

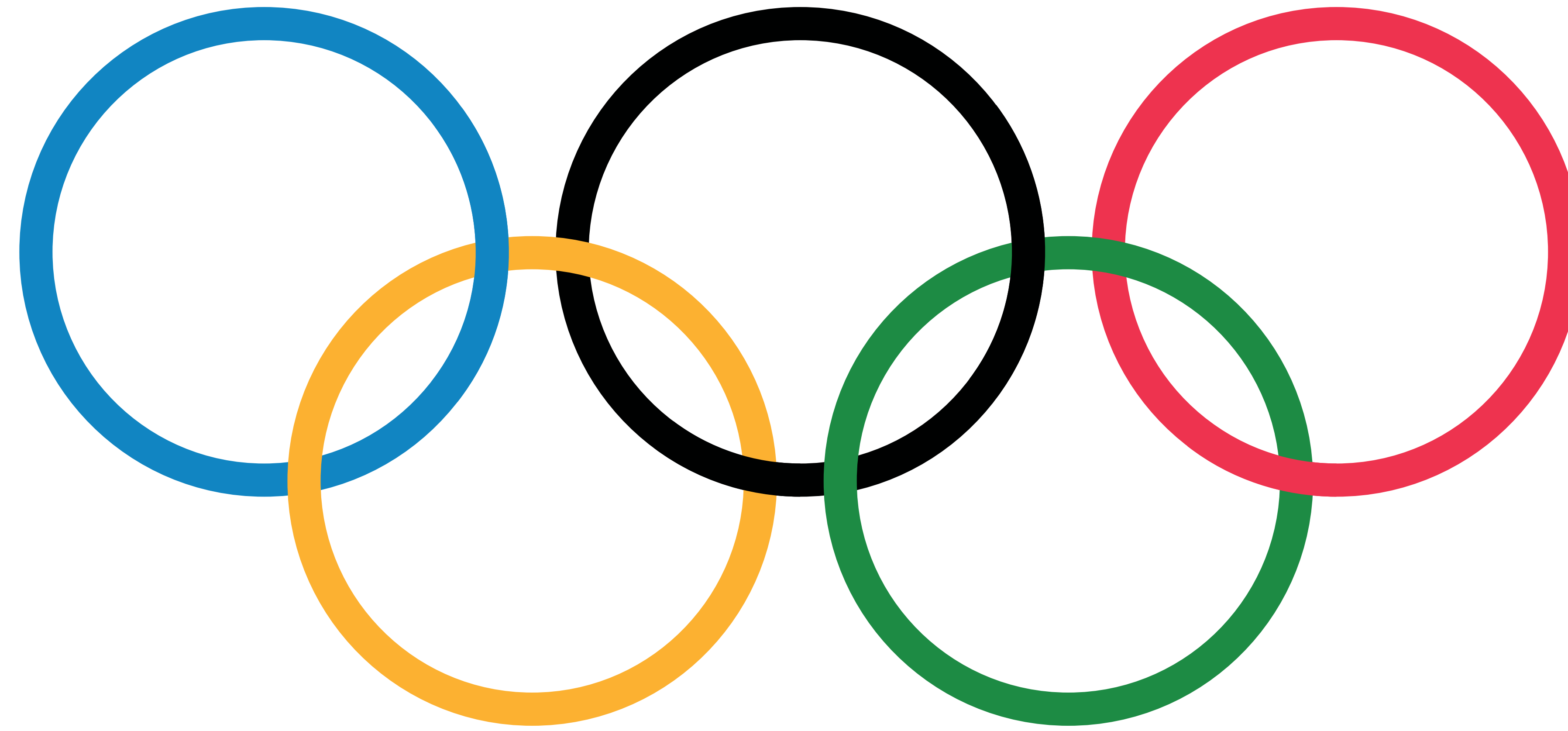
Weather Action Plan for the Olympic Golf Course at the 2016 Olympic Games in Rio de Janeiro

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Introduction

Golf returned to the Olympics in 2016 for the first time in 112 years. The PGA Tour, LPGA, and other golf organizations were heavily involved with the International Golf Federation (IGF) in the planning and organization of golf at the 2016 Olympics. The IGF implemented their own weather action plan at the Olympic Golf Course, independent of the other outdoor venues in Rio de Janeiro. While the Instituto Nacional de Meteorologica (INMET) was assigned to provide remote weather support for the outdoor Olympic Games in Rio de Janeiro, the IGF was the only sports federation to privately contract a meteorologist to work on-site at the Olympic Golf Course with the organizers of the event.

