Title: AIS Automatic Identification System
Grades 3-5
Topic: Transmitting and receiving radio waves, global communication, reading data from a map

Standards:
Massachusetts DLCS standard:
3-5.DTC b.1. Communicate key ideas and details individually or collaboratively in a way that informs, persuades, and/or entertains using digital tools and media-rich resources.

Understandings:
Students will understand that…
- By using the AIS system, we can identify and track the movement of ships at sea.
- Local and area displays show all ships with AIS and their movement in real time.

Essential Questions:
- How can real time radio location signals from marine vessels be helpful?
- What can we learn from AIS marine maps?

Students will know that…
- CMMC has its own shore AIS receiver
- Having an AIS system on board can aid safe marine travel.

Students will be able to…
- Identify various types of marine vessels and track their movement.
- Know how to gain more information for many vessels shown on the AIS display.
- Explain how the AIS signal from the boat is transferred to the AIS map online.
- See data on “vessels near me” to find the type and nationality of vessels near us.

Assessment Evidence:
- You may want to display a second chart to record, based on See/Think/Wonder comments, what you can explain about the AIS map now that you have learned more.
- Charts can be taken back to school and displayed for further exploration or as evidence of learning on the field trip.

Resources:
- http://www.marinetraffic.com/
- http://www.marineinsight.com/marine-navigation/automatic-identification-system-ais-integrating-and-identifying-marine-communication-channels/
- Marine Online YouTube channel- AIS playlist- for mariners but good background information https://www.youtube.com/watch?v=fz7ek78oeAU&list=PLXNEJpAaCDcz_TqU29ZYEdwqDb-FGPNnJ
- https://www.brainpop.com/technology/communications/radio/
- CMMC STEM Lesson Plans http://stem.chathammarconi.org/LessonPlanViewer.php?action=CurriculumMatrix

Activity Plan:

Prior knowledge question:
- Who has been boating before?
- Did you have or see a navigation or radar system on board?

- What was it used for?

Vocabulary:
- Automatic Identification System
- Vessel
- Radio waves
- Nautical chart (map)
- Navigation
- Satellite
- Automated
- Transmitter
- Receiver

Materials:
- Chart paper with See/Think/Wonder table (see below) to record student responses
- Markers
- AIS display and screen showing http://www.marinetraffic.com/

Suggested Procedure:

1. Gather students to sit on the floor in front of the screen and AIS display. Pose the prior knowledge questions shown above to introduce the topic of marine travel and tracking.
2. Show the display for our area from http://www.marinetraffic.com/ and allow a couple of minutes to view the live, real-time chart showing the movement of marine vessels (you need to be zoomed into an area to see live movement.)
3. Show the *See/Think/Wonder* chart and introduce the chart and chart questions:
   What do you SEE? What do you THINK about that? What do you WONDER?
   Write in comments as students share under each column, but leave space to add more comments as you progress through further exploration of the AIS map.
4. Ask a student to come to the display and use the mouse to hover over a vessel marker. Discuss what the label shows. Have a few more volunteers come up to hover over a marker and discuss the information/data you can read when opening the information labels. (type of vessel, speed, destination, name of vessel) Also notice that different vessels can be easily identified by color and shape of the marker.
5. Refer again to the *See/Think/Wonder* chart and review the chart and chart questions:
   What do you SEE? What do you THINK about that? What do you WONDER?
   Add comments as students share.
6. Pose the question, How does the website access this information? At this point you can explain that the CMMC has its own radio antenna receiver for AIS signals and the red light on the display blinks every time a signal is received from a vessel. Explain that signals are sent from each vessel frequently but the blinking light also indicates there are many vessels out there transmitting.
7. Pose the question, how might this information be useful to the pilot of a marine vessel? Would it be useful to anyone on land? How? (note that AIS is partially useful for safe navigation, but not foolproof)

Follow up suggestions/Extensions:

- Vessels near me - note and identify national flags, global awareness https://www.marinetraffic.com/en/ais/index/ships/nearme/nearlon:-69.979621/nearlat:41.7040505
- December activity- track boats with gifts on them http://www.marinetraffic.com/en/p/xmas2015
- For students who want to learn more, utilize the Think/Puzzle/Explore strategy to plan an independent or group study http://www.visiblethinkingpz.org/VisibleThinking_html_files/03_ThinkingRoutines/03d_UnderstandingRoutines/ThinkPuzzleExplore/ThinkPuzzleExplore_Routine.html

See-Think-Wonder is a thinking strategy to engage students in deeper observation or thought about an artifact or image.
More information here:
http://www.visiblethinkingpz.org/VisibleThinking_html_files/03_ThinkingRoutines/03c_Core_routines/SeeThinkWonder/SeeThinkWonder_Routine.html

To encourage students to look closely at the data maps (either shark or AIS) display map on screen begin with the question, What do you see or notice on the map?
(Create chart below on chart paper to record responses)
The "see" response can be followed with, What do you think about that? What does it represent? What does it indicate? Etc.
Then followed with, What do you wonder about your "thinking" ideas?

This can be employed as an opening activity to draw attention and interest towards looking closely at the maps for information and data.
After exploring the map, information about the map can be shared by volunteer or teacher if previewed before the visit.
Another strategy would be to invite students to come up to the computer to click on various map markers and discover the types of information that can be found on the map.

What do you **SEE**?	What do you **THINK** about that?	What does it make you **WONDER**?

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