1530 – 1730	PSMI Panel Business
1530 – 1545	Overview of gaps in process studies from survey (Caroline)
1545 – 1615	Discussion: Gaps in existing process studies: How to approach gaps via top-down or bottom-up? (Tom)
1615 – 1700	Discussion: PSMIP contributions in light of US CLIVAR Science Plan (Alessandra)
1700 – 1730	Revisit Terms of Reference & role of PSMIP (Gad/Caroline)

Questions / objectives for this breakout session:

→ How can PSMI have a more active role? e.g.,

- **facilitating closing gaps in existing process studies/identify up and coming critical process studies in the community**
- **Engaging with other panels**
- **contributing to US CLIVAR Science Plan**
- **raising profile/visibility of US CLIVAR science contributions**

→ Division of labor amongst panelists / POCs for specific tasks?

→ Revised order of items in Terms of Reference?

Model improvements and needs – Modeling center survey (fall 2014)

Expansion of CPTs to other realms:

In principle supportive, but not through single CPT solicitation (too broad/diluted); agencies should be focused in CPT solicitation to make meaningful contributions to programs/constituents; process-understanding in some realms possibly not ready for CPT, yet

ESM aspects requiring most attention often cite processes at interface between different realms, e.g.:

- Coupling/consistent and scale-insensitive parameterization of subgrid scale processes, fluxes/ exchange between different model system components
- Ice-ocean interactions and sea-ice dynamics (glacier-fjord models, sea-ice thermodynamics)
- Air-sea interactions (atmospheric boundary processes, near-surface ocean processes)
- All aspects of hydrological cycle and convective parameterization (snow and aerosol models)
- Coastal/marginal sea processes (e.g., estuarine mixing, coastal upwelling)
- Vertical transports and surface processes in ocean (e.g., overturning, upwelling, waves)
- Polar feedbacks (e.g., ice-albedo, cloud radiative)
- Biogeochemistry (e.g., carbon cycle and climate feedbacks, ocean biology, dynamic vegetation)
- Interaction between land (canopy) and atmosphere

Model improvements and needs – Modeling center survey (fall 2014)

Strongest model biases:

- Double ITCZ, precipitation intensity distribution across all spatiotemporal scales, tropical cyclones
- Ocean heat uptake, storage, and redistribution; biases in tropical ocean SST
- ENSO (e.g., amplitude, periodicity), MJO and other modes of climate variability (PNA, NAO, AO)
- Coastal upwelling and stratus decks (eastern boundary regions, including ocean biogeochemistry)
- Clouds (e.g., aerosol-cloud interactions, low-level clouds, liquid/ice water content)
- Diurnal cycle over land and ocean
- Subtropical cloud radiative effects in the Southern Ocean
- Ice-sheet dynamics and discharge

Model improvements and needs – Modeling center survey (fall 2014)

Specific climate processes with potential to improve models in 3-5 years:

- Meso- and submeso-scale mixing in ocean (waves, tidal mixing); Southern Ocean mixing
- Cloud microphysics (including aerosols), atmospheric turbulence, aspects of convection modeling (such as convective detrainment, cold pool triggering), cloud-radiation interaction
- Interaction between marginal seas and open ocean (including freshwater discharge)
- Upwelling (coastal, equatorial) and links to stratus decks (clouds)
- Multi-decadal internal climate variability (AMO), and QBO to be resolved in the stratosphere
- Increased model resolution and scale-aware parameterizations for various processes
- Diurnal-to-annual surface processes (land and ocean)
- Ice-sheet atmospheric interactions, ice-sheet dynamics, ice-ocean interactions
- Terrestrial carbon stores and land surface (surface/subsurface hydrological processes, LULCC)

Specific processes with potential to improve models in 3-5 years

Modeling centers

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Process studies

New parameterization schemes:
subgridscale ocean mixing; next-generation parameterization of internal-wave mixing; representation of calving; gravity currents; cloud parameterization CLUBB; representation of clouds and turbulence; equatorial mixing parameterizations; cloud/aerosol interaction parameterizations

Process understanding:
Western boundary currents; IASCLIP; cloud-atmosphere interactions in Arctic; eastern upwelling regions; glacier/ocean interaction

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Surveys produced a lot of information → how best make use of this (beyond CPT workshop)?