The IGF took extraordinary steps to mitigate the risks associated with lightning and inclement weather to their players, spectators, and staff at the 2016 Olympic Games in Rio de Janeiro. This poster will explain the weather action plan implemented by the IGF and also provide an overview of the lightning and severe weather management system that was put together by the Schneider Electric on-site meteorologist to assess the localized lightning threats and other impactful weather hazards.



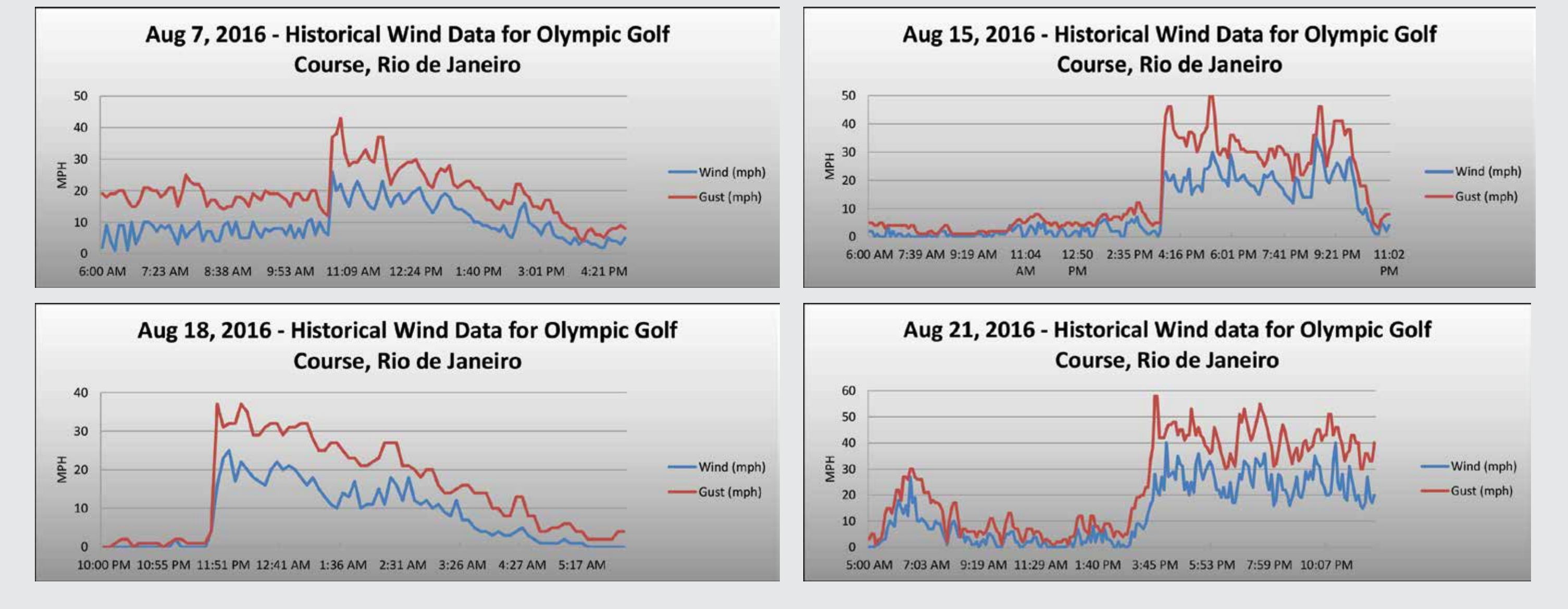
Aerial photograph of the Olympic Golf Course in Rio de Janeiro, Brazil.



Spectator grandstands at the Olympic Golf Course during the final round of the men's competition.

