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 [JJ] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-OS Ocean Sciences & Ocean Environment

## [A-OS15] Dynamics of oceanic and atmospheric waves, vortices, and circulations

convener: Ryo Furue (APL/JAMSTEC), Yuki Tanaka (Graduate School of Science, The University of Tokyo), Yukiharu Hisaki (琉球大学, 共同), Norihiko Sugimoto (Keio University, Department of Physics)

Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Oceanic and atmospheric dynamics aims at abstracting general principles from observed phenomena and constructing a system of mathematical models, thereby leading to the understanding, prediction, and parameterization of those phenomena. It provides perspectives for the advancement of sciences in various areas such as wind waves, swells, internal waves, Rossby waves, equatorial waves, tides, eddies, meandering of jets and fronts, general circulation, boundary layers, and ocean-atmosphere coupled modes. It has also been and will continue to be benefited by new uses of ideas and methods from such theories as resonance, nonlinear interaction, spectral analysis, probability, statistics, and dynamical systems. In this session, we solicit presentations on observational, experimental, numerical, and theoretical studies of oceanic and atmospheric dynamics and on exploratory use of new ideas and methods. We also welcome presentations on new methods of data analysis and on interdisciplinary studies in fields such as climate and environment.

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## [AOS15-P02] Inertia-gravity wave radiation from the vortex in the f-plane shallow water

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Keywords: inertia-gravity wave, shallow water system, spontaneous emission

Inertia-gravity waves propagate far from the source region and drive general circulation of the middle atmosphere. Recently, it has become clear that inertia-gravity waves are spontaneously radiated from unsteady motions of strong flows, such as jet. Here, inertia-gravity wave radiation from the vortex is investigated in the f-plane shallow water system. The f-plane shallow water system is the most simplified system in which both the vortex and inertia-gravity wave exist. If the effect of the Earth rotation is negligible, the system is equivalent to the 2-dimensional compressible fluid system. Therefore, inertia-gravity waves are considered as sound waves in the aero-acoustic theory. In the poster, far fields of inertia-gravity waves radiated from several vortical configurations, such as vortex pair, merging of them, and elliptical vortex, are derived analytically and simulated numerically.

[1] Inertia-gravity wave radiation from the elliptical vortex in the f-plane shallow water system, Norihiko Sugimoto, *Fluid Dynamics Research*, Vol. 49, (2017), 025508, 17pp.

[2] Inertia-gravity wave radiation from the merging of two co-rotating vortices in the f-plane shallow water system, Norihiko Sugimoto, *Physics of Fluids*, Vol. 27, (2015), 121701, 6pp.

[3] Cyclone-anticyclone asymmetry in gravity wave radiation from a co-rotating vortex pair in rotating shallow water, Norihiko Sugimoto, Keiichi Ishioka, Hiromichi Kobayashi, and Yutaka Shimomura, *Journal of Fluid Mechanics*, Vol. 772, (2015), p80-106.