

# Atmospheric and Oceanic Flows

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**DAMTP**

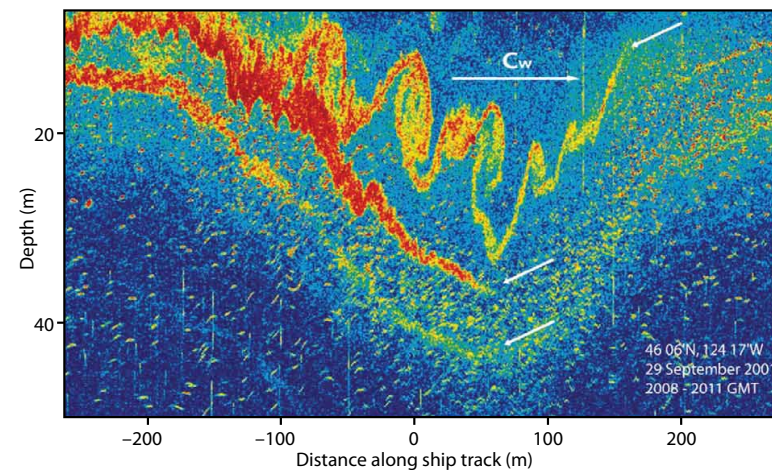
**CCfCS**



# Surface water waves



# Kelvin-Helmholtz instability in atmosphere and ocean



(Smyth and Moum 2012 review article)



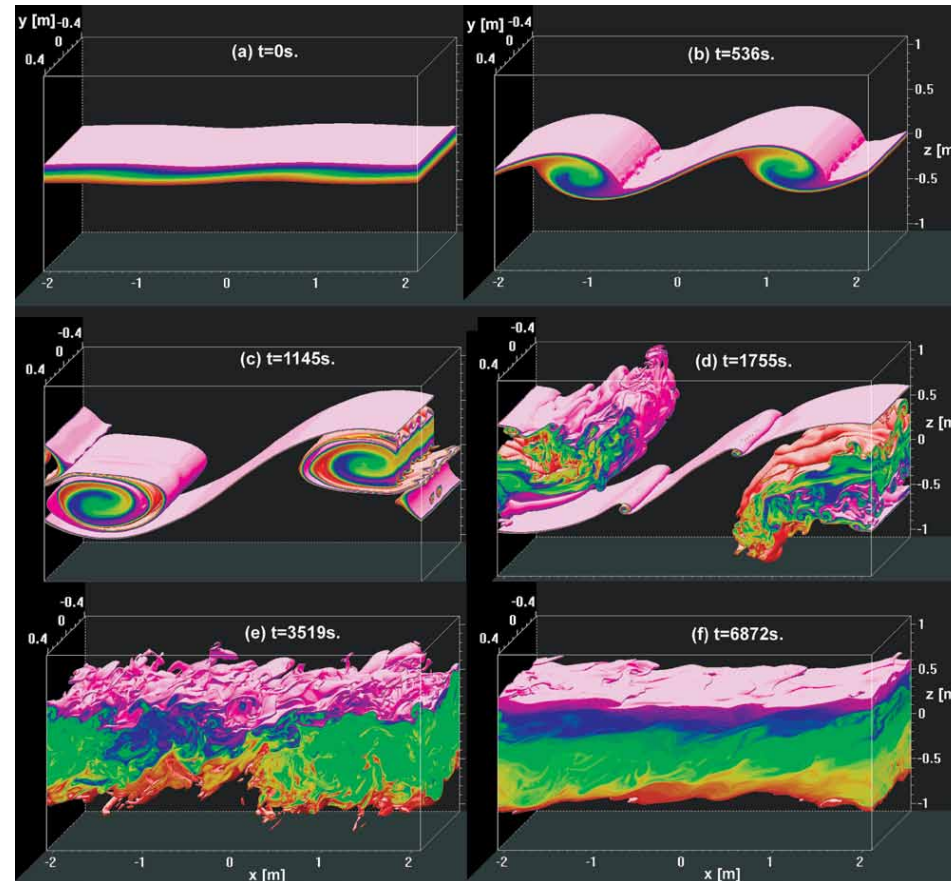
# Thorpe tilted-tank experiment



(from Smyth and Moum 2012)



