

ing Navigation Satellite System (GLONASS), uses transmission of coded radio signals, with the structure described above, from a plurality of Earth-orbiting satellites. A single passive receiver of such signals is capable of determining receiver absolute position in an Earth-centered, Earth-fixed coordinate reference system utilized by the SPS. A configuration of two or more receivers can be used to accurately determine the relative positions between the receivers or stations. This method, known as differential positioning, is far more accurate than absolute positioning, provided that the distances between these stations are substantially less than the distances from these stations to the satellites, which is the usual case. Differential positioning can be used to provide location coordinates and distances that are accurate to within a meter.

In differential position determination, many of the errors in the SPS that compromise the accuracy of absolute position determination are similar in magnitude for stations that are physically close. The effect of these errors on the accuracy of differential position determination is therefore substantially reduced by a process of partial error cancellation.

I claim:

1. Apparatus for determining the approximate location, on the upper surface of a body of water, of a perceived boundary between a target chemical released in the water and the ambient water, the apparatus comprising one or more location-indicating instruments, each of which comprises:

a free-floating body designed to be placed in and to float in an upright position on the upper surface of a body of water;

an activatable Satellite Positioning System (SPS) signal antenna and receiver/processor that, when activated, receives SPS signals from two or more SPS satellites and determines the location of the SPS antenna, the SPS receiver/processor and antenna being contained on the free-floating body;

an activatable location transmitter and transmitter interface that, when activated, continually receives from the SPS receiver/processor a location signal representing the SPS-determined location of the SPS antenna and transmits this location signal at a selected frequency, with the transmitter and transmitter interface being contained on the free-floating body;

activation means for activating the SPS receiver/processor and location transmitter; and

a power supply connected to the SPS antenna, the SPS receiver/processor, the transmitter and the transmitter interface, and the activation means, to provide operating power;

where each free-floating body is deposited approximately on a perceived boundary between the target chemical released in the water and the surface of the ambient water.

2. The apparatus of claim 1, wherein at least one of said location-indicating instruments further comprises:

a chemical analyzer, positioned on said free-floating body to be in contact with a liquid in which said body floats, that determines and issues an output signal representing the local concentration of said target chemical in this liquid, wherein said transmitter interface also receives the chemical analyzer output signal and causes said location transmitter to transmit this chemical analyzer signal at a selected transmitter frequency.

3. The apparatus of claim 1, wherein said activation means includes an immersion switch that is contained on said free-floating body and is electronically activated by immersion in water.

4. The apparatus of claim 1, wherein said activation means comprises:

an activation signal transmitter and associated power supply that transmits an SPS receiver/processor activation signal and is located on a structure near where a person or object has fallen into the water; and

an activation signal receiver, contained on said floatable object, to receive the SPS receiver/processor activation signal and to activate said SPS receiver/processor and said location transmitter in response to receipt of this activation signal.

5. The apparatus of claim 1, wherein said activation means includes a manually operable switch that, when switched to an active state, activates said SPS receiver/processor and said location transmitter, this switch being contained on said free-floating body.

6. The apparatus of claim 1, further comprising a visually perceptible flag, visually perceptible light or other visually perceptible indicia attached to said floatable object so that, when said free-floating body floats in an upright position in the water, at least a portion of the flag, light or other indicia is visible above the upper surface of the water.

7. The apparatus of claim 1, further comprising a drogue attached to said free-floating body and unfurled in the water to encourage said free-floating body to move at approximately the same velocity and in approximately the same direction as the local water current.

8. A method for determining the approximate location, on the upper surface of a body of water, of a target chemical in the water, the method comprising the steps of:

providing one or more free-floating bodies designed to be placed in and to float in an upright position on the upper surface of a body of water, with each free-floating body containing or being attached to: an activatable Satellite Positioning System (SPS) signal antenna and receiver/processor that, when activated, receives SPS signals from two or more SPS satellites and determines the location of the SPS antenna, the SPS receiver/processor and antenna being contained on the free-floating body;

an activatable location transmitter and transmitter interface that, when activated, continually receives from the SPS receiver/processor a location signal representing the SPS-determined location of the SPS antenna and transmits this location signal at a selected frequency, with the transmitter and transmitter interface being contained on the free-floating body;

activation means for activating the SPS receiver/processor and location transmitter; and

a power supply connected to at least one of the SPS antenna, the SPS receiver/processor, the transmitter, the transmitter interface and the activation means, to provide operating power; and

positioning the free-floating body or bodies in a selected pattern in the water approximately on a perceived boundary between the target chemical released in the water and the surface of the ambient water.

9. The method of claim 8, further comprising the step of activating said SPS receiver/processor and location