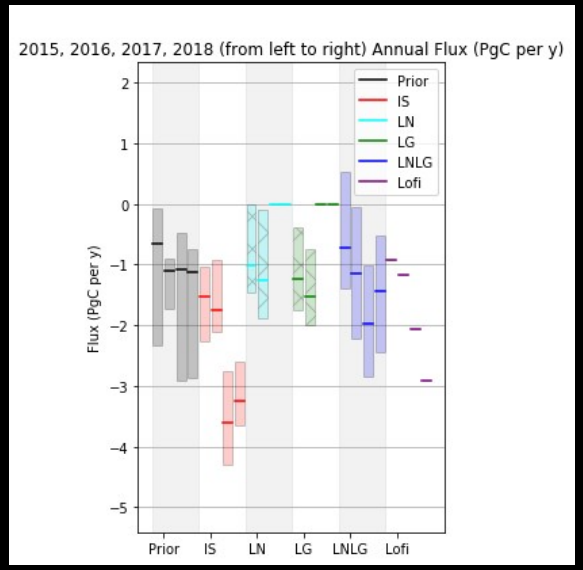
- Updates in the ObsPack NRT in situ data

- v7 only available from 2015 - 2016 while v9 from 2015 - 2018

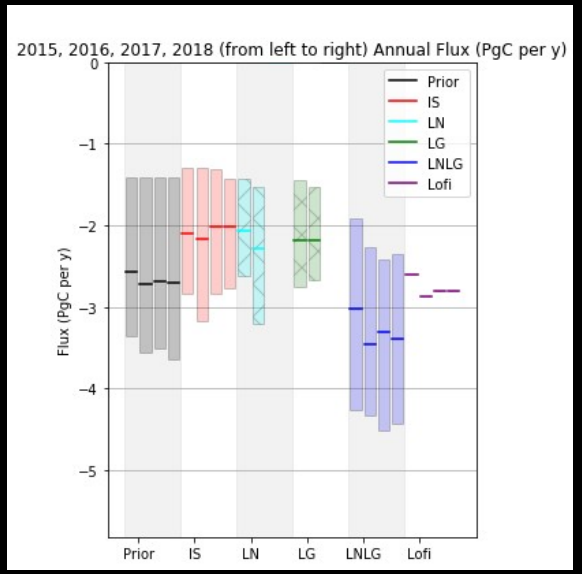
Global



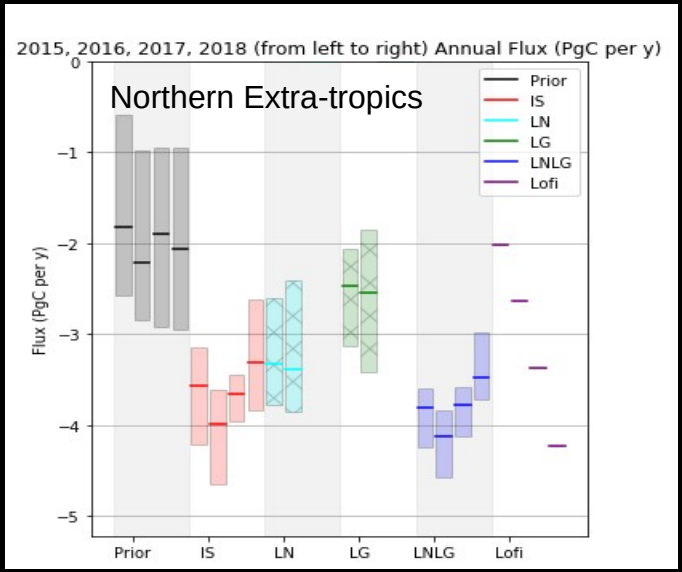
Global Land

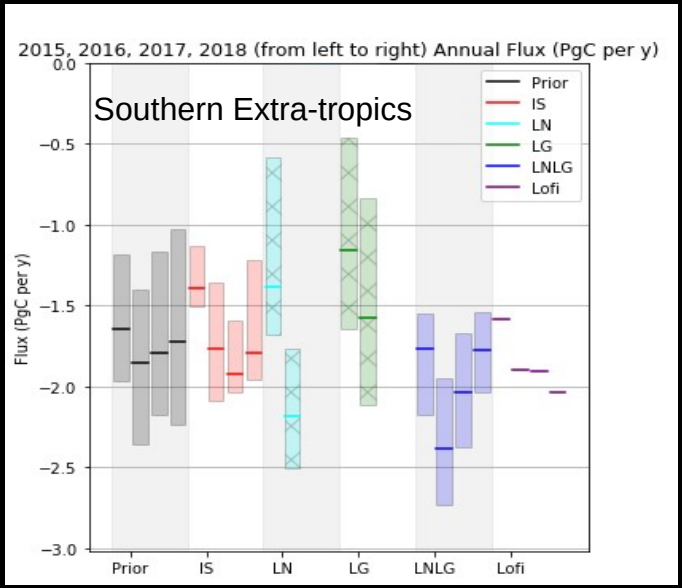