~2010 numerical simulation



(Smyth and Moum 2012)



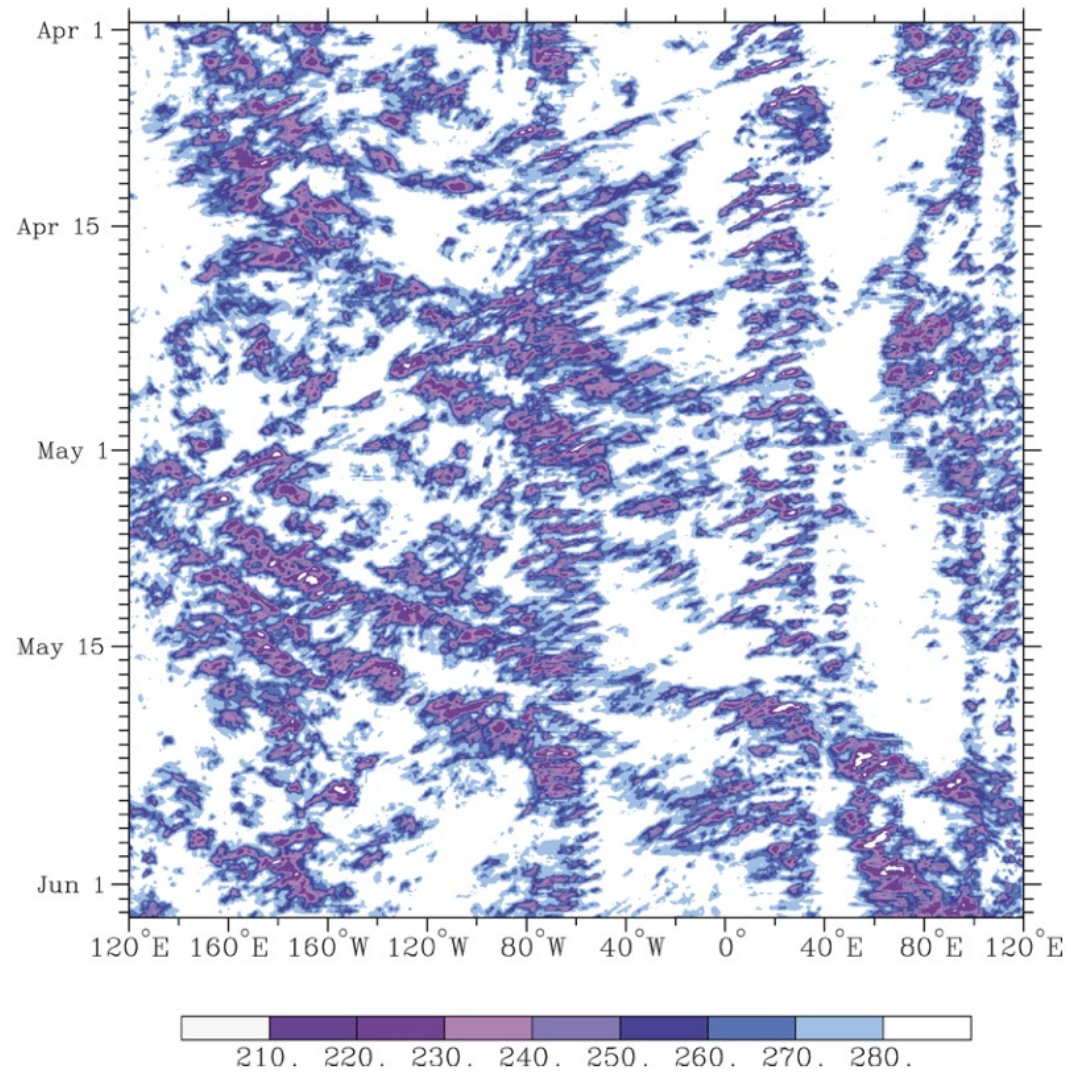
# 'Hector the convector'



(Chaboreau, Dauhut, ...)



