

National Aeronautics and Space Administration

Earth Systems Science Pathfinder Program Office Executive Summary

Winter 2017-2018



Recent project and investigation news and highlights:

(Please click on hyperlinks for more information)

- **Happy Birthday to CYGNSS!!** One year ago (Dec 15, 2016), CYGNSS was launched into low earth orbit. This constellation of eight small satellites in low-Earth orbit uses GPS technology to obtain measurements of wind speeds within hurricanes at an accuracy and resolution that will enable scientists to study storm intensification processes and improve extreme weather forecasts. Check out [this blog post](#) from Principal Investigator Dr. Chris Ruf (University of Michigan), describing highlights from the first year. Thanks to a fruitful collaboration with the NOAA Airborne Operations Center during the 2017 hurricane season, there are now many tracks of wind speed observations from CYGNSS overpasses coincident with observations taken from NOAA's P-3 "hurricane hunter" aircraft that are available for analysis. Also note that new [CYGNSS science data files \(v2.0\)](#) are now available at the [NASA PO.DAAC](#).
- The **GRACE-2** satellite re-entered the atmosphere on December 24, and **GRACE-1** was at an altitude of 280 km as of Jan 3, 2018, expected to re-enter the atmosphere in early March 2018. [GRACE was a pioneering mission](#) that used the dual satellites to obtain precise measurements of the Earth's gravity field for 15 years. This has enabled scientists to calculate changes in sea level, ground water, ice, and solid Earth mass that have benefited environmental monitoring and forecasts of water consumption, agriculture and industry, flood and earthquake hazards, and climate impacts. The mission is a U.S./German collaboration and is lead by Principal Investigator Byron Tapley at the Center for Space Research at the University of Texas at Austin.
- On December 12, the **OCO-2** Science Team [published a collection of 5 papers](#) in the journal Science that demonstrate the breadth of the research stemming from 2 ½ years of OCO-2 data. The groundbreaking studies were announced at a NASA Briefing on October 12, 2017. The team of OCO-2 scientists reported that the growth rate in CO₂ during 2015-16 was 50% greater than recent averages, and was largely [the result of significant drought conditions in tropical forests caused by the 2015-16 El Nino](#). An additional study suggested that this spike in CO₂ growth rate had been likely somewhat moderated because the El Nino-driven warmer Pacific waters suppressed the CO₂ release by oceans. Accompanying studies showed that the measurements from OCO-2 were of high enough resolution to isolate CO₂ sources with small footprint sizes on a global scale, such as from individual cities and volcanoes. Additionally, the instrument on OCO-2 was shown to observe solar-induced fluorescence (SIF) at a high enough resolution to enable direct comparison with ground-based measurements of the flux of carbon dioxide between plants and air, setting the direction for future in-depth studies of the relationship between SIF and global photosynthesis.
- The [Earth Venture Suborbital-3 solicitation](#) was released on December 8. Proposers are strongly encouraged to submit a NOI by January 31, 2018. Proposals are due April 12, 2018.