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Decomposition of plant litter in sea-fog area along pacific coast of Hokkaido, Japan

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Effects of alternation of microclimate which is caused by frequent fog against terrestrial ecosystem is well known as cloud forest at the higher elevation of tropical mountainous areas. However, knowledge on similar effects at along coast line of cold ocean in the higher latitude area, where sea-fog is observed frequently, is limited. Species composition of plants and animals are better known in these areas, and it is being easier to access the geographical distribution of each species throughout the recent development of database, but material cycling is relatively fewer known. Measurement of plant litter, like leaf, twig or wood, in in-situ environment had a fundamental problem of separation on the effect of both environment and quality of material for decomposition, because no plant distributes all over the world, however, a newly developed method, which is called as Tea-Bag Index (TBI), successfully overcame this problem. Then, in this study, relationship between decomposition of plant litter and micro-climate which is created by frequent sea-fog was studied in eastern Hokkaido, Japan. Sea-fog as a typical advection fog is frequently observed in study area during from April to September when the Pacific High-Pressure Cell supplies warm vapor on south wind. This vapor turns into fog at the surface of the Oyashio, a cold ocean current which flows at offshore of Hokkaido, through cooling, and is carried to coastal area. Carried air which include fog is warmed by land and turned into vapor again at the distant area from coastline. Decomposition late was measured by TBI method at three sites, where slope is faces to south direction, in eastern Hokkaido, Japan; 1) Coastal site locates less than 1 km distant from Pacific Ocean 2) highland site locates at 45 km distant from coastline and 600 m in altitude, and 3) inland site locates at 40 km distant from coastline and 100 m in altitude at the middle of the Konsen Plateau. Decomposition late from July 2015 to July 2017 was lower in coastal site than inland and highland site, although in-situ soil temperature during decomposition seasons was similar between coastal and inland sites, and higher than highland site. Slower decomposition in foggy area which followed the prediction of the present study was found, although obtained in-situ soil temperature denied the predicted alternation of microclimate which is caused by frequent sea-fog in coastal area. These findings suggest that some mechanism, which is caused by sea-fog, other than alternation of temperature might more control on decomposition of plant litter.