My scientific (and sociologic)experiences

as Lien's PhD supervisor

Relationships between the supervisor and the student are complex
Sometimes they can be conflictual

With Lien it was a pleasure to work. She was very stimulating
She had lot of imagination

I thought it was an easy Job to supervise a student !

Once upon a time, I met Lien Hua at the Museum d'Histoire Naturelle in Paris

I was a young associate professor at this institution

She already graduated from ENS (Ecole Normale Supérieure)

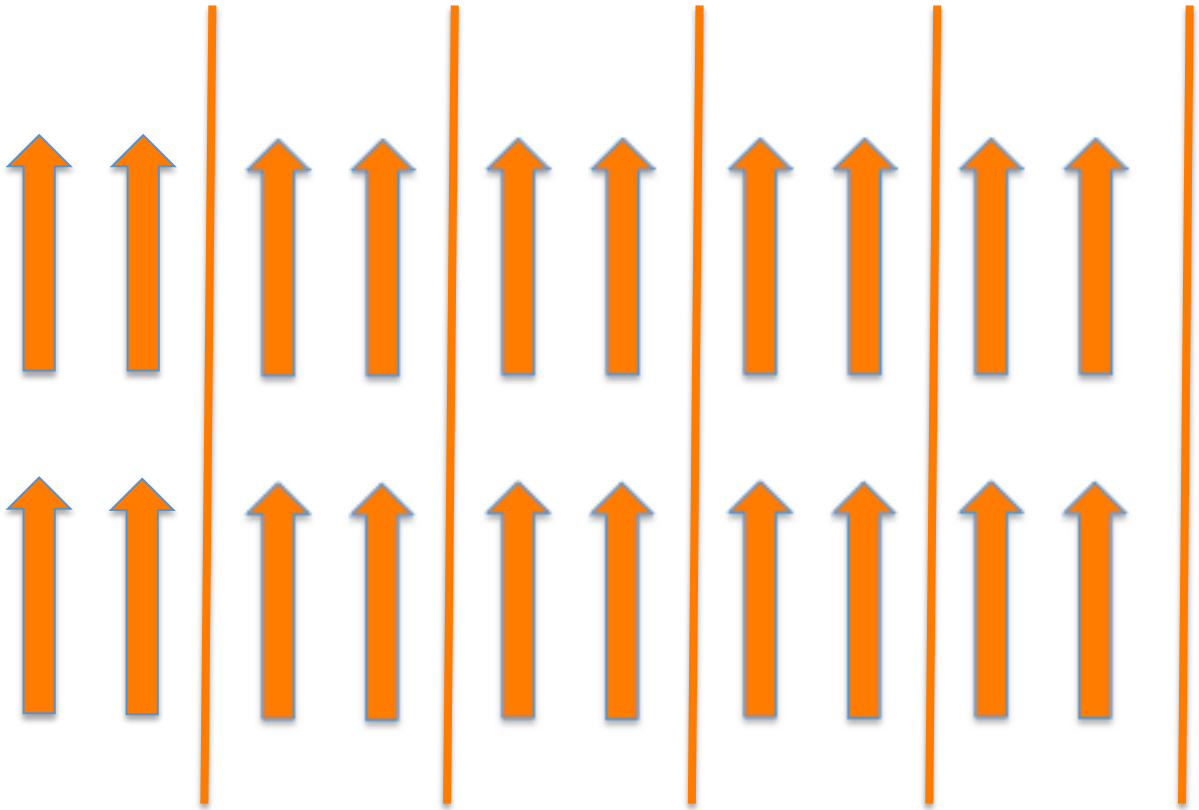
Lien was interested in studying the ocean and getting a Ph.D. in ocean sciences.

By that time there was a lab devoted to Physical Oceanography at the Museum under the direction of Professor Lacombe and Pierre Tchernia

I proposed to Lien to study the wake generated by a transient moving atmospheric disturbance

She worked very hard using Laplace and Fourier transforms. Found nice solutions depending on the velocity of the disturbance.

We presented that work at a Liège colloquium



And a very smart scientist said : Ok but Proudman solved that problem in 1920!

