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## From concentrations requirements to emission commitments: prospects and challenges for the Global Stocktake

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The Paris Agreement was a watershed moment in providing a framework to address the mitigation of climate change. The Global Stocktake is a bi-decadal process to assess progress in greenhouse gas emission reductions in light of climate feedbacks and response. However, the relationship between emission commitments and concentration requirements is confounded by complex natural biogeochemical processes potentially modulated by climate feedbacks. We investigate the prospects and challenges of mediating between emissions and concentrations through the NASA Carbon Monitoring System Flux (CMS-Flux) project, which is an inverse modeling and data assimilation system that ingests a suite of observations including the Orbital Carbon Observatory (OCO-2) and state-of-the-art biomass change maps across the carbon cycle to attribute atmospheric carbon variability to anthropogenic and biogeochemical processes. We decompose the spatial drivers of CO<sub>2</sub> accumulation since the beginning of the decade into component fluxes and emissions in the context of the historic 2010 and 2015 El Ninos, which had a tremendous influence on the CO<sub>2</sub> growth rate. These processes reshuffle the primary contributors of CO<sub>2</sub> growth at Stocktake time scales that must be reconciled with Nationally Determine Contributions and concentration targets. Based on these findings, we investigate how systems such as CMS-Flux can harness the carbon constellation to fill a vital gap between policy needs and scientific assessment needed for the Stocktake.