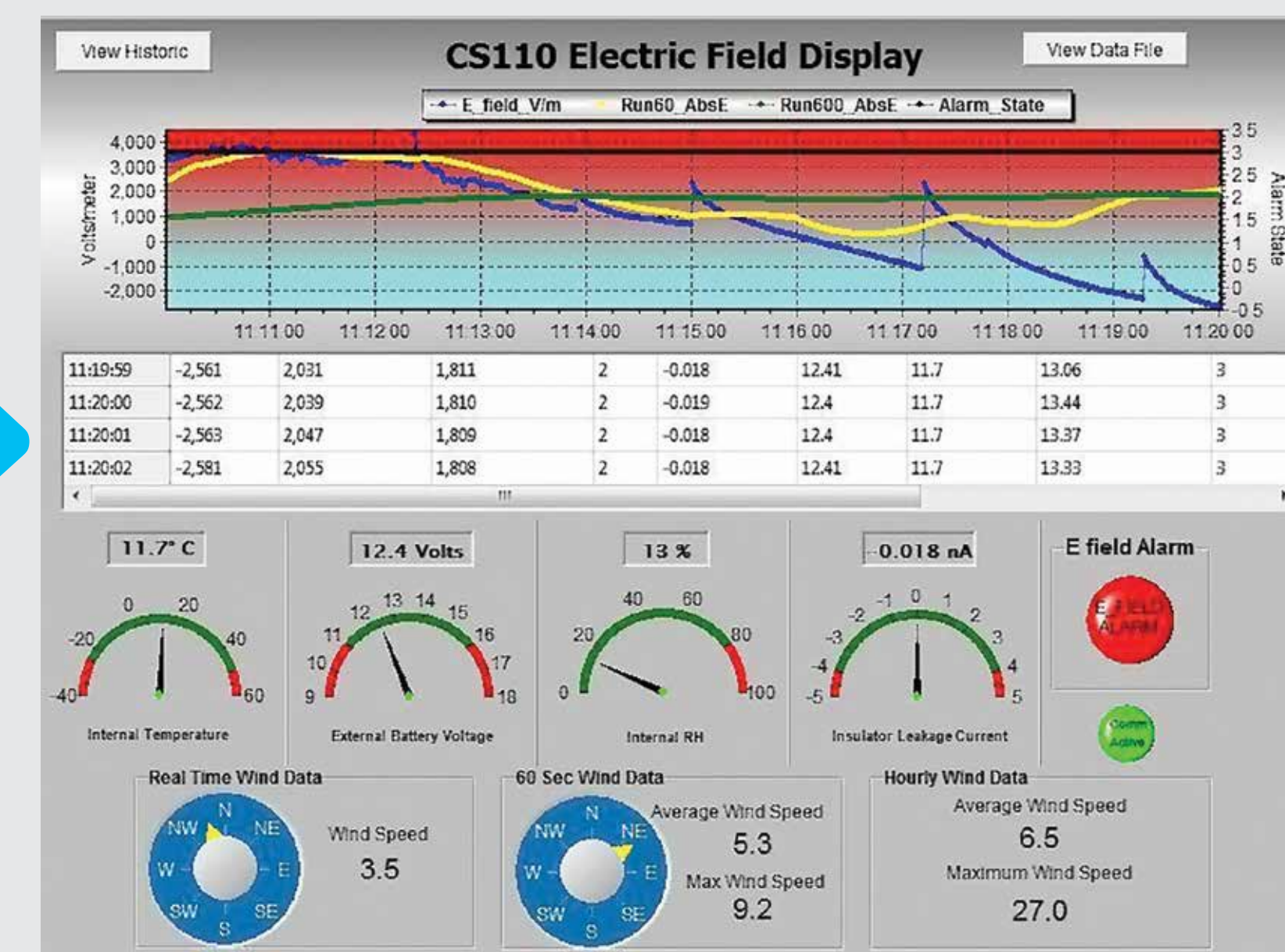
Damaging wind events during the Olympics

Strong winds were the main weather hazard at the 2016 Olympic Games and a total of 4 damaging wind events occurred during the 2 week period. The strong wind events preceded synoptic cold fronts and would develop abruptly with the highest gusts occurring at the onset. The strongest wind event occurred on the afternoon of Aug 21 where a peak gust of 58mph was recorded. The women's competition finished up on Aug 20 and was not affected by these damaging winds. Aug 21 was the final day of the Olympic games and the closing ceremonies were held that evening.