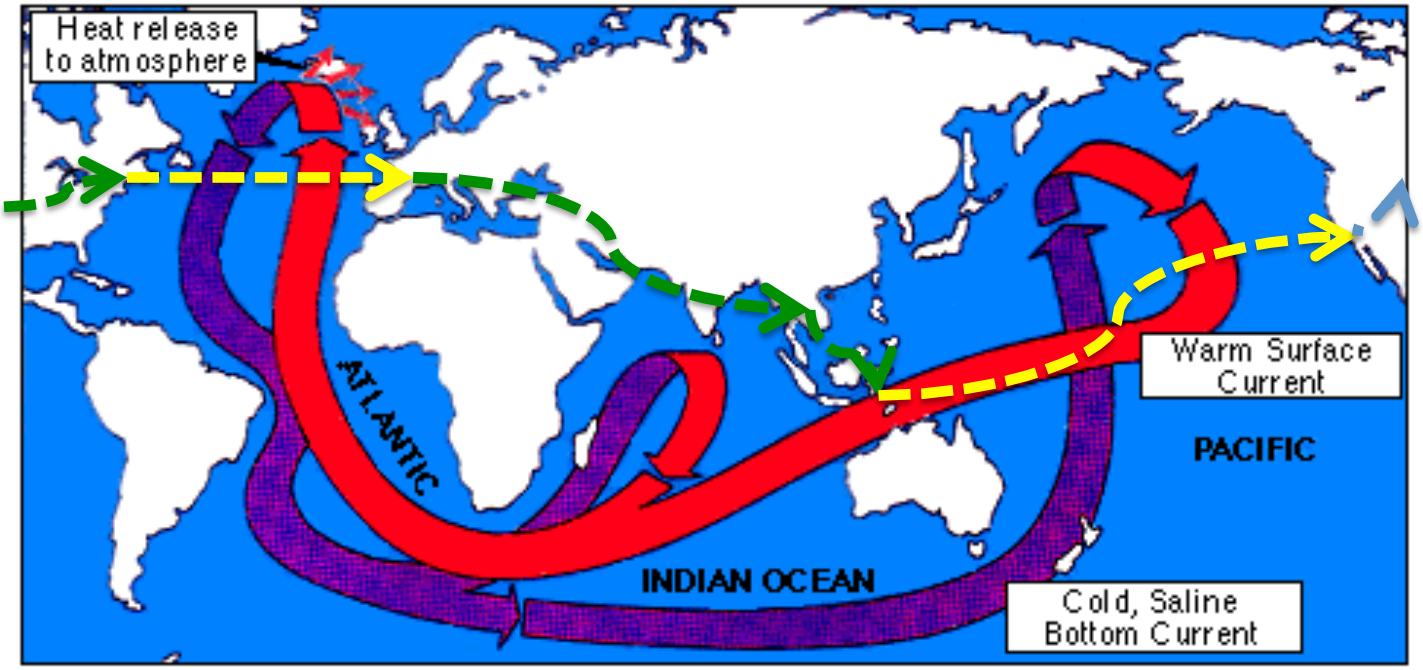
I was the speaker (Lien did not speak English at that time). I nearly collapsed.
Lien blushed and said : Michel shame on you!!

Back to the lab, I rushed to the Library and discovered that Proudman solved the problem
In 1920 but without Coriolis acceleration!

The smart scientist was a fanatic of polyhedral structures

After her Thèse de 3ème Cycle, Lien got a scholarship to visit the major oceanic labs Around the world

She first stopped in Asia, and discovered the pleasure to walk unnoticed in the streets

