

**2<sup>nd</sup> NCWG MEETING**  
**Monaco 26-29 April 2016**

**Paper for Consideration by the Nautical Cartography Working Group (NCWG)**  
**E-Navigation: Update on Development of S-412, "Weather Overlay"**

<b>Submitted by:</b>	United States (NOAA)
<b>Executive Summary:</b>	A link is provided to a recent article in <i>Hydro International</i> , which describes the effort to design an S-100 IHO Universal Hydrographic Data Model compliant product specification for a marine weather overlay product.  A set of symbols that have been proposed to portray the product in ECDIS is provided in Annex C.
<b>Related Documents:</b>	<a href="#">S-100</a> IHO Universal Hydrographic Data Model
<b>Related Projects:</b>	

### Introduction / Background

The Joint WMO-IOC (World Meteorological Organization – Intergovernmental Oceanographic Commission) Technical Commission for Oceanography and Marine Meteorology (JCOMM) made ECDIS weather overlay products a priority in 2012 and designated the U.S. National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) as the project lead. The Brazilian Hydrographic Office recognised the importance of delivering life-saving weather information via ECDIS and joined the project in 2014.

### Analysis / Discussion

Recently, LCDR Cesar Reinert B. Morais (Brazil) and LT Christine Schultz (US) wrote an article for *Hydro International* that describes the effort to design an S-100 IHO Universal Hydrographic Data Model compliant product specification. S-100 provides the framework for defining separate digital overlay products that may be displayed individually or together with other S-100 based products in ECDIS.

The development of the IHO S-412 "Weather Overlay" product specification is described in "[Designing a New Way to Deliver Marine Weather Data](#)" in the January 2016 issue of *Hydro International*. As all other S-100 based product specifications do, S-412 will define (among many other properties) the features (or objects) that the product data holds (see Annex A), the attributes that are used to describe each feature (see Annex B), and the symbols that are used to portray the data within an ECDIS (see Annex C).

### Conclusions

The effort to develop a weather overlay to be displayed in ECDIS has made significant progress and has developed a set of proposed symbols for the digital portrayal of weather data.

The [NCWG Terms of Reference](#) states the working group's objectives. Objective 1 a)(iii) is:

The integration of the nautical chart and other cartographic products for eNavigation. This includes resolving portrayal issues related to the simultaneous display of a nautical chart in combination with navigational information and non-navigational information within an integrated navigation system.

Therefore, it is within the scope of NCWG activities to monitor and assist in "resolving portrayal issues" related to the display of "navigational information and non-navigational information" within ECDIS for S-412 and other S-100 based products.

**Recommendations**

NCWG should review the proposed symbols listed in Annex C for any possible conflicts with the portrayal of ENC or other S-100 based products in ECDIS.

**Justification and Impacts**

As additional S-100 product specifications are developed, the potential for conflicting symbology and portrayals within ECDIS will increase. It would be prudent for the NCWG to monitor this and similar S-100 based product developments; doing so will help achieve the objectives of the NCWG TOR.

**Action required of NCWG**

NCWG is invited to:

- a. note the progress being made in the development of this particular S-100 overlay product, and
- b. review the proposed symbols listed in Annex C for any possible conflicts with the portrayal of ENC or other S-100 based products in ECDIS.

ANNEX A: S-412 Object List

<b>Object Number</b>	<b>Object Name</b>	<b>Acronym</b>	<b>Feature Type</b>
1.1	Air Temperature	AIRTEM	Geo
1.2	Atmospheric Pressure	AIRPSR	Geo
1.3	Centre of Anticyclone	CEHIPR	Geo
1.4	Centre of Depression	CENDEP	Geo
1.5	Cloud	CLOUDS	Geo
1.6	Convergent Boundaries	CONVBO	Geo
1.7	Dew-point Temperature	DPTEMP	Geo
1.8	Freezing Spray	FZSPRY	Geo
1.9	Front	FRONTS	Geo
1.10	Gust	GUSGUS	Geo
1.11	Ice Edge	ICEDGE	Geo
1.12	Isoheight	ISOHGT	Geo
1.13	Limit of Known Icebergs	ICEBRG	Geo
1.14	Low Water Level	LOWATR	Geo
1.15	Maximum Air Temperature	MAXTEM	Geo
1.16	Maximum Dew-point Temperature	MAXDPT	Geo
1.17	Maximum Pressure Decrease/Minimum Pressure Increase	MAXPDE	Geo
1.18	Maximum Pressure Increase/Minimum Pressure Decrease	MAXPIN	Geo
1.19	Maximum Sea Surface Temperature	MAXSST	Geo
1.20	Metarea	METARE	Meta
1.21	Minimum Air Temperature	MINTEM	Geo
1.22	Minimum Dew-point Temperature	MINDPT	Geo
1.23	Minimum Sea Surface Temperature	MINSST	Geo
1.24	Observations	OBSERV	Geo
1.25	Pressure Tendency	PRETEN	Geo
1.26	Ridge	RIDGES	Geo
1.27	Sea Surface Temperature	SSTEMP	Geo
1.28	Significant Wave Height	SIGWAV	Geo
1.29	Significant Weather	SIGWET	Geo
1.30	Storm Surge	STOSUR	Geo
1.31	Surface Visibility	SURVIS	Geo
1.32	Surface Wind	SUWIND	Geo
1.33	Swell	SWELLS	Geo
1.34	Thickness	THKNSS	Geo
1.35	Tropical Cyclone	TROCYC	Geo
1.36	Tsunami	TSUNAM	Geo
1.37	Watch/Warning	WRNING	Geo
1.38	Wind Wave	WINWAV	Geo

