Enhancement of Marine Meteorological Observations in the past 10 Years

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Marine meteorological observations are vital for weather monitoring and prediction, and for the study of climatic conditions over the oceans. The Hong Kong Observatory has been actively collecting and sharing such observations through the operation of a fleet of Hong Kong Voluntary Observing Ships (HKVOS) since 1949.

In 2006, the HKVOS fleet consisted of 36 ships, including container ships, cruise ships, liquefied natural gas ships and vehicle carrier ships, travelling mainly in Southeast Asia, North Pacific and from Asia to Europe, making a total of 2 690 marine meteorological observations. By the end of 2016, the number of ships has nearly doubled, increasing to a total of 67 and leading to a significant increase of marine meteorological observations made by the crew on board to 11 953, more than 4 times the total of 2006 (Figure 1).

With the advance in technology, collection of marine meteorological observations on board ships using shipborne automatic weather stations (AWS) has grown in popularity. In early 2013, the Observatory collaborated with the UK Meteorological Office to install a shipborne AWS on board a HKVOS travelling between Hong Kong and Southampton in UK[1] (Figure 2a). Towards the end of 2013, the Observatory introduced a buoy-type shipborne AWS on board another HKVOS travelling between Hong Kong and New Zealand [2] (Figure 2b). Transmitting observations automatically every hour, these two shipborne AWSs contributed over 13 000 automatic marine meteorological observations in 2016, more than that collected manually by the whole HKVOS fleet in the same year.

Furthermore, the Observatory also started to deploy drifting buoys over the South China Sea to collect mean sea level pressure and sea temperature observations in recent tropical cyclone seasons[3]. In 2016, five drifting buoys were deployed under the Barometer Upgrade Scheme of WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM), collecting a total of 8 692 marine meteorological observations in the region.

In summary, the Observatory contributed more than 34 000 marine meteorological observations globally in 2016, more than 12 times the total in 2006 (Figure 3). In particular, over the South China Sea region, the coverage has become even more extensive (Figure 4) with the number of marine meteorological observations contributed by the Observatory increasing remarkably from 328 in 2006 to 16 462 in 2016!

References

[1] Trial operation of shipborne automatic weather station (http://www.hko.gov.hk/wservice/tsheet/pms/images/HKVOS_AWS.pdf)

[2] Trial Use of Drifting Buoy as Automatic Meteorological Observing System on board Voluntary Observing Ships (http://www.hko.gov.hk/wservice/tsheet/pms/images/Drifting_Buoy.pdf)

[3] The Observatory and the shipping community working together to enhance meteorological observation over the South China Sea (http://www.hko.gov.hk/hkonews/D2/sl20150710_e.htm)