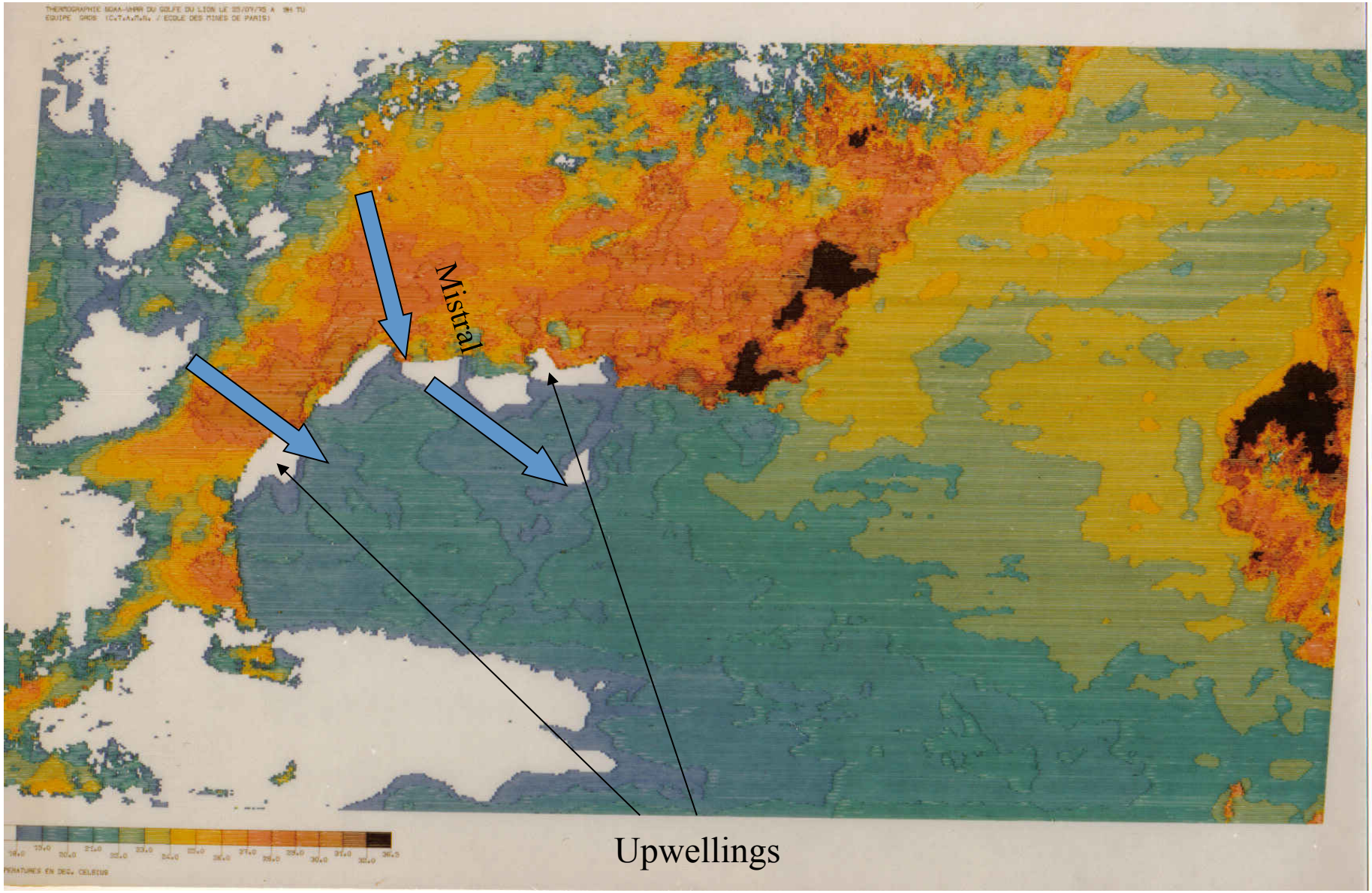


The present large-scale ocean current system determines climate to a great extent. The huge "conveyor belt" reacts extremely sensitively to global temperature changes accompanying each increase and decrease in the content of carbon dioxide in the atmosphere. - Broecker

When she was back in Paris, I offered to Lien to study the upwellings in the Gulf of Lion and to model them as a thèse d'Etat

SST in the Gulf of Lion

SST in the Gulf of Lion after a strong Mistral Gust



A Numerical Study of the Effects of Coastline Geometry on Wind-Induced Upwelling in the Gulf of Lions

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(Manuscript received 6 July 1982, in final form 14 December 1982)

ABSTRACT

An attempt is made to explain the fixed locations of coastal upwelling centers in the Gulf of Lions as a function of the coastline geometry alone. The semi-implicit numerical model, based on two-layer shallow water equations, uses a spatial discretization with triangular finite elements. Vertical mixing is shown to play an important role in determining the final shape of the upwelling centers. It is conjectured that an observed upwelling filament results from the straining and stretching of a coastal upwelling center by the observed anticyclonic circulation farther offshore.

