H.R. 2157 Additional Supplemental Appropriations for Disaster Relief Act, 2019: “HSUP19”

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The bill passed Apr 9, 2019: $17.2 billion in FY19 supplemental appropriations to several federal agencies for expenses related to the consequences of recent wildfires, hurricanes, volcanos, earthquakes, typhoons, and other natural disasters.

...including: $25,000,000 to NOAA to improve: (a) hurricane intensity forecasting, including through deployment of unmanned ocean observing platforms and enhanced data assimilation; (b) flood prediction, forecasting, and mitigation capabilities; and (c) wildfire prediction, detection, and forecasting
FY18 Supplemental project areas
$50M, 27 projects, over 100 sub-projects

- Accelerate Improvements in Weather Forecasting
  - $18.440M Allocated Funding
  - 8 Projects
  - OAR: $18.440M

- Accelerate Improvements in Flood Forecasting and Mitigation
  - $8.252M Allocated Funding
  - 5 Projects
  - NWS: $6.750M
    - NOS: $1.502M

- Accelerate Improvements in Hurricane Intensity Forecasting
  - $10.548M Allocated Funding
  - 7 Projects
  - NWS: $7.250M
    - OAR: $2.750M
    - OMAO: $0.548M

- Accelerate Data Assimilation from Observations to Improve Forecasting
  - $12.760M Allocated Funding
  - 7 Projects
  - OAR: $1.250M
    - NWS: $7.000M
    - NESDIS: $4.510M
FY19 Supplemental project areas
$25M, 12 projects (still pending approval)

- **Hurricane Intensity Forecasting**, including observations and DA
  - $9.2M
  - 4 Projects:
    - 3.5M NWS
    - 2.2M OAR
    - 1.8M NESDIS
    - 1.8M NOS

- **Flood prediction**, forecasting & mitigation
  - $7.9M
  - 5 Projects:
    - 2.6M NWS
    - 0.8M NWS
    - 1.8M NESDIS
    - 2.6M NWS

- **Wildfire prediction**, detection & forecasting
  - $4.4M
  - 3 Projects:
    - 1.8M NWS
    - 1.8M OAR
    - 0.8M NESDIS
HU-1 Prototype UFS based RRFS (Rapid Refresh Forecast System) on the Cloud

- Lead: A. Chawla ($3.5M)
- Goal: Accelerate the development of CAM ensemble UFS system using cloud
- Ultimately, RRFS will replace NAM, SREF, RAP, HRRR, HiRewW, HREF
  - This process is compute-limited. Once ported to the cloud, options to accelerate development will open.
- So far UFS cloud projects have focused on FV3 and GEFS
- CAM-cloud will add DA, V&V, test CCPP physics.
- Hurricane cloud modeling would need to add coupling and adjust DA, physics
- HU-1 will leverage
  - HSUP 1A-4b: Accelerate SAR FV3 CAM Development
  - HSUP 1A-5: Accelerate FV3-based ensemble prediction system
  - EPIC-FY19: Improve spread-skill with stochastic physics
  - EPIC-FY19: Multigrid background error covariance model for high-res DA
HU-2 Accelerate the development of the Hurricane Analysis and Forecasting System (HAFS)

- Lead: J. Cortinas ($2.2M)
- Goal: Accelerate the development of DA for HAFS
  - High-resolution (JEDI) DA for HAFS static nest and moving nest
  - Analysis component of HAFS to effectively use high-resolution observations
  - Needed for probabilistic hazard information using FACETS framework
- HU-2 will leverage
  - HSUP FY18: 1A-4a, 1B-2, 3A-1, 3A-2, 3B, 4A-1, 4A-2, 4B-2, HAFS & JEDI
HU-3 Increasing satellite data use and impacts in hurricane analysis and prediction leveraging AI applications

- Lead: K. Garrett ($1.8M)
- Goal: Increase volume and quality of satellite observations used in NWP to improve hurricane analysis and forecasts
  - Increased utilization of passive microwave sensors, infrared sensors and scatterometers
  - AI for satellite data preprocessing, all-sky satellite radiance data assimilation and hurricane location and intensity analysis
  - AI/ML based Simultaneous Wind-Rain algorithm in FV3GFS
  - AI/ML developed for 3D-winds using GOES imagery and HWRF forecast
- HU-3 will leverage
  - JEDI
HU-4 Autonomous Observation in Support of Hurricane Intensity Forecasts

- Lead: Carl Gouldman ($2.2M)
- Goal: Expand existing autonomous technologies to improve (e.g. temperature, salinity, surface air pressure) observations in regions known to cause rapid intensification or weakening of tropical cyclones
  - Deploy autonomous underwater gliders throughout hurricane season in regions of high model uncertainty
  - Air-deploy drifters with Sea Level Pressure sensors designed for hurricane observations, from C-130 and NOAA’s P3 aircraft, ahead of and within TCs.
  - Seed and maintain network of Hardened Directional Wave Spectra Drifters (HDWSD) on the eastern seaboard with real-time data availability and bi-directional satcomms
- HU-4 extends observations started under HSUP18
Advance ocean data assimilation and coupling of air-sea models in the NOAA Unified Forecast System (UFS) for improved flood and inundation forecasting through coordination with NWS and NOS.

- **Lead:** A. Mehra ($2.6M)
- **Goal:** Advance developments of high resolution Ocean Data Assimilation techniques for oceanographic data from in situ and remote platforms to support improvements to hurricane intensity forecast models and surge predictions in the HAFS/UFS and Marine JEDI frameworks.
  - Integrate ROMS within UFS
  - Implement ROMS 4D-Var in JEDI
  - Ingest high resolution ocean observations in JEDI
  - Build Hybrid ODA for HAFS

- **FL-4 will leverage**
  - JEDI, HAFS
Conclusions

- FY19 Supplemental - fewer, larger projects
- These projects are still pending final approval by Supplemental Executive Committee
- Important to integrate projects among Supplementals in FY18, FY19, UFS (NGGPS & EPIC) and HFIP programs
- FY18-FY19 Supplementals: Important to demonstrate significant milestones/deliverables