User's Guide for:

SeaSonde® Radial Site

What is a SeaSonde®?

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Please read the disclaimer on the last page of this publication.

A SeaSonde is a **compact, simplified radar system** that measures **currents near the surface of the ocean,** and in some situations, ocean waves**.**

SeaSonde was **developed** by **scientists and engineers** in California's Silicon Valley.

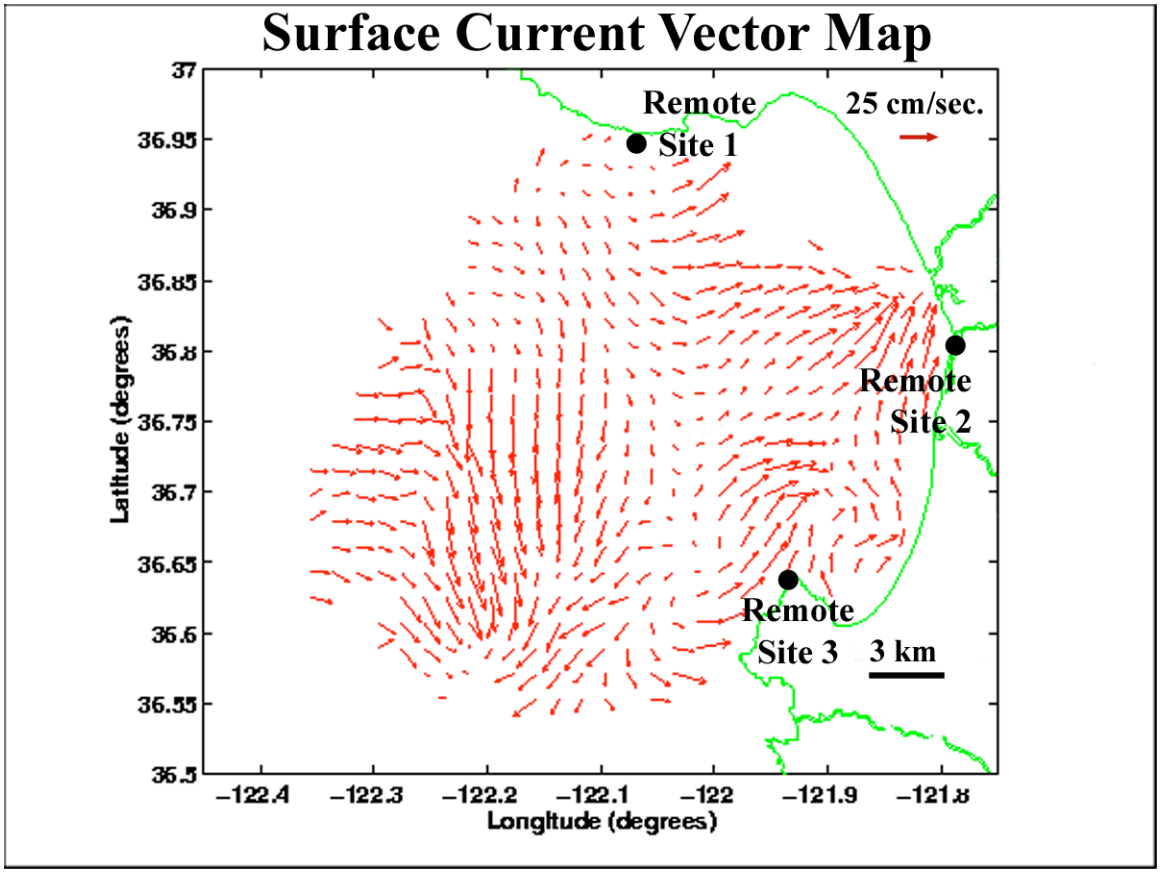
SeaSonde operates at **low frequencies**, from **4 to 50 megahertz** while using a small bandwidth.

This guide gives a general overview of SeaSonde. For a **detailed**, **technical description** of SeaSonde, please refer to the "**Theory of Operation**" section of the *SeaSonde Hardware Manual*.

