• 計畫中文名稱	台灣地區空氣長程傳輸中微粒微生物調查與健康效應評估計畫		
• 計畫英文名稱	Biological Compositions and Health Effects of Long-Range Transported Pollution in Taiwan		
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• 中文關鍵字	沙塵暴；大氣中真菌；流行病學；心肺疾病		
• 英文關鍵字	Dust storm；Ambient fungi；Epidemiology；Cardiopulmonary diseases		
• 中文摘要	有鑑於沙塵中生物性成份可能對台灣地區民眾健康及空氣品質造成影響，本研究配合環保署之相關沙塵研究計畫，進行大台北地區生物性微粒監測調查、評估長程傳輸對生物性微粒成份與濃度的影響，並瞭解長程傳輸事件的可能健康危害。 根據大台北地區生物性微粒的監測結果顯示，戶外最常見、濃度最高的真菌爲 Non-sporulating Fungi、Cladosporium、Penicillium、Aspergillus 以及 Curvularia。而可能影響真菌濃度變化之因素包括季節、空氣污染物及氣象因子。爲進一步瞭解總真菌濃度及重要真菌菌屬與環境因子之相關性，我們利用統計模式評估其相關性。結果顯示，影響真菌濃度的主要環境因子包括採樣地點、温度、降雨量、O3 等等。由於相關性複雜，在評估真菌濃度變化時，應考慮多項氣象因子及空氣污染物間的交互作用。 彙整 2003 年和 2004 年的沙塵期間前後監測結果發現，有多種真菌種類在沙塵期間的濃度高於非沙塵期間，包括 Acremonium、Aspergillus (A. niger 和 other) 、Coelomycetes、Rhinocladiella、Sporothrix 及 Verticillium。而只出現於沙塵暴期間之真菌爲 Botrysporium 及 Trichothecium。此結果顯示，沙塵暴事件確實會影響到北台灣地區的真菌種類及濃度，不過造成真菌濃度成份和濃度變化的機制則需進一步探討。在易感受族群監測網方面，本研究根據環保署發佈之沙塵暴來襲確實時間，於 2004 年 2 月份沙塵暴來襲期間及來襲前後 2 日，徵求了 102 位台大醫學院內科部心臟科之門診病人，完成其心電圖量測、心跳速率變異性（Heart rate variability, HRV）相關參數計算以及基本資料包括年齡、性別、身高、體重、血糖濃度、血中膽固醇濃度、用藥狀況及過去病史等資料收集，並結合微粒超級測站及環保署空氣品質監測資料進行易感受族群空氣污染物與 HRV 相關性之統計分析。本研究在控制年齡、性別、身體質量指數、時間、用藥狀況以及大氣溫度等參數後，我們發現在受測者於沙塵暴事件日及高壓迴流事件日期間，空氣污染物濃度的提高與 HRV 下降有顯著相關性。 在急診病例監測網方面，本研究計畫收集 1997-2002 年環保署監測站空氣品質資料及台大醫院急診室資料，依照疾病及年齡分層後逐一配適最佳迴歸模式。此外，我們選取台大醫院建立急診監測網，於今年		

	沙塵暴來襲時，配合環保署所發佈之沙塵暴預警進行收集急診電子資料與空氣污染監測資料，經由急診醫師檢視並補正錯誤後，應用多層次及個案相關模式分析 2004 年沙塵暴對急診病患健康之影響。本研究配適出 7 個不同的統計模式，分別爲：46 歲以上年齡層之心臟疾病、0~18 歲年齡層之輕微呼吸道疾病、0~18 歲年齡層之嚴重呼吸道疾病、19~64 歲年齡層之輕微呼吸道疾病、19~64 歲年齡層之嚴重呼吸道疾病、65 歲以上年齡層之輕微呼吸道疾病以及 65 歲以上年齡層之嚴重呼吸道疾病。研究結果顯示懸浮微粒及氣候因子爲影響 46 歲以上年齡層之心臟疾病及各個年齡層輕微及嚴重呼吸道疾病急診人數的重要因子。2004 年 2~4 月沙塵暴來襲對 46 歲以上心臟疾病、65 歲以上年齡層之嚴重呼吸道疾病、0~18 歲年齡層之輕微呼吸道疾病、19~64 歲年齡層之輕微呼吸道疾病的急診人數有影響，其他年齡層的疾病急診人數在沙塵暴日與平常日差異較不明顯。
• 英文摘要	The biological composition and health effects of Asian dust events have not been fully investigated in Taiwan. Therefore, we conducted a one-year study to evaluate the effects of Asian dust events on the composition/ concentration of biological particulates in Taipei, and to assess the potential health impacts of long-range transport events. According to our results, the most prevalent outdoor fungi in the Taipei area included Non-sporulating Fungi, Cladosporium, Penicillium, Aspergillus and Curvularia. Ambient fungal concentrations are associated with season, air pollutants and meteorological factors. In order to understand the interactions between major fungi and other environmental factors specifically, we used statistical models to evaluate their associations. According to the model results, the main factors associated with fungal concentrations were sampling locations, temperature, rainfall, O3 and etc. Because of the complex interactions, it is important to consider the influences of both meteorological factors and air pollutants while predicting ambient fungal variations. According to the data collected from 2003 to 2004, we found several fungal taxa had significantly higher concentrations during Asian dust periods, including Acremonium, Aspergillus (A. niger and other), Coelomycetes, Rhinocladiella, Sporothrix and Verticillium. In addition, two fungal genera, Botrysporium and Trichothecium, were only recovered during Asian dust periods. It is apparent that Asian dust events would influence fungal compositions and concentrations in northern Taiwan, but the underlying mechanisms need to be further investigated. To investigate the potential health effects of air pollution resulting from Asian dust events, we recruited 102 cardiac patients in the National Taiwan University Hospital from February 12th to 20th, 2004. We measured subjects？？ 24-hour HRV (Heart rate variability) by ambulatory electrocardiographic (ECG) and collected corresponding air pollutant data, including carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), ozone (O3), particulate matters with aerodynamic diameter less than 10？gm (PM10), from nearby monitoring station of each subject？？s residence for statistical analysis. After adjusted for sex, age, body mass index, hour of day, medication and temperature, the panel of cardiac patients showed significant decreases in heart rate variability (HRV) during the dust storm period. To evaluate the impacts of air pollution on emergency visits, we collected daily emergency admission for cardiovascular diseases, severe and mild respiratory diseases to the National Taiwan University Hospital and air pollutant data of CO, NO2, SO2, O3, particulate matters with aerodynamic diameter less than 2.5？gm (PM2.5) and PM10 from April 12, 1997 to December 31, 2002 in the Taipei metropolitan areas. Time series analysis of daily emergency admission counts was performed using Poisson regression models to establish prediction models. We used the prediction models to explore the associations between daily emergency admissions and air pollutant data during February 3-20, March 31 and April 1-8, which were three Asian dust events affecting Taipei significantly this year. The 90th percentile of mean daily emergency admission count and the maximum daily emergency admission count predicted by the models were used as indices to determine whether daily emergency admission count increased during the three Asian dust events. The results showed that daily numbers of cardiovascular admissions among people over age 46 years, mild respiratory diseases among people age 0-18 years, and severe respiratory diseases among people age 0-18

	and 19-64 years rose with increasing daily PM levels in Asian dust events.