

HyARC Seminar(#159)

Date: October 7 (Monday) 15:00-

Room: Meeting room (617) of Research Institutes Building

Speaker: Prof. Thomas Giambelluca (Department of Geography,  
University of Hawaii/HyARC, Nagoya University)

Title: Mapping evapotranspiration in the Hawaiian Islands

Summary:

Knowledge of evapotranspiration (ET) is critically important for numerous applications in hydrology, water resource assessment, and ecology. In the Hawaiian Islands, the spatial patterns of ET-relevant climate variables are extremely diverse because of elevation- and exposure-related effects on temperature, cloud cover, and precipitation. In this study, mean ET, and the components of ET (soil evaporation, wet-canopy evaporation, and transpiration) were estimated at an hourly interval for the diurnal cycle of each month. Solar and net radiation were estimated using cloudiness and surface characteristics from satellite remote sensing, clear-sky radiation simulations, and ground-based observations. Other spatial data sets developed or acquired for use in estimating ET included air temperature, relative humidity, wind speed, soil moisture, fractional canopy wetness, fractional vegetation cover, vegetation height, leaf area index, land cover type, and maximum stomatal conductance. All variables were estimated for the main Hawaiian Islands at a resolution of 250 m. In total, more than 12,000 digital maps were produced for this study. Results show that across Hawai'i mean annual solar radiation varies from 130 to 296 W m<sup>-2</sup>. Low solar radiation is found along cloudy windward slopes below the trade-wind inversion level and in terrain-shaded valleys, while the highest values occur at the high mountain summits of Mauna Kea and Mauna Loa. ET has a complex spatial pattern reflecting variations in net radiation, moisture availability, and vegetation characteristics. With a few exceptions, annual ET ranged from less than 50 mm at the dry high mountain summits to around 1,700 mm in sunny, irrigated areas.

(given in English)