A **SeaSonde network** consists of two or more SeaSonde Radial Sites contributing to a SeaSonde Combine Site to produce current maps

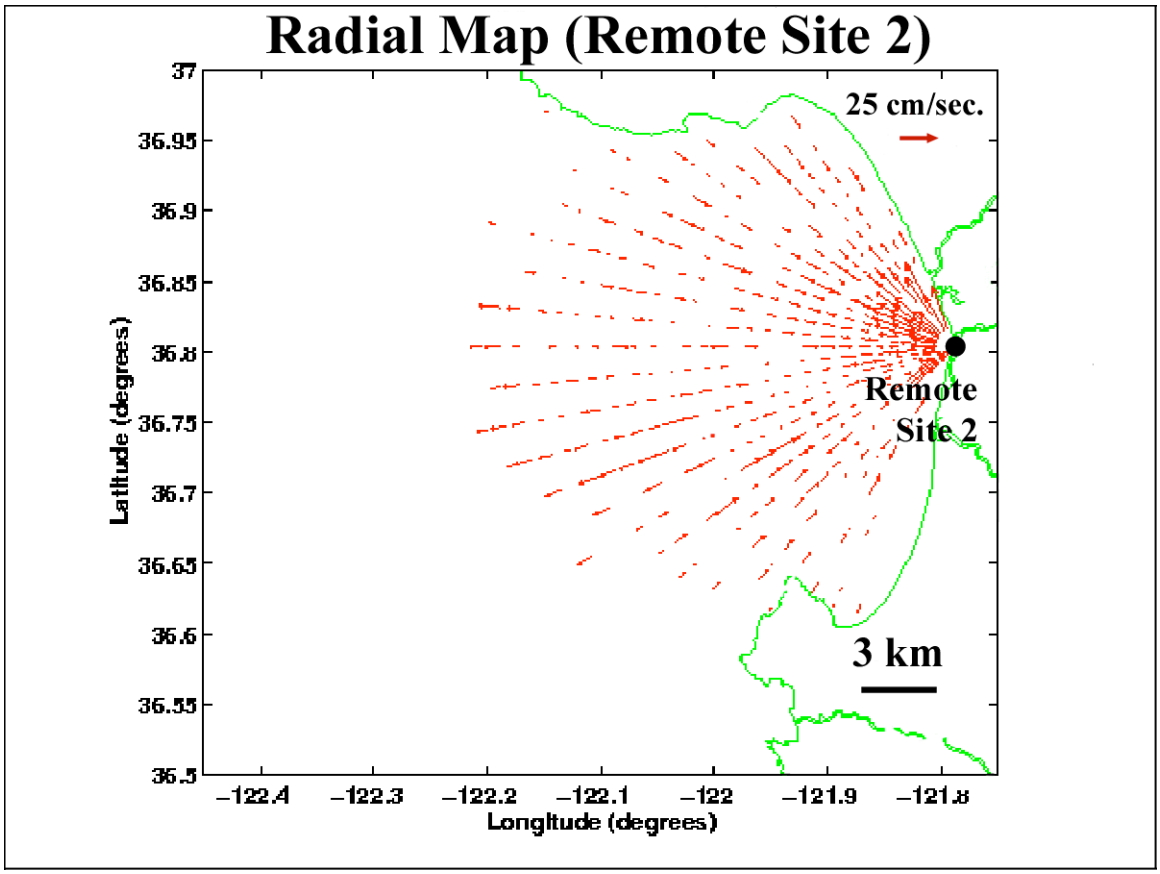
The **main purpose** of a SeaSonde network is to **produce maps** showing the **direction and speed** of surface currents.

Here is a typical map generated by a SeaSonde network:



Each red arrow is a **vector** that shows the **speed and direction** of currents near the ocean surface. **Longer** arrows mean **higher** speed. For reference, the red arrow in the upper right corner of the vector map represents a speed of **25 centimeters per second**.