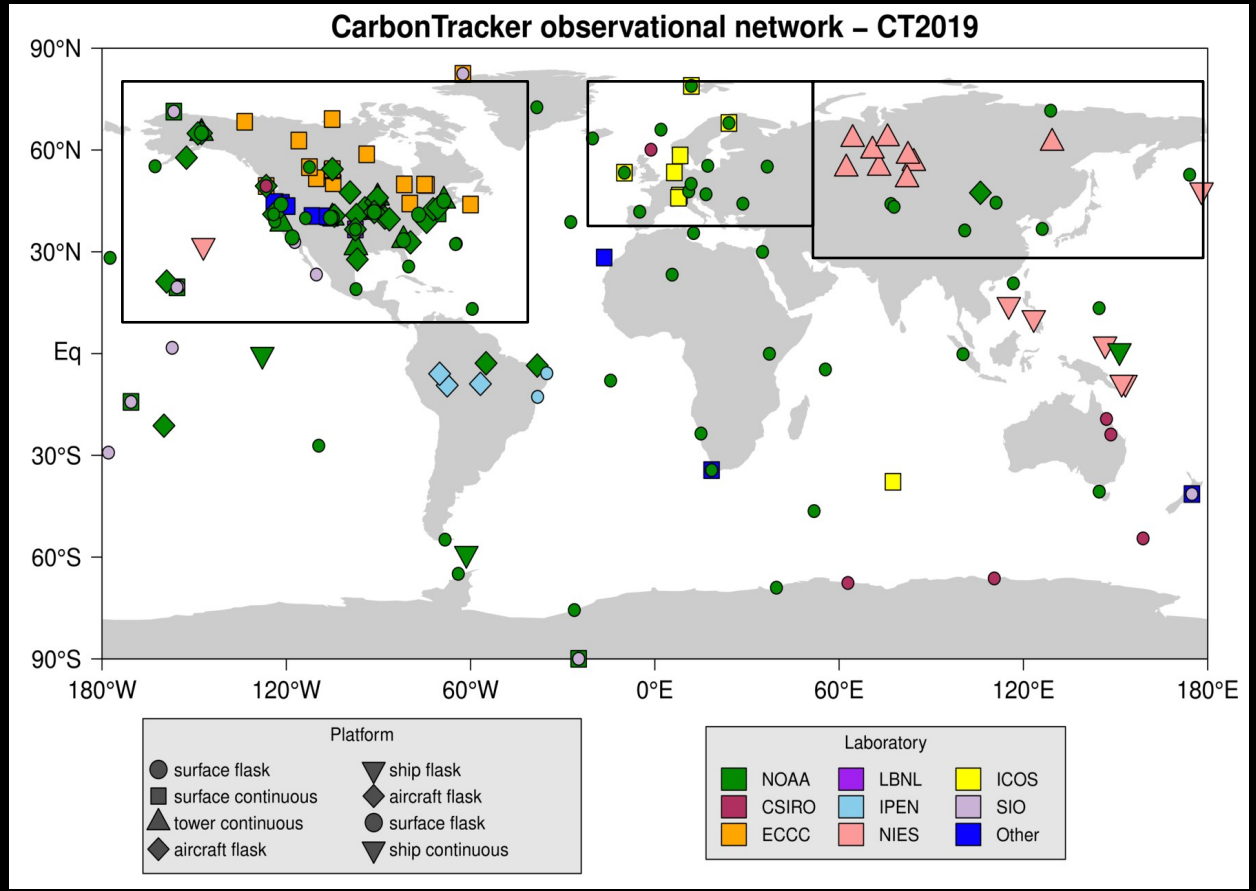
Global Ocean



- Friedlingstein et al., 2019 ~ -2.0 PgC/yr in 2018 over the land for the NBE



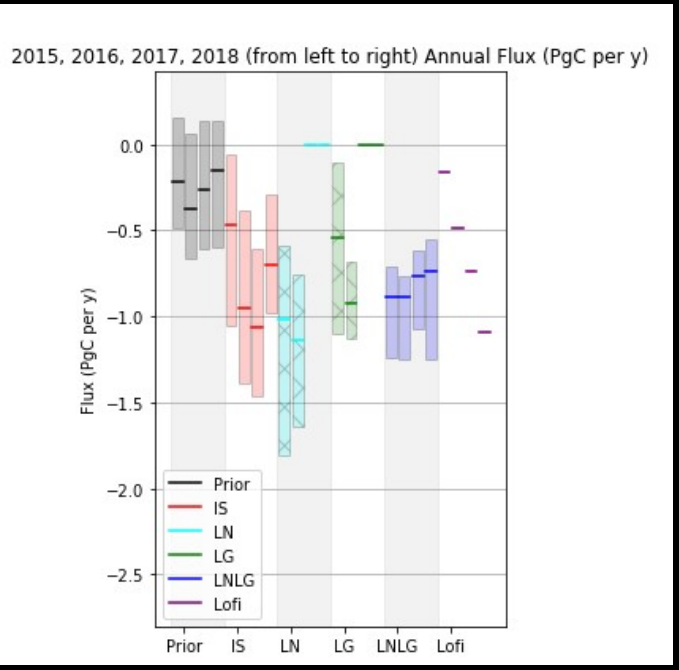




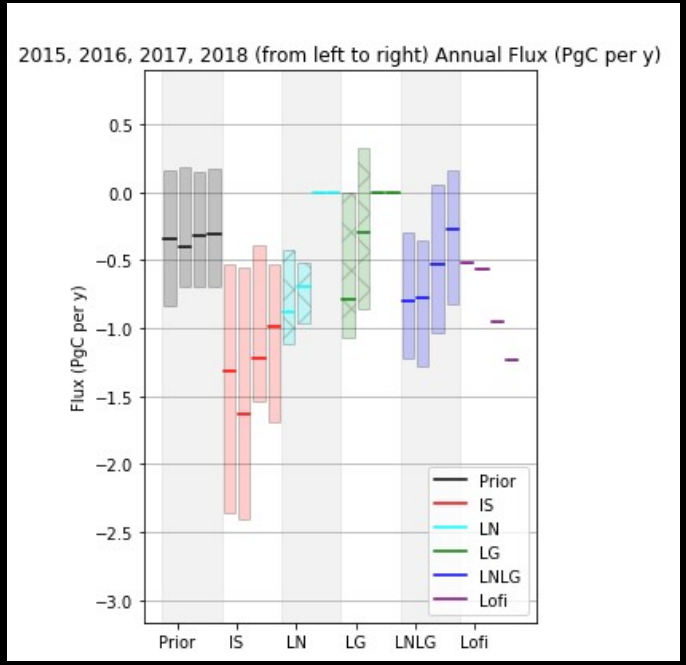
https://www.esrl.noaa.gov/

Northern hemisphere regions

