Typhoon Footprint on Ocean, Atmosphere, and Meteorology in Northwest Pacific during August 2020

Akshansha Chauhan[1]、Yuei-An Liou[1, 2]

(1)Center for Space and Remote Sensing Research, National Central University, 300 Jhongda Rd., Jhongli Dist., Taoyuan City 320317, Taiwan.、(2)National Museum Marine Science and Technology, (NMMST), No. 367, Beining Rd., Zhongzheng Dist., Keelung City, 202010, Taiwan

Natural disasters like Typhoons are a major threat to the coastal regions, cause large-scale destructions along their paths and impact land, ocean, and atmosphere. In the Northwestern Pacific, several typhoons originate from May to August and make their landfall over China, Taiwan, Japan, Philippines, and other countries. From July to September 2020, more than 13 typhoons affected the northwestern pacific region, and 9 of them passed within the 500km range of Taiwan. These typhoons made their landfall over China, North Korea, and South Korea, but no landfall occurred in Taiwan. These conditions were unique in recent years and induced drought conditions in Taiwan during 2020. Hence, we analyzed the impact and association of the cyclonic conditions over the ocean, atmospheric and meteorological conditions from July to September 2020 using satellite, modeled, and station-level data. A strong rise in ocean temperature from surface to 100m depth was observed which helped rise in intensity of typhoons. The change in mixed layer depth indicated the strong upwelling of the ocean water and impacted the ocean salinity in South China, East China, and the Philippines Seas. The mixing of marine aerosols affected the properties of the air quality over Taiwan and also impacted the ozone concentration near the surface. The strong convective forces during the storm conditions also caused a prominent rise in CO and Ozone concentrations. The air quality in Taiwan suffered from rising particulate matter ($PM_{1.0}$ and $PM_{2.5}$) and surface ozone concentration. The back-trajectory analysis of airmass suggested a strong impact of transboundary air pollutants, which caused major health hazards to a large population of Taiwan.

Keywords:Typhoons, Ocean Salinity, Atmospheric Aerosols, Tropospheric Ozone and CO, Transboundary Air Pollutants