Notice **three Radial Sites** on the vector map. Each remote site produces **radial map**:



Think of a Radial Site as the **center of a wheel**, with the spokes being radials.

Radials always point directly **toward or away** from the Radial site.

A radial is the component **speed** of an ocean current moving towards or away from the Radial site at a specific **direction** from the radial site.

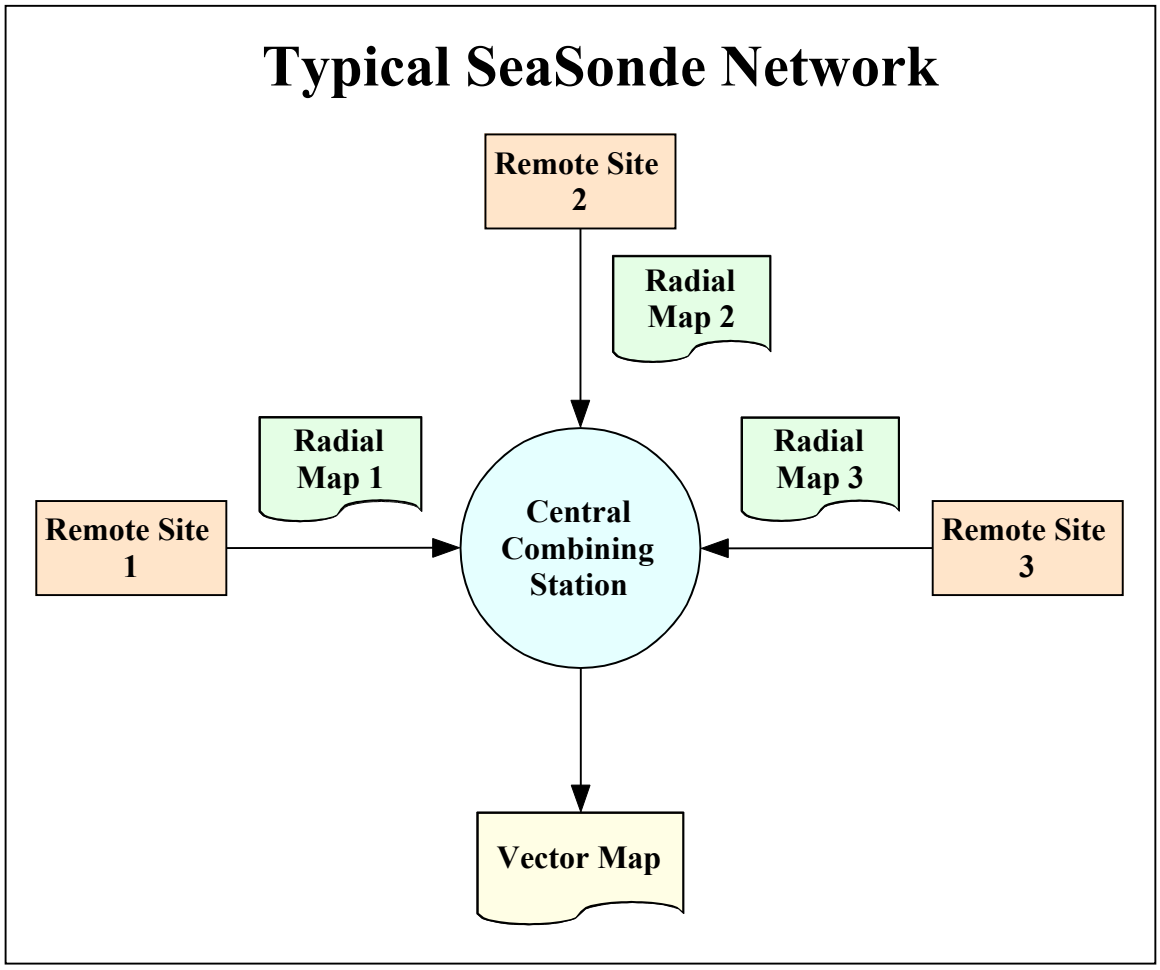
The radial map, **when combined with two other Radial Sites**, results in the vector map on page two.

