

# SAB Work Plan Topic 2: Review the Use of Observing System Simulation Experiments (OSSEs)

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Xubin Zeng, EISWG Member  
Brad Colman, EISWG Co-Chair  
Eugenia Kalnay, University of Maryland  
and SAB Member

## Topic 2 Guiding Statement:

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An OSSE is a modeling experiment used to evaluate the impact of new observing systems on operational forecasts when actual observational data are not available. OSSEs are done: 1) to find out if a new observing system will add value to NWP analyses and forecasts; 2) to make design decisions for a new observing system; and 3) to investigate the behavior of data assimilation systems in an environment where the system's behavior is known (paraphrased from Prive & Errico PPT, 2015).

NOAA has a Quantitative Observing System Assessment Program that uses OSSEs for a number of purposes related to NOAA's observing and modeling activities for both the atmosphere and ocean. These OSSEs are mandated by Section 107 of the Weather Act and follow the rigorous methodology for performing OSSEs that was established by (Atlas et al., 1984) and described in detail by Hoffman and Atlas (2016) in the Supplement to their article on future OSSEs in the Bulletin of the American Meteorological Society.

# Topic 2 Work Plan

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- **Objective:**

- Review the use of OSSEs in NOAA, Navy, NASA, and elsewhere
- Develop options for NOAA to consider current and future research and development (R&D) work in this area, such as the combination of OSSEs with EFSO (which is being carried out at AOML with UMD collaboration, and is expected to strongly enhance and accelerate the current abilities of OSSEs).

- **Confirmed Team:**

- EISWG Members: Bill Hooke, Ron Birk, Bob Weller, Xubin Zeng (Chair)
- SAB members: Eugenia Kalnay and Susan Avery (SME)
- Climate Working Group members: Joellen Russell, Fuqing Zhang, Raghu Murtugudde
- NOAA liaison: Lidia Cucurull and Bob Atlas, NOAA AOML
- Domain experts: Fred Carr (note that other people mentioned here, such as Bob Atlas and Eugenia Kalnay, are also domain experts)
- External Agency Partners: Derek Posselt (NASA JPL)

- **Deliverables:**

- A short white paper that will review the use of OSSEs in NOAA, Navy, NASA, and elsewhere; and develop recommendations for NOAA to consider and provide rationales for each recommendation made.

# Original Timeline

**Aug. 31, 2018:**  
Submit the EISWG  
OSSE work plan to  
SAB

**Oct. 31, 2018:**  
Review the use of  
OSSEs in NOAA,  
Navy, NASA, and  
elsewhere

**Jan 31, 2019:**  
Revise the white  
paper based on  
EISWG and other  
inputs

**Sept. 30, 2018:**  
Finalize the team  
membership

**Dec. 31, 2018:**  
Develop  
recommendations for  
NOAA to consider;  
finish the draft white  
paper

**Mid-Feb 2019:**  
Finalize the white  
paper for  
submission to the  
SAB

# Revised Timeline

**Aug. 31,  
2018:** Submit  
the EISWG  
OSSE work  
plan to SAB

**Late-Dec  
2018/Early-Feb  
2019:** Collect  
short write-ups  
from team  
members

**Feb. 27,  
2019:**  
Present initial  
thoughts for  
white paper  
to the SAB

**Apr. 23-24  
2019:** Finalize  
the white  
paper for  
submission to  
the SAB

**Early Dec.  
2018:** Finalize  
the team  
membership

**Jan. 2019:**  
OSSE Task  
Force face-to-  
face meeting

**Apr. 2, 2019:**  
Present Interim white  
paper to the EISWG  
members for  
comment and input

# Activities since Nov 2018 Update on Topic 2 - 1

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- EISWG OSSE Task Force Meeting in early January 2019 (during the AMS Annual Meeting in Phoenix)
  - Meeting Participants:
    - Xubin Zeng, Lead, NOAA EISWG
    - John Snow, EISWG Chair
    - Bill Hooke, EISWG Member
    - Ron Birk, EISWG Member
    - Joellen Russell, CWG Member
    - Fred Carr, University of Oklahoma
    - Derek Posselt, NASA
  - Main outcome of the meeting is the establishment of the organizational structure for the OSSE White Paper
    1. **Section 1:** OSSE Capability/Practice
    2. **Section 2:** When, on what decision, and with what approach are OSSEs useful? When and on what decision is the value of OSSEs limited
    3. **Section 3:** Recommendation on what NOAA might do in the near future with respect to OSSEs.

