[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-CG Complex & General

[A-CG34]Extratropical oceans and atmosphere

convener:Hatsumi Nishikawa(Institute of Low Temperature Science, Hokkaido University), Yoshi N Sasaki(Hokkaido University), Satoru Okajima(東京大学先端科学技術研究センター, 共同), Thomas Spengler(University of Bergen)

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The extratopical ocean had been considered passive to atmospheric variability. Recent studies, however, revealed some active role of the extratopical ocean in modulating the atmosphere. The goal of this session is to deepen our understanding of the air-sea interaction in the extratropics. A wide variety of researches whose topics range from mesoscale to basin-scale, and from daily to global warming are welcomed. Researches on cloud, aerosol, and ecosystem related to the extratopical air-sea interaction are also welcomed.

[ACG34-P05]Global Climatology of Baroclinicity and its Variations: Role or Air-Sea Interactions

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The positioning and maintenance of mid- and high-latitude baroclinicity and associated storm tracks is still not fully understood. In particular, the relative role of surface inhomogeneities, such as land-sea contrasts and fronts in sea surface temperature versus the role of diabatic and adiabatic processes in the free troposphere, are still debated. A seminal paper pointed to the self-maintenance of storm tracks via diabatic heating of the storms themselves, which would imply that the storms not only live off the baroclinicity, feeding from its available potential energy, but would actually also act to resupply baroclinicity for subsequent development. Recent studies emphasise the importance of sea surface temperature fronts on positioning storm tracks. Using a recently introduced diagnostic analysing the slope of isentropic surfaces and its tendency, we assess the relative roles of diabatic and adiabatic effects in maintaining baroclinicity in the lower and upper troposphere.

We present a global climatology of baroclinicity for summer and winter, measured by the slope of isentropic surfaces. As expected, the storm tracks are clearly visible in the mean baroclinicity, as well as their seasonal progression. Furthermore, the previously claimed self-maintenance of storm tracks is confirmed, with the diabatic tendencies balancing the adiabatic tendencies in the time mean, where the diabatic tendencies are mostly associated with extratropical cyclones and act to increase baroclinicity. In addition, we highlight certain differences between the Atlantic and Pacific storm tracks in terms of their maintenance by the aforementioned processes. We also contrast the two main storm tracks in the Northern Hemisphere to the storm track in the Southern Hemisphere. We will also shed light on the potential role of sea surface temperature and fronts and land-sea contrasts in this framework for baroclinicity.