Tools used to monitor the lightning threat at the Olympic Games

Campbell Scientific CS-110 Electric Field Meter



- CS110 Electric Field Meter and Young Wind Monitor are assembled on-site.
- The CS110 Electric Field Meter measures the electric field at the venue and has a range of 15-20 miles.
- Data is transmitted wirelessly and displayed on a laptop using the LoggerNet software.



Minor damage to the spectator grandstands after the Aug 15 wind event. Mesh was ripped from the scaffolding and the grandstand flags were ripped and tattered.



Rain develops 1 hour after the closing ceremonies of the Women's Competition on Aug 20, 2016.

Olympic Golf Course Weather Action Plan

Pre-Tournament

- Weather action plan is created by the tournament. An on-site meteorologist is contracted.
- Evacuation vehicles are rented and strategically staged across the golf course.
- Weather message graphics are loaded into the electronic scoreboard database.
- Evacuation committee practices evacuation scenarios to ensure the staff is prepared.
- Course evacuation instructions are provided to all players, officials, and tournament staff.

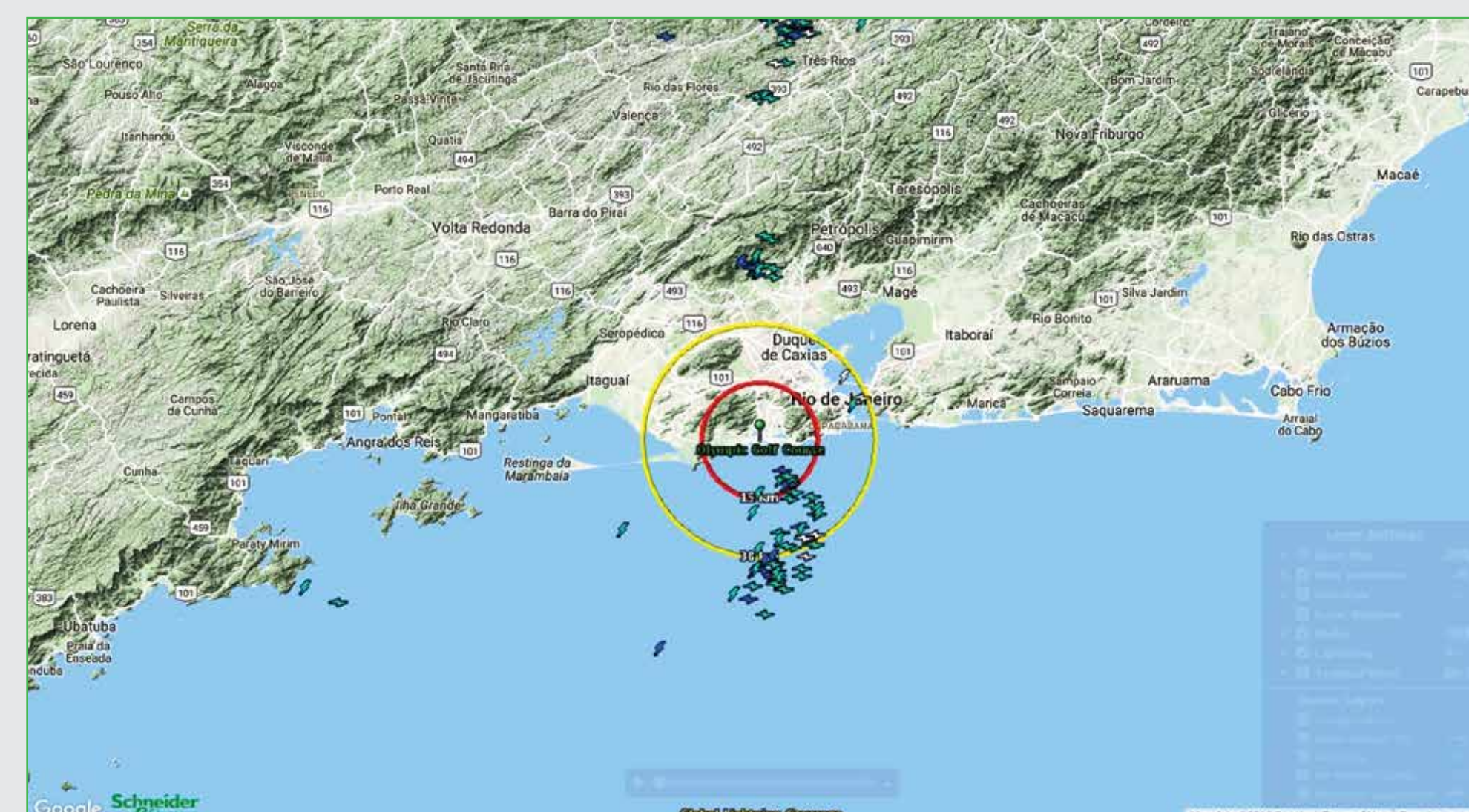
Tournament Week

- On-site meteorologist creates custom forecasts for the venue and distributes to tournament staff and organizers.
- On-site meteorologist provides daily staff briefings for tournament organizers, operations staff, and golf course maintenance regarding current and forecast weather conditions.
- On-site meteorologist will continuously monitor weather conditions at the venue and alert organizers to approaching hazardous conditions.

Plan of action during a thunderstorm event



WeatherSentry® Online – lightning layer map



- WeatherSentry Online is a subscription weather package from Schneider Electric that includes high resolution layered mapping.
- Real-time lightning data from Vaisala and Earth Networks are integrated into a single product for the most comprehensive lightning package on the market with world-wide lightning coverage.