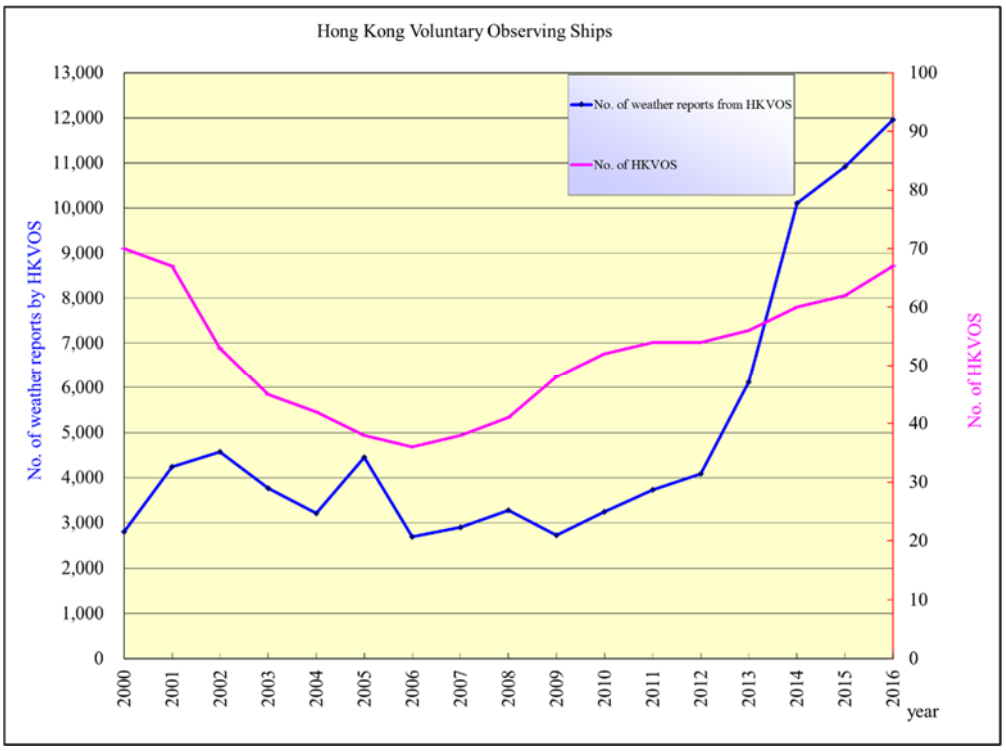

Figure 1. Trends of the numbers of HKVOS and marine meteorological observations made manually by the crews on board HKVOS from 2000 to 2016.

Figure 2a. Shipborne AWS of UK MetOffice on board a HKVOS.

Figure 2b. Buoy-type shipborne AWS on board a HKVOS.