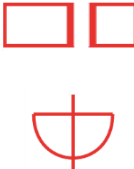

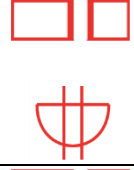

















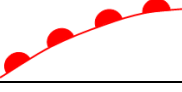





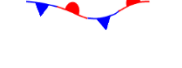

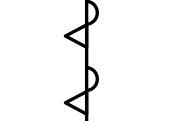
ANNEX B: S-412 Attribute List


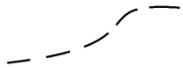

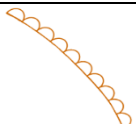
























<b>Attribute Number</b>	<b>Attribute Name</b>	<b>Acronym</b>
2.1	Amount of Pressure Change	AMPRCH
2.2	Atmospheric Pressure Accuracy	ATPACC
2.3	Azimuth Degrees of Significant Swell Direction	DEGSWL
2.4	Azimuth Degrees of Significant Wave Direction	DEGWAV
2.5	Azimuth Degrees of Surface Wind Direction	DEGWND
2.6	Azimuth Degrees of Wind Waves Direction	DEGWWA
2.7	Beaufort Force	BEAUFOR
2.8	Category of Convergent Boundaries	CATCON
2.9	Category of Front	CATFRO
2.10	Category of Significant Swell Wave Height	CATSWH
2.11	Category of Significant Swell Direction	CATSWD
2.12	Category of Significant Wave Height	CATSEH
2.13	Category of Significant Wave Direction	SIWADE
2.14	Category of Significant Weather	CATSWE
2.15	Category of Surface Visibility	CATVIS
2.16	Category of Tropical Cyclone	CATCYC
2.17	Category of Warning	CATWRN
2.18	Category of Wind Wave Direction	CATWWD
2.19	Category of Wind Wave Height	CATWWH
2.20	Change in Significant Swell Height	CHSWHE
2.21	Change in Significant Swell Period	CHSWPE
2.22	Change in Significant Wave Height	CHWAHE
2.23	Change in Significant Wave Period	CHWAPE
2.24	Change in Surface Wind Direction	CHAWDI
2.25	Change in Surface Wind Speed	CHCWDS
2.26	Change in Wind Wave Height	CHWWHE
2.27	Characteristic of Pressure Change	CHPRCH
2.28	Compass Point of Surface Wind Direction	COMDIR
2.29	Direction of Expected Movement	DREXMO
2.30	Expected Change in Intensity	EXPINT
2.31	Front Level	FROLEV
2.32	Frontal Development	FRODEV
2.33	Height of Cloud Base	HCLOBA
2.34	Height of Storm Surge	HEISUR
2.35	Height Probability	HTPROB
2.36	Icing Intensity	ICIINT
2.37	Isallobar Time Interval	ISLOTM
2.38	Issue Time	ISSTIM
2.39	Length Units	LUNITS
2.40	Low Water Level	LOWLVL
2.41	Lower Isobaric Level	LOWLEV
2.42	Metarea Number	METNUM
2.43	Next Update Time	NUPTIM
2.44	Observation Source	OBSRCE
2.45	Observation Source Identification	OBSIDS
2.46	Observation Source Status	OBSTAT
2.47	Predicted Tsunami Maximum Wave Height	TMWHGT

