

Scientific Goals of SuperDARN

Topic	DARN Requirements	Additional instrumentation and data of particular interest
Structure of Global Convection	<ul style="list-style-type: none"> -extended coverage in MLT and magnetic latitude -moderate spatial (~100 km) and temporal (~10 min) resolution 	<ul style="list-style-type: none"> -Collaboration with modelers -Incoherent scatter radars -Ground magnetometer chains -Solar wind parameters
Dynamical Studies of Global Convection	<ul style="list-style-type: none"> -extended, continuous coverage in MLT and magnetic latitude -Good spatial (~50 km) and temporal (~2 min) resolution -Multi-directional observations of common volume to determine instantaneous 2-D velocity vectors 	<ul style="list-style-type: none"> -Plasma diagnostics from ISTP satellites -Incoherent scatter radars -Magnetometer and optical imager data -Conjugate radar observations -IMF and solar wind parameters
MHD Wave Studies	<ul style="list-style-type: none"> -Extended, continuous coverage in MLT and magnetic latitude -Good spatial (~50 km) and temporal (~2 min) resolution -Multi-directional observations of common volume to determine instantaneous 2-D velocity vectors 	<ul style="list-style-type: none"> -Ground magnetometer chains -ISTP optical imager data -IMF and solar wind parameters -Plasma diagnostics from ISTP satellites
Substorm Studies	<ul style="list-style-type: none"> -Extended coverage in MLT and magnetic latitude -Good spatial (~50 km) and temporal (~1 min) resolution -Multi-directional observations of common volume to determine instantaneous 2-D velocity vectors 	<ul style="list-style-type: none"> -Magnetometer and optical imager data -Conjugate observations from radars, magnetometers, and imagers -IMF and solar wind parameters
Gravity Wave Studies	<ul style="list-style-type: none"> -Large area coverage -Continuous operation -good spatial (~50 km) and temporal (~10 min) resolution 	<ul style="list-style-type: none"> -Optical and/or incoherent scatter radar data to provide conductivities and Joule heating rates -Density profiles from ionospheric sounders
High Latitude Plasma Structure Studies	<ul style="list-style-type: none"> -Large field-of-view, including the polar cap regions -Continuous monitoring of the source region(s) 	<ul style="list-style-type: none"> -Polar cap all-sky cameras and photometers -Ionospheric sounders and/or incoherent scatter radars
Ionospheric Irregularities	<ul style="list-style-type: none"> -Multi-frequency observations of common volumes -High temporal (~1 min) and high spatial (~30 km) resolution 	<ul style="list-style-type: none"> -Plasma diagnostics from ISTP satellites and incoherent scatter radars -Field-aligned current measurements from satellites -Scintillation measurements for km-scale irregularity structure -VHF radar measurements for us in conjunction with multi-frequency HF observations