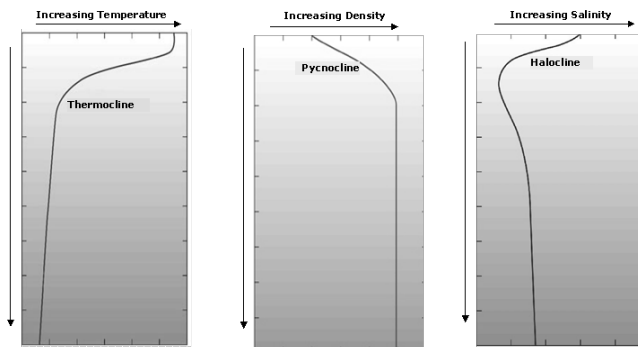
# Kiladis et al 2009



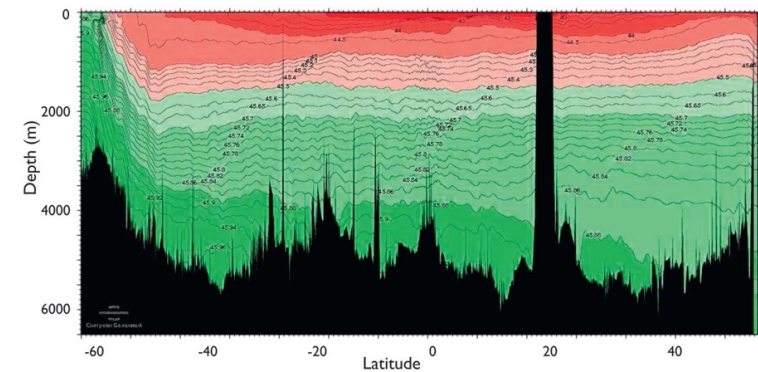
Time-longitude variation of tropical cloudiness