2.48	Saffir-Simpson Category	SAFSIM
2.49	Significant Swell Wave Height	SSWHGT
2.50	Significant Swell Wave Period	SWLPRD
2.51	Significant Wave Height	SIWAHE
2.52	Significant Wave Period	SIWAPE
2.53	Speed of Expected Movement	SPEXMO
2.54	Swell Height Change Time Interval	SWHTTI
2.55	Swell Period Change Time Interval	SWPETI
2.56	Temperature Accuracy	TMPACC
2.57	Thickness Height	THKNSS
2.58	Tidal Datum	LEVREF
2.59	Total Cloud Cover	TCLOCO
2.60	Tsunami Wave Arrival Time	ARRTIM
2.61	Tsunami Wave Period	TSUPER
2.62	Upper Isobaric Level	UPRLEV
2.63	Valid Time	VALTIM
2.64	Value of Atmospheric Pressure	VALPSR
2.65	Value of Dew-point Temperature	VALTDT
2.66	Value of Height Contour	VALHGT
2.67	Value of Sea Surface Temperature	VALSST
2.68	Value of Surface Wind Gust	VALGST
2.69	Value of Surface Wind Speed	VAWISP
2.70	Value of Temperature	VALTMP
2.71	Velocity Units	VUNITS
2.72	Visibility Range	VIZRNG
2.73	Warning End Time	WRNEND
2.74	Warning Start Time	WSTART
2.75	Watch/Warning Type	WTCWRN
2.76	Water Height Units	HUNITS
2.77	Wave Height Change Time Interval	WAHETI
2.78	Wave Period Change Time Interval	WASWTI
2.79	Wind Average Period	WNDAVP
2.80	Wind Change Time Interval	WNDTIM
2.81	Wind Wave Height	WIWAHE
2.82	Wind Wave Height Change Time Interval	WWHETI
2.83	Wind Wave Period	WIWAPE
2.84	Wind Wave Period Change Time Interval	WWSWTI









ANNEX C: S-412 Symbols (as of 29 Jan 2016)

Feature	Acronym	Attribute	Geometry	SVG Symbols Used	Complete Symbol
Atmospheric Pressure	AIRPSR	All Attributes	Curve		
Atmospheric Pressure	CENHIP	All Attributes	Point		
Atmospheric Pressure	CENDEP	All Attributes	Point		
Convergent Boundary	CONVBO	Intertropical Convergence Zone	Curve		
Convergent Boundary	CONVBO	Squall Line	Curve		
Convergent Boundary	CONVBO	Trough Line	Curve		
Convergent Boundary	CONVBO	Trough	Curve		
Convergent Boundary	CONVBO	Shear Line	Curve		
Convergent Boundary	CONVBO	Convergence Line	Curve		
Convergent Boundary	CONVBO	Monsoon Trough	Curve		
Convergent Boundary	CONVBO	Tropical Wave	Curve		
Freezing Spray	FZSPRY	All Attributes	Curve		
Freezing Spray	FZSPRY	Light	Point, Curve	 	

Freezing Spray	FZSPRY	Moderate	Point, Curve		
Freezing Spray	FZSPRY	Severe	Point, Curve		
Freezing Spray	FZSPRY	Very Severe	Point, Curve		
Front	FRONTS	Cold Front, Developing	Curve		
Front	FRONTS	Cold Front, Dissipating	Curve		
Front	FRONTS	Cold Front, Surface	Curve		
Front	FRONTS	Cold Front, Above Surface	Curve		
Front	FRONTS	Warm Front, Developing	Curve	 	
Front	FRONTS	Warm Front, Dissipating	Curve		
Front	FRONTS	Warm Front, Surface	Curve		
Front	FRONTS	Warm Front, Above Surface	Curve		
Front	FRONTS	Occluded	Curve		
Front	FRONTS	Quasi-stationary Front, Surface	Curve		
Front	FRONTS	Quasi-stationary Front, Above Surface	Curve		

Front	FRONTS	Convergence Line	Curve		
Front	FRONTS	Dry Line	Curve		
Ice Edge	ICEDGE	All Attributes	Curve		
Ridge	RIDGE	All Attributes	Curve		
Surface Wind	SUWIND	Value of Surface Wind Speed = 2	Point		
Surface Wind	SUWIND	Value of Surface Wind Speed = 5	Point		
Surface Wind	SUWIND	Value of Surface Wind Speed = 10	Point		
Surface Wind	SUWIND	Value of Surface Wind Speed = 50	Point		
Tropical Cyclone	TROCYC	Tropical Disturbance	Point		
Tropical Cyclone	TROCYC	Tropical Depression	Point		
Tropical Cyclone	TROCYC	Tropical Storm	Point		
Tropical Cyclone	TROCYC	Severe Tropical Storm	Point		
Tropical Cyclone	TROCYC	Tropical Cyclone	Point		
Tropical Cyclone	TROCYC	Hurricane	Point		



Tropical Cyclone	TROCYC	Typhoon	Point		
Tropical Cyclone	TROCYC	Super Typhoon	Point		
Tropical Cyclone	TROCYC	Post-tropical Cyclone	Point		
Tropical Cyclone	TROCYC	Subtropical Cyclone	Point		
Tropical Cyclone	TROCYC	Remnant Low	Point	