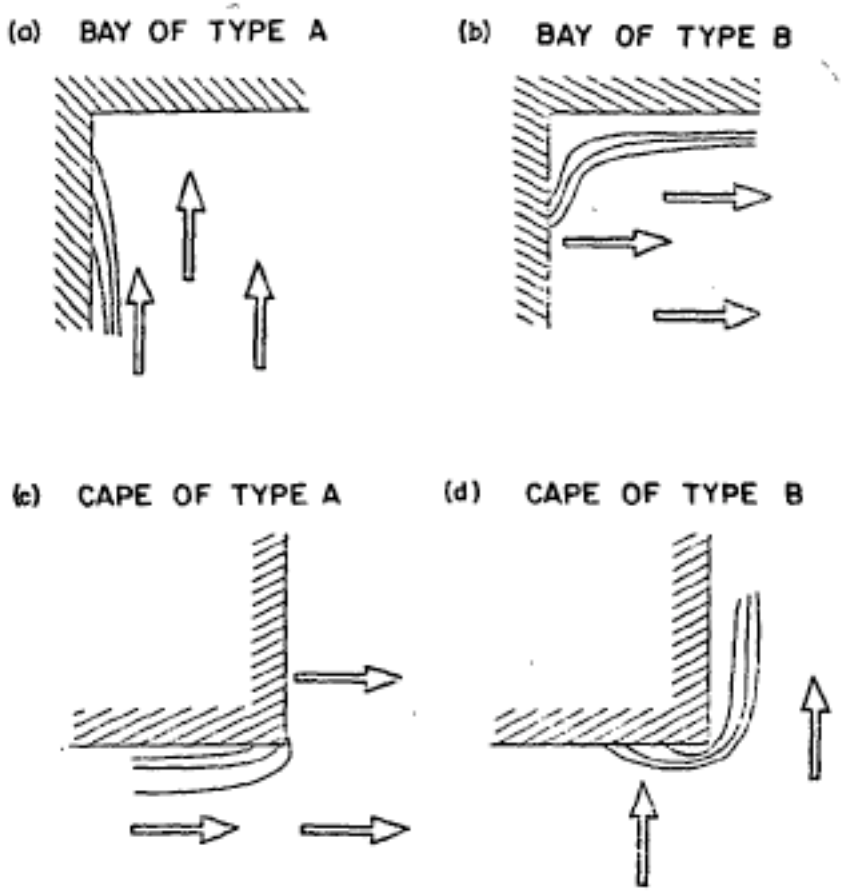


FIG. 10. Analogous cases for bays and capes.

Transient Upwelling Generated by Two-Dimensional Atmospheric Forcing and Variability in the Coastline

MICHEL CRÉPON AND CLAUDE RICHEZ

Laboratoire d'Océanographie Physique du Muséum National d'Histoire Naturelle, Paris, France

(Manuscript received 25 June 1981, in final form 16 July 1982)

JP0 Dec 1982

ABSTRACT

The present paper deals with two-dimensional transient upwelling in a two-layer ocean of constant depth. Motions generated by several two-dimensional atmospheric forcings are investigated. Using asymptotic expansions in time, it is shown that the component of the wind parallel to the coast generates an interface elevation which propagates along the coast as an internal Kelvin wave front. Strong horizontal baroclinic motions are linked to this phenomenon. The velocity within the deep layer is in the opposite direction to that of the wind on the surface. It is found that the spin-up time of mean motions is of the order of the Coriolis period.

The motion generated by a wind blowing over a bay is then studied. The bay is idealized by a right angle corner. Two independent cases are considered, depending on whether or not the wind is parallel to one coast or the other.

Effects of Coastline Geometry on Upwellings

MICHEL CRÉPON, CLAUDE RICHEZ AND MICHEL CHARTIER

Laboratoire d'Océanographie Physique, Museum National d'Histoire Naturelle, Paris Cedex 05, France

(Manuscript received 14 September 1983, in final form 1 May 1984)

JPO Aug 1984

ABSTRACT

The shallow water equations applied to a two-layer ocean are solved in order to study the effect of capes on upwellings. First, analytical solutions of the linearized version of these equations are given for academic right angle corners. Two cases must be envisaged depending on whether or not the wind, favorable to upwelling, is parallel to one coast or to the other. Then, the nonlinear version of the equations is solved by using a numerical model dealing with the finite elements method. Capes of various shapes are studied. Numerical results can be interpreted in the light of analytical solutions. The major observed phenomena are a difference in the interface elevation between the upwind and downwind coasts, and a generation of currents flowing in opposite direction to the wind in the bottom layer. Both effects are due to the generation of Kelvin waves by the variability of the coast.

