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## **Solar wind modelling for operational forecasting**

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Dark regions seen in extreme ultraviolet and X-ray images of the solar corona, called coronal holes (COHO), are known to be sources of fast solar wind streams. These streams often impact the Earth's magnetosphere and produce geomagnetic storms to which Canada is susceptible. COHO are associated with open coronal magnetic field lines along which fast solar wind streams emanate from the Sun. COHO can survive several Sun's rotations, especially near the solar minimum, giving rise to recurrent enhancements in the solar wind speed and geomagnetic activity. While solar wind forecasting can be based on COHO images by taking into account a statistical correlation between COHO area and solar wind parameters at the Earth, a more physics based approach considers open magnetic field lines that extend from the photosphere to the corona. To forecast the solar wind, a numerical code based on the coronal field approach has been developed. To derive the global coronal magnetic field a potential field source surface and Schatten current sheet models are used. Empirical relations, including Wang-Sheeley-Argé, are used to establish a link between the solar wind speed and properties of open magnetic field lines. Investigations of the solar wind speed and magnetic field polarity forecasts at the Earth for 2007-2014 show a good agreement with observations, most notably around solar minimum. Disagreements, excluding those due to transient solar disturbances, are discussed. In particular, the role of COHO area size, their latitudinal location and proximity to active regions is discussed. Prospects of using the solar wind forecast in forecasting geomagnetic activity over Canada are examined.

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