Day 1 Morning: Session 1: OAR/CPO/ESSM Overviews and Panel Discussion

08:00 Coffee and refreshments

08:15: Welcome/logistics and workshop introduction (Jin Huang)

8:30-10:00 (Chair: Jin Huang; Rapporteur: Nicholas Komisarjevsky)
- OAR remarks (Ko Barrett, 10 min)
- CPO overview (Wayne Higgins, 20 min)
- CPO/ESSM overview (Jin Huang, 20 min)
- Major climate science challenges and opportunities (Jean-Francois Lamarque, 20 min)
- Engaging the external research community: a historical view (Dennis Lettenmaier, 20 min)

10:00-10:20 Break

10:20-11:15 Short talks (5 minutes/3 slides) (Chair: Sandy Lucas; Rapporteur: Cody Sullivan)

- OAR labs overviews (mission; core capabilities; gaps/needs): AOML (Molly Baringer); ARL (Ariel Stein or Howard Diamond); ESRL/CSD (Tom Ryerson); ESRL/GMD (Jim Butler); ESRL/GSD (Stan Benjamin); ESRL/PSD (Robin Webb); GFDL (Yi Ming); GLERL (Phillip Chu); NSSL (Harold Brooks); PMEL (Chidong Zhang)

11:15-12:30 Panel Discussions (panelist remarks and participant interaction): Values of engaging the external community, role of CPO grants programs, and coordination/partnership strategies.

Panel members: Ana Barros (Lead), Chidong Zhang (PMEL), Yi Ming (GFDL), Roger Pulwarty (PSD), Jim Hurrell, Mike Patterson (USCLIVAR)

Rapporteur: David Herring

12:30-1:30 Lunch (Lobby outside of Spring Room)
Day 1 Afternoon: Session 2: Research to advance climate science and to enable societal resilience to extremes

1:30 -3:30: Presentations to highlight the key issues and relevance to CPO/ESSM
(Chair: Sukyoung Lee; Rapporteurs: Nicholas Komisarjevsky – Applications Perspectives & Science Overviews, Cody Sullivan – NOAA Core Capabilities)

- **Application perspectives on climate research needs (15 min. each)**
  - Climate intelligence for coupled human-natural systems from summit to sea (Ana Barros)
  - Upstream research to advance NWS Unified Forecast Model (Hendrik Tolman)
  - Climate linkage to atmospheric composition (wildfire, air quality) (Tom Ryerson)

- **Science overviews and pressing research needs (15 min each)**
  - Multi-scale predictability and model improvements (Magdalena Balmaseda)

- **NOAA core capabilities and major gaps (10 min. each)**
  - Modeling of the Earth system (Yi Ming)
  - Subseasonal-to-seasonal-to-decadal prediction system (Andrew Wittenberg)
  - OSSE (Molly Baringer)
  - Interactions of aerosols and clouds (Graham Feingold)
  - Decadal predictabilities of extremes (Matt Newman)
  - Attributions of climate extremes (Martin Hoerling)

3:30-4:00 Break

4:00-5:00: Discussions on the pressing research needs, potential CPO/ESSM research priorities and partnership strategy (Lead: Ben Kirtman; Rapporteur: David Herring)

Day 2 Morning: Session 3: Climate research to inform coastal and marine ecosystem management

08:00: Coffee and refreshments

08:15-10:00 Presentations to highlight the key issues and relevance to CPO/ESSM
(Chair: Dan Barrie; Rapporteur: Nicholas Komisarjevsky)

- **Application perspectives (15 min. for each talk)**
  - Climate science needs for Fisheries (Cisco Werner)
  - Climate science needs for Ocean Service (Mark Osler)

- **Science overviews and research needs (15 min. for each talk)**
  - Coupling at the ocean-atmosphere interface – boundary layer processes (Joellen Russell)
  - Advances in global Earth system predictions for marine ecosystem applications (Charlie Stock)
  - Towards a multi-scale Earth system model: challenges and opportunities (Enrique Curchitser)
  - Climate research for marine resources and ecosystem applications (Mike Alexander)
  - Ocean forecasts for marine resources management (Mike Jacox)
10:00–10:30 Break

10:30-11:30: NOAA core capabilities and major gaps (10 min for each talk)
(Chair: Ken Mooney; Rapporteur: Cody Sullivan)
- Ocean Acidification Program (Dwight Gledhill)
- Ocean Carbon and BGC Argo (Rik Wanni
khof)
- Innovative observing technologies for studying the marine ecosystem (Chris Meinig)
- Climate and ocean ecosystem projections for fisheries management in Alaska (Anne Hollowed)
- GLERL (Philip Chu)
- Producing and providing climate intelligence related to coastal inundation (Billy Sweet)

11:30-12:30: Discussions on the pressing research needs, potential CPO/ESSM research priorities and partnership strategy (Lead: Jim Hurrell, Rapporteur: David Herring)

12:30-1:30 Lunch (Lobby outside of Spring Room)

12:30-1:30 ESSM Council and Organizing Committee Side Meeting: to reflect the takeaways from the workshop so far; and to discuss the next steps to develop and disseminate the workshop report.

Day 2 Afternoon: Session 4: Linking observations to process understanding and model improvements (Chair: Monika Kopacz; Rapporteur: Cody Sullivan)

1:30-3:00 Short presentations to highlight NOAA existing observational and modeling capabilities, process studies and needs for their integrations (10 min for each talk)
  o Introduction (Lori Bruhwiler, 5 min)
  o JPSS (Mitch Goldberg)
  o NCEI (Russell Vose)
  o A multi-lab and integrated observation/modeling approach to improving understanding land-atmosphere interactions (Dave Turner and Tilden Meyer, 20 min)
  o GMD (Jim Butler)
  o AOML (Gustavo Goni)
  o PMEL (Chidong Zhang)
  o GFDL (Yi Ming)

3:00–3:00 Break

3:30-4:30: Discussions on the pressing research needs, potential CPO/ESSM research priorities and partnership strategy (Lead: GMD/Lori Bruhwiler; Rapporteur: Nicholas Komisarjevsky)

4:30-4:45: Brief workshop summary and closing remarks (Jin Huang)