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## Mapping pond aquaculture for the entire coastal zone of Asia using high resolution Sentinel-1 and Sentinel-2 data

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Asia is the world's most important region for aquaculture and generates almost 90 percent of the total production. The farming of fish and shrimp in land-based aquaculture systems expanded mainly along the shorelines of South Asia, Southeast Asia, and East Asia, and is a primary protein source for millions of people. The production of fish and shrimp in freshwater and brackish water ponds in coastal regions of Asia has increased rapidly since the 1990s due to the rising demand for protein-rich foods from a growing (world) population. The aquaculture sector generates income, employment and contributes to food security, has become a billion-dollar industry with high socio-economic value, but has also led to severe environmental degradation. In this regard, geospatial information on aquaculture can support the management of this growing food sector for the sustainable development of coastal ecosystems, resources and human health.

With free and open access to the rapidly growing volume of data from the European Sentinel satellites as well as using machine learning algorithms and cloud computing services, we extracted coastal aquaculture at a continental-scale. We present a multi-sensor approach which utilizes Earth Observation time series data for the mapping of pond aquaculture within the entire Asian coastal zone, defined as a buffer of 200km from the coastline. In this research, we developed an object-based framework to detect and extract aquaculture at single pond level based on temporal features derived from high spatial resolution SAR and optical satellite acquired from the Sentinel-1 and Sentinel-2 satellites. In a second step, we performed spatial and statistical data analyses of the Earth observation derived aquaculture dataset to investigate spatial distribution and to identify production hotspots in various administrative units at regional, national, and sub-national scale.