## Ocean – density variation



Schematic of typical temperature, salinity and density profiles in the ocean

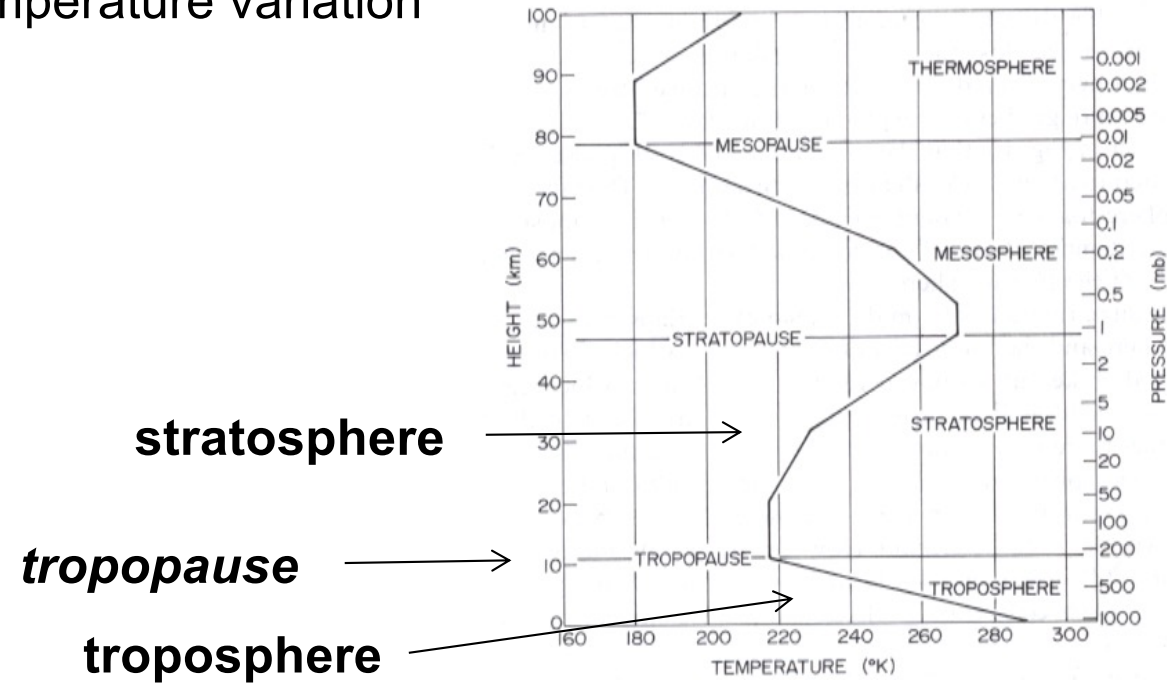


WOCE potential density  $\sigma_4$   
(~150°W)

Nikurashin and Vallis (2011)



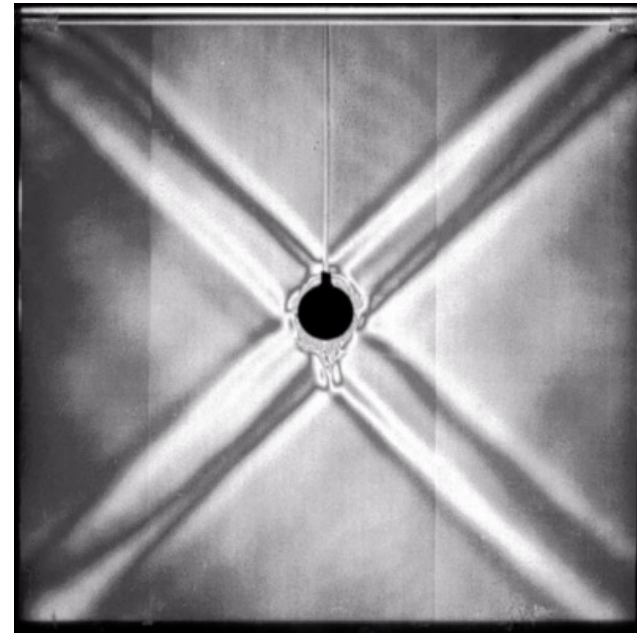
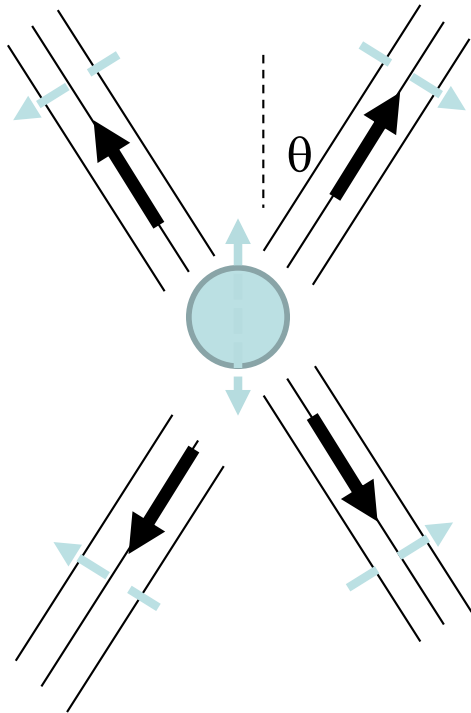
# Atmosphere – temperature variation



# Oscillating sphere

[http://denno-k.gfd-dennou.org/library/gfd\\_exp/exp\\_e/index.htm](http://denno-k.gfd-dennou.org/library/gfd_exp/exp_e/index.htm)

(Professor Satoshi Sakai)



