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The Zilitinkevich Scale in Life and Science

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A prominent scientist, a leader in environmental turbulence and planetary boundary layer research Sergej Zilitinkevich passed away on February 15, 2021. His scientific contribution is of a remarkably large scale, and so was his life. In fact, one of his most commonly referred research achievements is now widely known as The Zilitinkevich scale - a length scale of a rotation-stratification turbulent mixing in stably stratified planetary boundary layers. In fact, one of his most significant life achievements can be characterized as organizing large international consortiums to advance the boundary layer research into new territories of non-local turbulence, organized structures, and extreme stratifications. Many of his discoveries are now in textbooks, often cited as classical common knowledge without references. Sergej Zilitinkevich was passionate for truly large-scale international science that combined the best of multidisciplinary approaches and multicultural research schools. In the last decade, he has been leading international efforts to develop an energetically consistent turbulence theory that could be applied to strongly stratified, very-high-Reynolds-number environmental flows. He and collaborators obtained ground-breaking results in the studies of key mechanisms controlling both the stably stratified and convective turbulence. Until present, turbulence in strongly stratified flows such as those found in the free atmosphere and hydrosphere has been parameterized only heuristically; the theoretical and experimental basis behind the computing schemes was rather fragmented. Convective turbulence is still parameterized only heuristically. These and other theoretical advances open opportunities for a novel class of parametrizations for modelling and forecasting of climate, weather, wind-energy potential, and air and water quality. His last project - the Pan-Eurasian experiment - connects more than 100 research groups from 20 countries. It aims to solve interlinked challenges of global warming, atmospheric pollution, biodiversity loss, energy production, and fresh water recognizing the increasing role of the cold climate areas in the context of global change. This presentation commemorates the life and work of our colleague and friend.