- Real-time lightning data is also available on the WxSentry App available on iPhone and Android. Custom alerts, texts, and emails can be generated when lightning occurs within a defined area.

Official Weather Summary for the 2016 Olympic Games

OLYMPIC GOLF COURSE		Golf	
CAMPBELL SCIENTIFIC CS-110		GOLF COURSE	
Weather Summary			
Olympic Golf Course Men's competition			
Date: 8 Aug - 14 Aug, 2016			
Date	Weather	Low	High
EQ	CS	EQ	CS
Sat 8 Aug	Sunny and hot.	25	33
Sun 9 Aug	Sunny and hot before 10:00, then partly cloudy and windy with falling temperatures after 10:00.	25	31
Mon 10 Aug	Mostly cloudy.	21	26
Tue 11 Aug	Partly cloudy.	17	27
Wed 12 Aug	Cloudy with periods of light rain between 03:00 - 20:00.	17	23
Thu 13 Aug	Partly cloudy and breezy.	15	24
Fri 14 Aug	Periods of rain before 12:00, then partly cloudy.	15	23
Sat 15 Aug	Mostly sunny.	15	26
Sun 16 Aug	Sunny.	16	29
Climatology 06-14 Aug		Climatology 15-21 Aug	
Average maximum temp: 25C		Average maximum temp: 25C	
Average minimum temp: 18C		Average minimum temp: 18C	
Average weekly rainfall: 0.65"		Average weekly rainfall: 0.65"	

OLYMPIC GOLF COURSE		Golf	
CAMPBELL SCIENTIFIC CS-110		GOLF COURSE	
Weather Summary			
Olympic Golf Course Women's competition			
Date: 15 Aug - 21 Aug, 2016			
Date	Weather	Low	High
EQ	CS	EQ	CS
Sat 15 Aug	Mostly sunny with strong winds after 15:00.	18	28
Sun 16 Aug	Partly cloudy early. Skies became mostly cloudy after 15:00 with a few afternoon showers.	18	28
Mon 17 Aug	Sunny.	19	33
Tue 18 Aug	Strong winds from midnight to 05:00. Skies were partly cloudy during the day. Some showers developed between 13:00-15:00.	11	28
Wed 19 Aug	Partly cloudy and breezy.	21	30
Thu 20 Aug	Mostly cloudy with rain developing at 16:00. Rain showers occurred between 16:00-20:00.	21	26
Fri 21 Aug	Mostly cloudy with periods of light rain throughout the day. Very strong winds developed after 15:30 with a peak gust of 58mph recorded.	17	26
Climatology 15-21 Aug		Climatology 22-28 Aug 2016 at 09:00	
Average maximum temp: 25C		Average maximum temp: 25C	
Average minimum temp: 18C		Average minimum temp: 18C	
Average weekly rainfall: 0.65"		Average weekly rainfall: 0.65"	