Direction of group  
propagation



Direction of phase  
propagation



Link to movies -- [http://denno-k.gfd-dennou.org/library/gfd\\_exp/exp\\_e/exp/iw/1/res.htm](http://denno-k.gfd-dennou.org/library/gfd_exp/exp_e/exp/iw/1/res.htm)



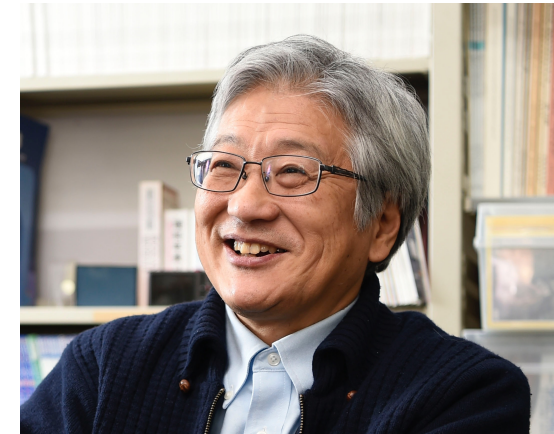
# Atmosphere and Ocean in a Laboratory

*Atmosphere and Ocean in a Laboratory*

INDEX of Experiments



Satoshi Sakai



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[Ekman Spiral](#) | [Rotating Convection](#) | [QBO](#) | [Baroclinic Instability](#)

[Kelvin Wave](#) | [Internal Gravity Wave](#) | [Salt Finger](#)



[Technical notes](#) | [Image List](#) | [References](#) | [Glossary](#) | [Biographical](#)