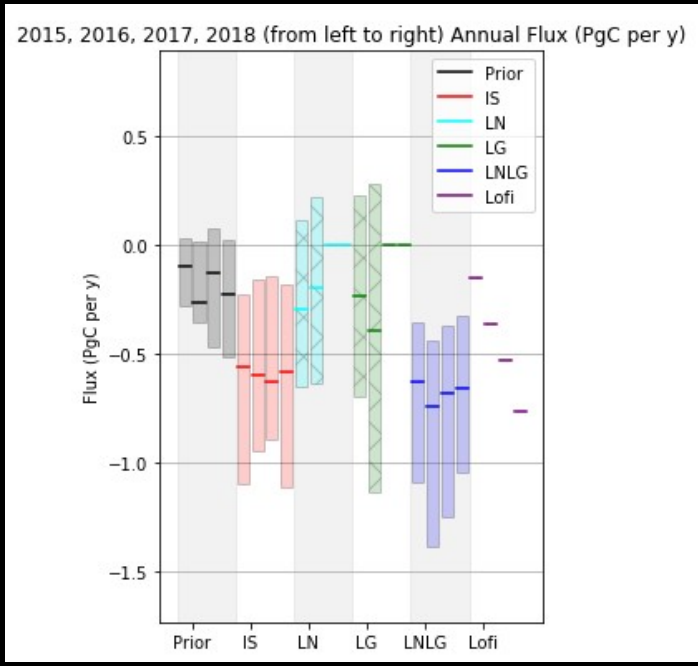
Northern America



Northern Asia



Europe



- Diff between v7 and v9
- Ens spread larger

} over Europe ↔ lack of carbon budget information (Reuter et al., 2017)

- Fewer in-situ obs in Asia compared to Europe and N.America (Park and Kim, 2019)

Evaluation data