Radial Sites are usually **several kilometers** apart.

Radial Sites are **fully automated**. Once they are set up and running, they produce data with **few or no adjustments**.

SeaSonde networks must have **at least two** Radial sites. The number of radial sites needed for **your application** depends on factors such as coastline placement, and the amount of area to cover verses the desired resolution.

In a SeaSonde network, computer programs **combine radial maps** from several sites to make a Vector Map at a **central combining station**:



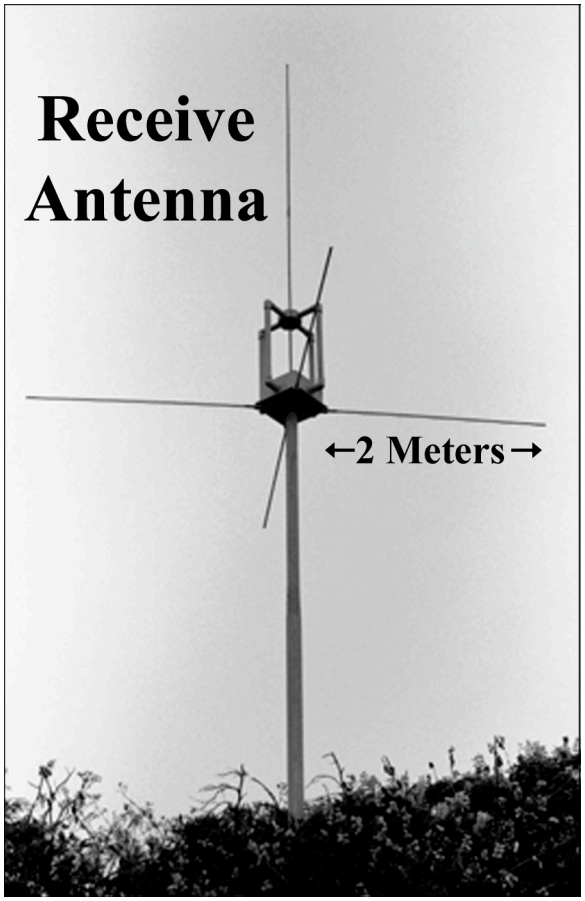
Communication between the Radial Site and the Combine Site is through a **computer modem or ethernet network**.

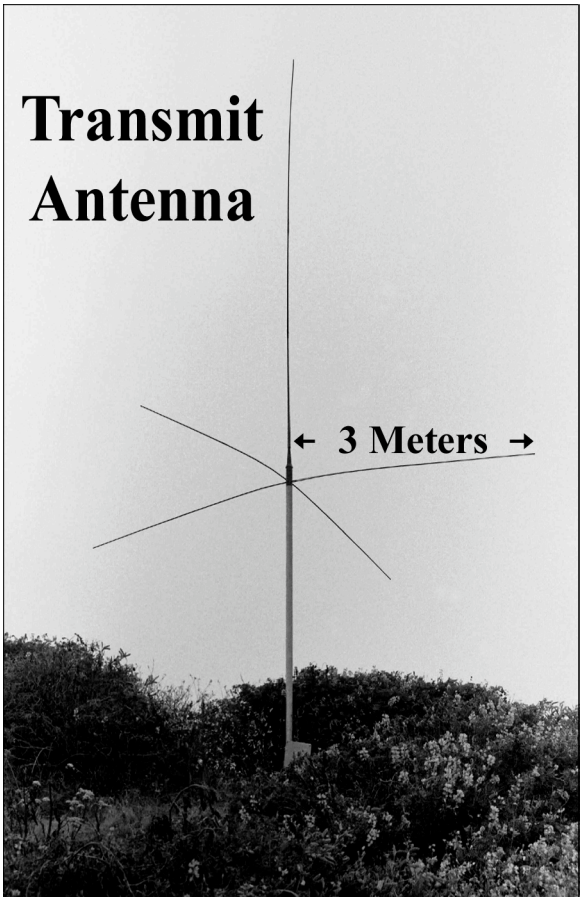
Radial Sites can be **accessed individually** for diagnostic purposes.