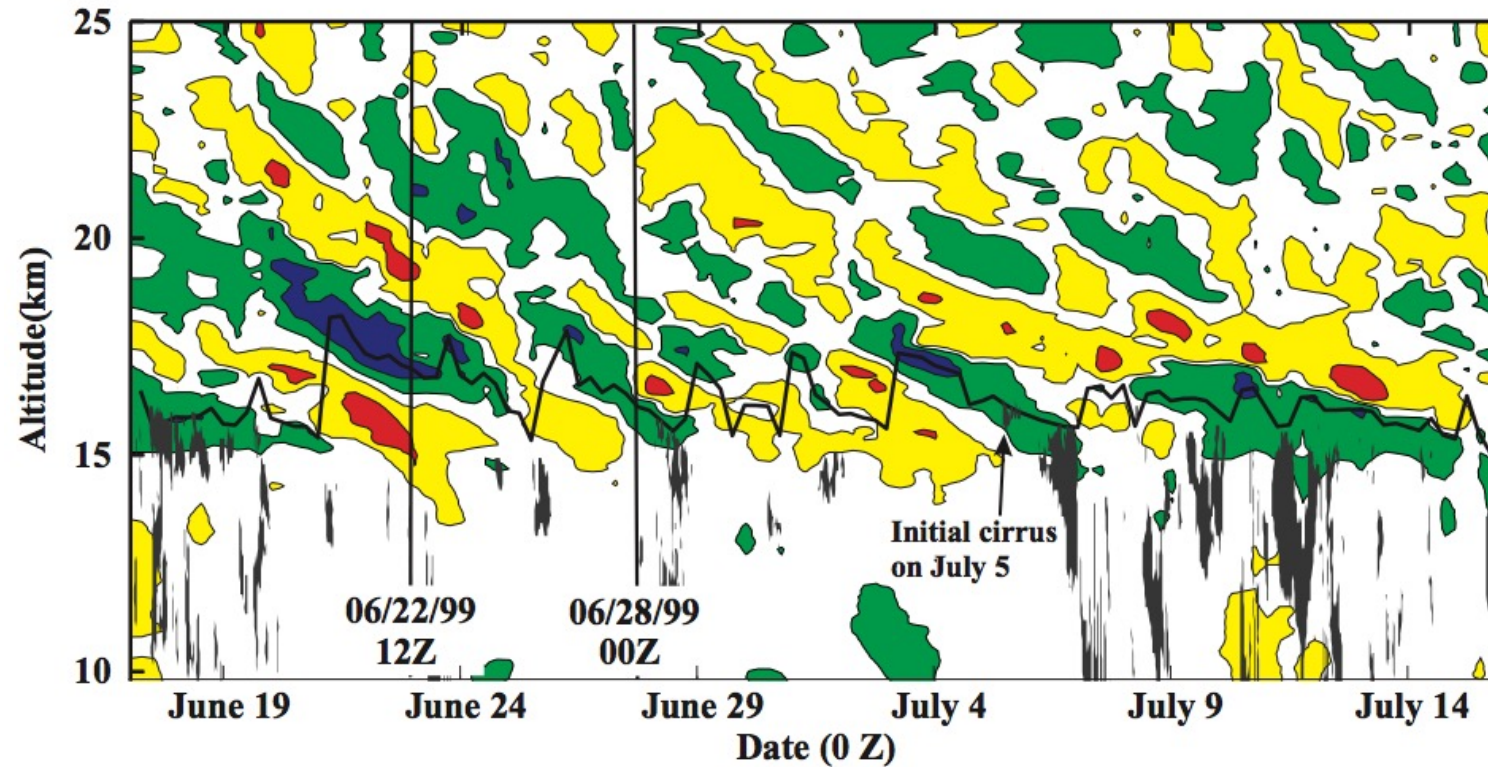
gfd-dennou.org



Mathematical Fluid Dynamics Cargese 13-21 August 2021



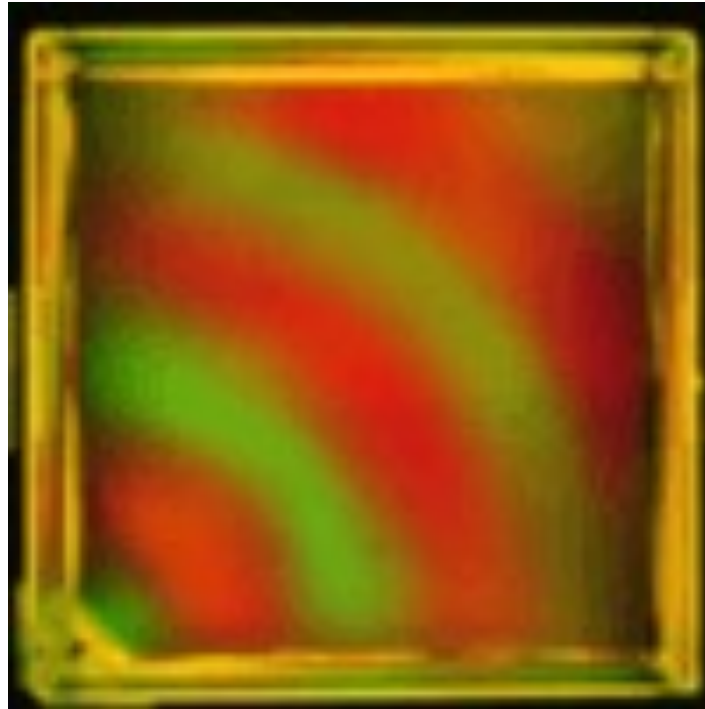
## Atmospheric equatorial Kelvin waves seen in radiosonde temperature profiles



(Boehm and Verlinde 2000 'Stratospheric influence on upper tropospheric tropical cirrus')



# Kelvin wave laboratory experiment



[http://dennou-k.gfd-dennou.org/library/gfd\\_exp/exp\\_e/index.htm](http://dennou-k.gfd-dennou.org/library/gfd_exp/exp_e/index.htm)

(Professor Satoshi Sakai)

Link to movies -- [http://dennou-k.gfd-dennou.org/library/gfd\\_exp/exp\\_e/exp/kw/1/res.htm](http://dennou-k.gfd-dennou.org/library/gfd_exp/exp_e/exp/kw/1/res.htm)

