Remotely sensed data application for hydrocarbon exploration offshore Ukraine

Alexander Kitchka

CASRE at Institute of Geological Sciences, NASU, 55-B Gonchar St., 01601 Kiev, Ukraine

(E-mail: kitchka@casre.kiev.ua)

This study features the research program developed at *CASRE* to apply space-born data for oil and gas prospecting in the Black Sea basin. The program includes processing and thematic interpretation of space-born imagery coupled with analysis of available geological, geophysical, hydrophysical, environmental and meteo information. The applied technique is based on rather simple and clear theory the prognostic power of which is proved by experiments, numerical modeling and exploration practice. It is based on immanent attribute of oily material to attenuate higher harmonics of sea waves due to surface tension forces of the film at water-air interface (Marangoni effect). That is why a microwave radar signal beamed from the orbit onto a smoothed sea surface backscatters to the sensor with a low impedance that drastically, up to 20 *dB*, differs from surrounding wavy medium if the wind velocity ranges from 3 to 10 *m/s*. Oil slick form very characteristic features and patterns on sea surface and produce peculiar semi-lunar, dogleg, spiral, snake- and star-like patterns.

The repetitive oil slicks in two areas, west and south of Tarkhankut Peninsula and south of Cape Opuk of Crimea (known for numerous submarine gas seeps, mud cones and pockmarks) allowed delineation of hydrocarbon emission zones and selection of first-order prospects to increase success ratio within this highly promising but still immature hydrocarbon-prone basin. A comprehensive analysis of all available data permitted to conclude (2004) that an optimal solution is to spud the first wildcat within the Subbotin prospect where rather thick Plio-Quaternary seal rocks cap the eroded crest of Maykop anticline.

As to the NW shelf the data looks much complicated due to significant pollution coming from the Danube and Dnieper, accidental spills along main tanker routes and ship lanes, leaks from exploration platforms and intensive algal bloom during summer months. Several slick groups of higher population density were recorded nearby Zmeiny Island on the western part of the area studied; however they were deselected from the consideration for the moment due to an ambiguity caused by severe pollution of the sea with oil products. Nevertheless, it was possible to discriminate natural oil manifestations from spills and confidently delineate several emission zones, and one of them to mention is Pribiyna prospect located west of Tarkhankut Peninsula, nearby of Krymske gas field. The radar images of this area demonstrate a compact group of slicks (5 repetitions) shown on *ERS* scenes. It is worth to mention that Pribiyna prospect is located not far from onshore West Oktyabrske oilfield.

There are some evidences that certain phenomena like earthquakes, solid Earth tides and strong baric fronts affect submarine seepage activity and produce higher slick population density, however, these assumptions need to be proved with proper statistic retrieval of the data.