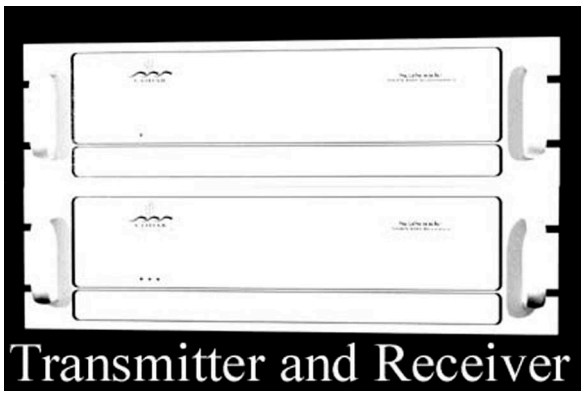
For an example of **continually refreshed radial and total vector maps** from **test sites** operated by Codar Ocean Sensors, go to this **website**: http://earthsystems.monterey.edu/hf-radar.

What **equipment** is needed for a **Radial Site**?

Each Radial Site has **two antennas**, a **transmitter** and a **receiver**, and a **computer**:

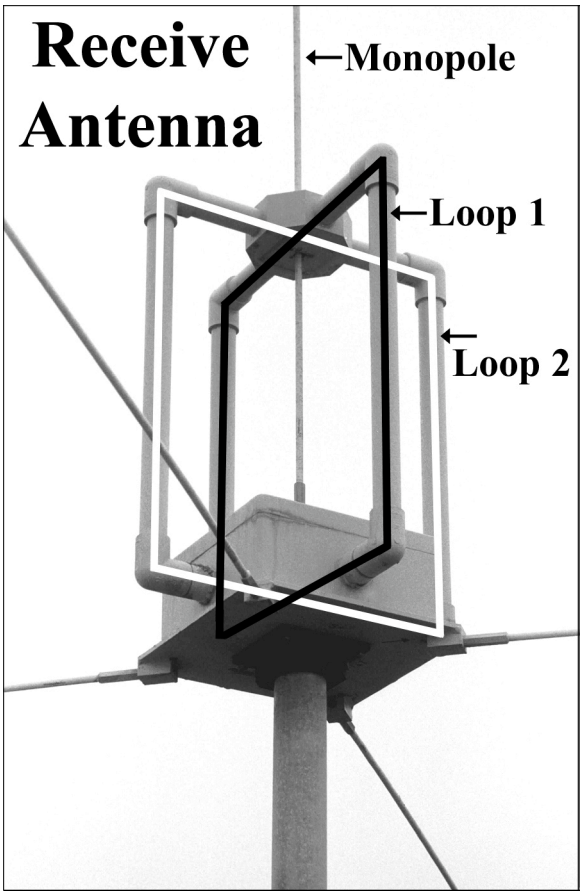






Also, **interconnecting cables**, a **modem/network interface** and a **climate controlled enclosure** for the electronics are required.

A closer look at a typical receive antenna, shows SeaSonde's **design principles** of **compactness, simplicity and ruggedness**. **Three antennas** are **combined** in one unit.
There are two **loop** antennas and one vertical **monopole**:



Combining three antennas allows SeaSonde to **calculate the direction and speed of radials**. This is done by **comparing** the **electric currents** generated by the three antennas, which **differ** depending on the **direction of arrival** to the antenna.

Four additional antenna elements extend **horizontally** from the base of the receive antenna. These are **connected to ground** and act as a **ground plane** to enhance the receive antenna's performance.

To summarize, a SeaSonde network is a **radar system** consisting two to six radial sites and a combine site. Each radial site produces a radial map. When two or more radial maps are combined by the SeaSonde software, a **simple, easy-to-read vector map** is produced showing the direction and speed of surface currents.