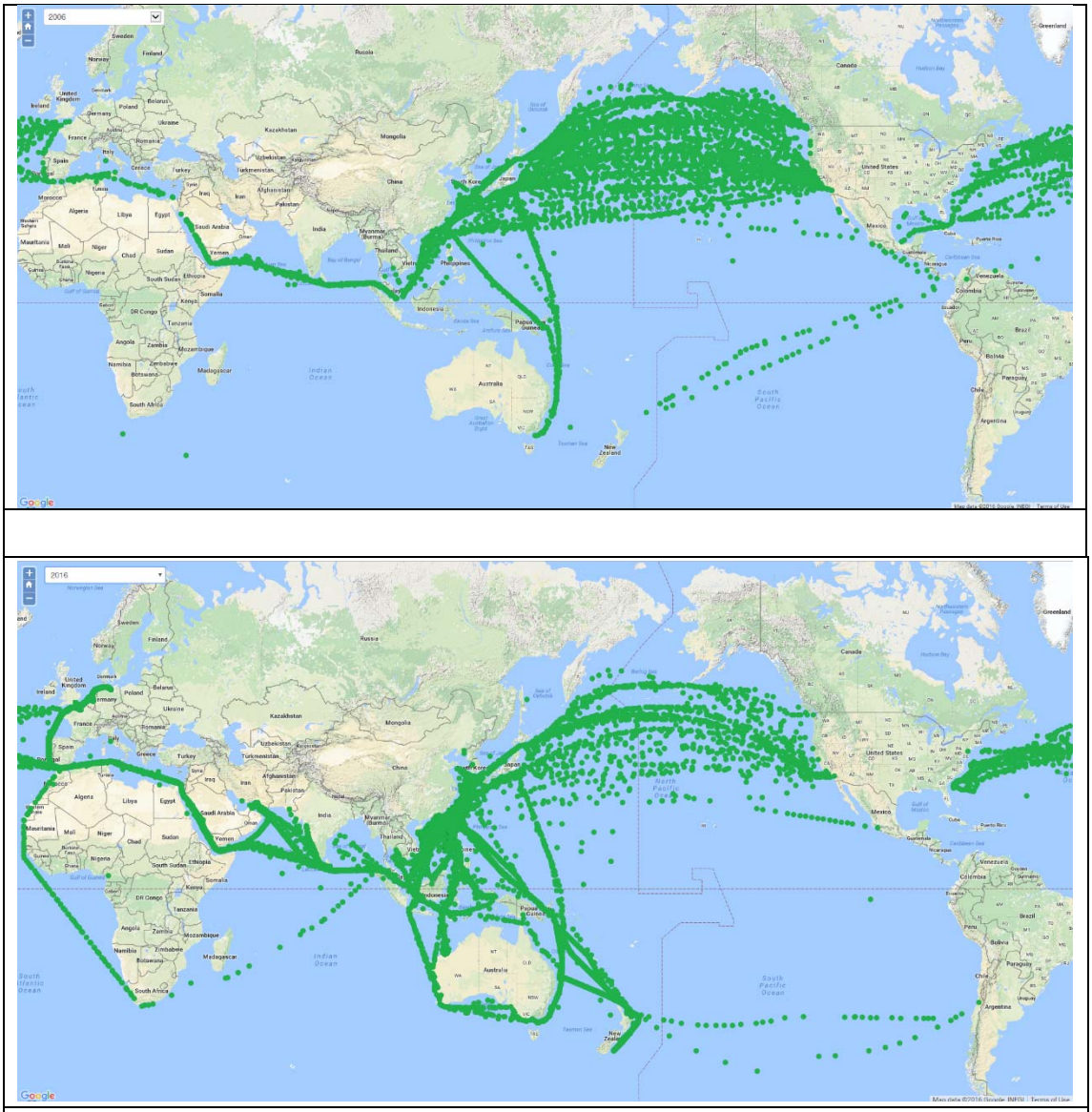

Figure 3. Distribution of marine meteorological observations globally contributed by the Observatory in 2006 (top) and 2016 (bottom).

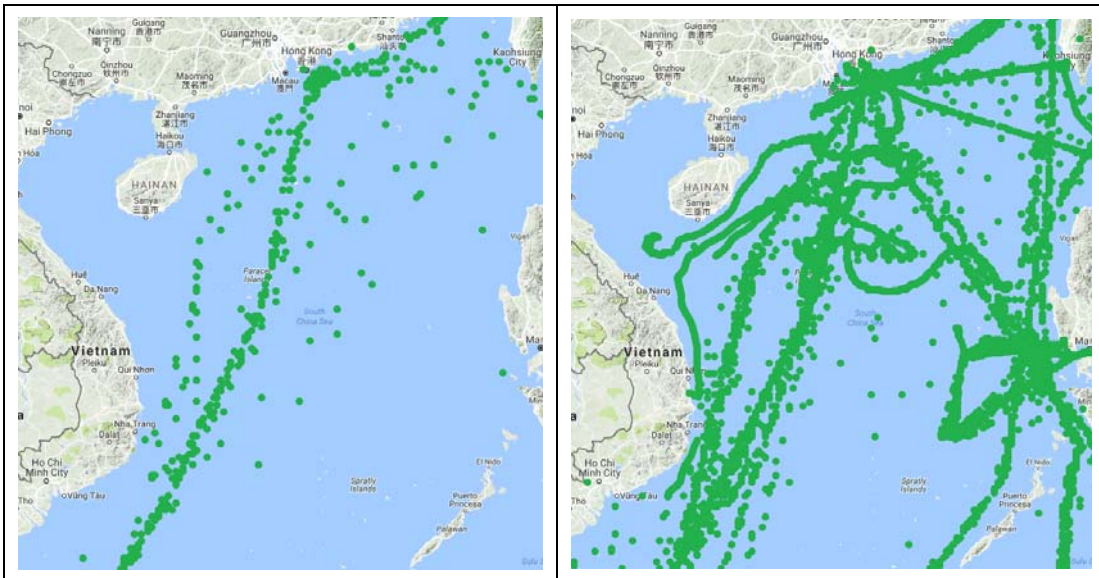

Figure 4. Distribution of marine meteorological observations in the South China Sea region contributed by the Observatory in 2006 (left) and 2016 (right).