# Activities since Nov 2018 Update on Topic 2 - 2

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- Nine team members have provided written contributions by 2/5/2019: R. Birk, R. Weller, E. Kalnay, B. Hooke, D. Posselt, F. Zhang, F. Carr, R. Atlas and L. Cucurull
- While we don't have a member from Naval Research Laboratory (NRL), Dan Tyndall and his colleagues (N. Baker, D. Flagg, C. Barron, M. Carrier, S. Smith, D. Allen, and K. Hoppel) there helped us by providing the summary of OSSEs at NRL
- A preliminary report is being circulated among the team members for iterations.

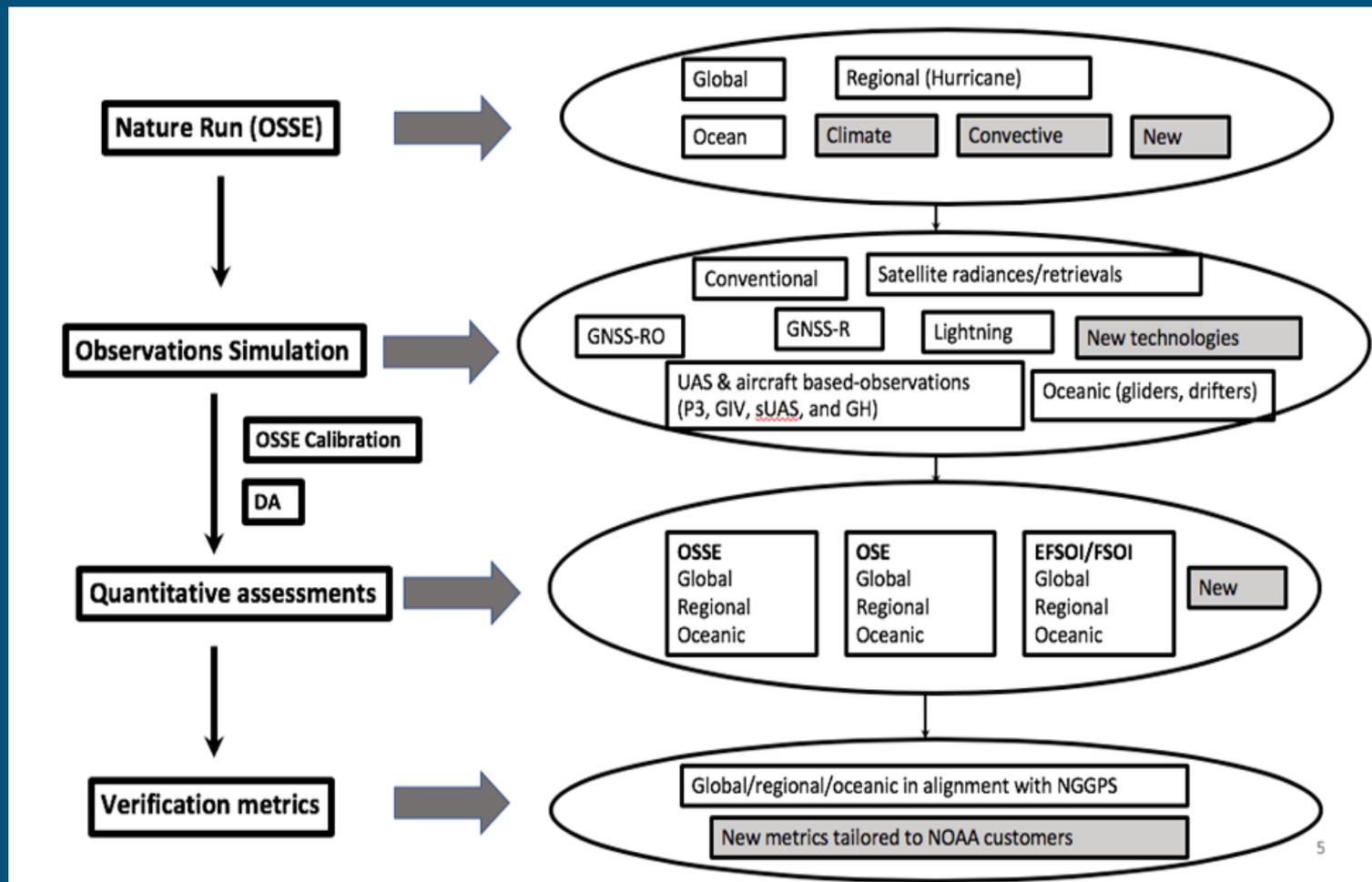


Diagram showing the different components of the OSSE system at NOAA AOML

# Some thoughts on discussion and findings

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- Use OSSE, OSE, FSO, EFSO synergistically
- Develop OSSEs for earth system models
- Use OSSEs to address major observational systems and investment strategies (e.g., sea ice prediction, different types of satellites)
- Extend OSSEs to societal impacts

# Discussion