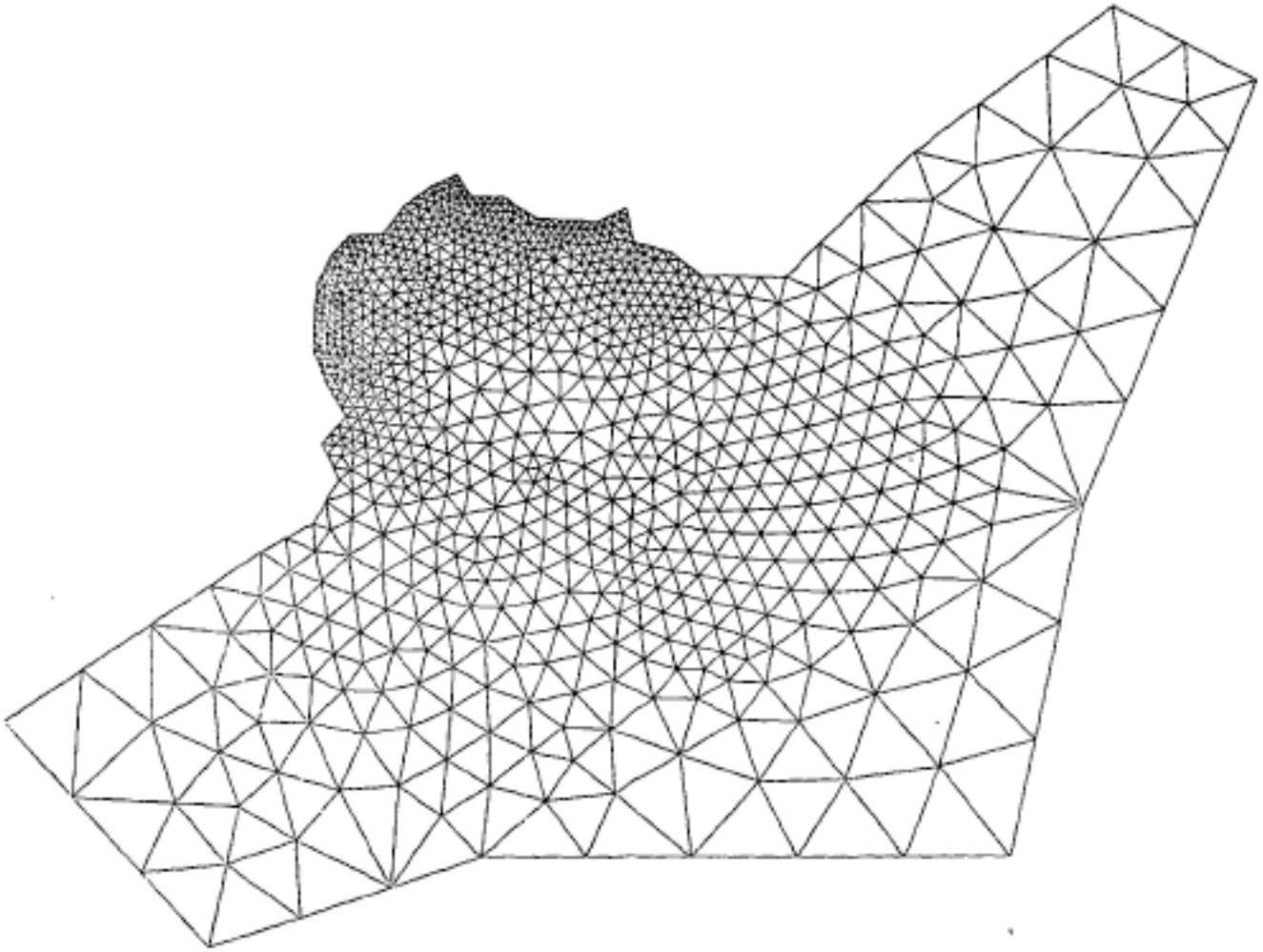


FIG. 12. Finite element grid used for the Gulf of Lions.

T=30h

T=35h

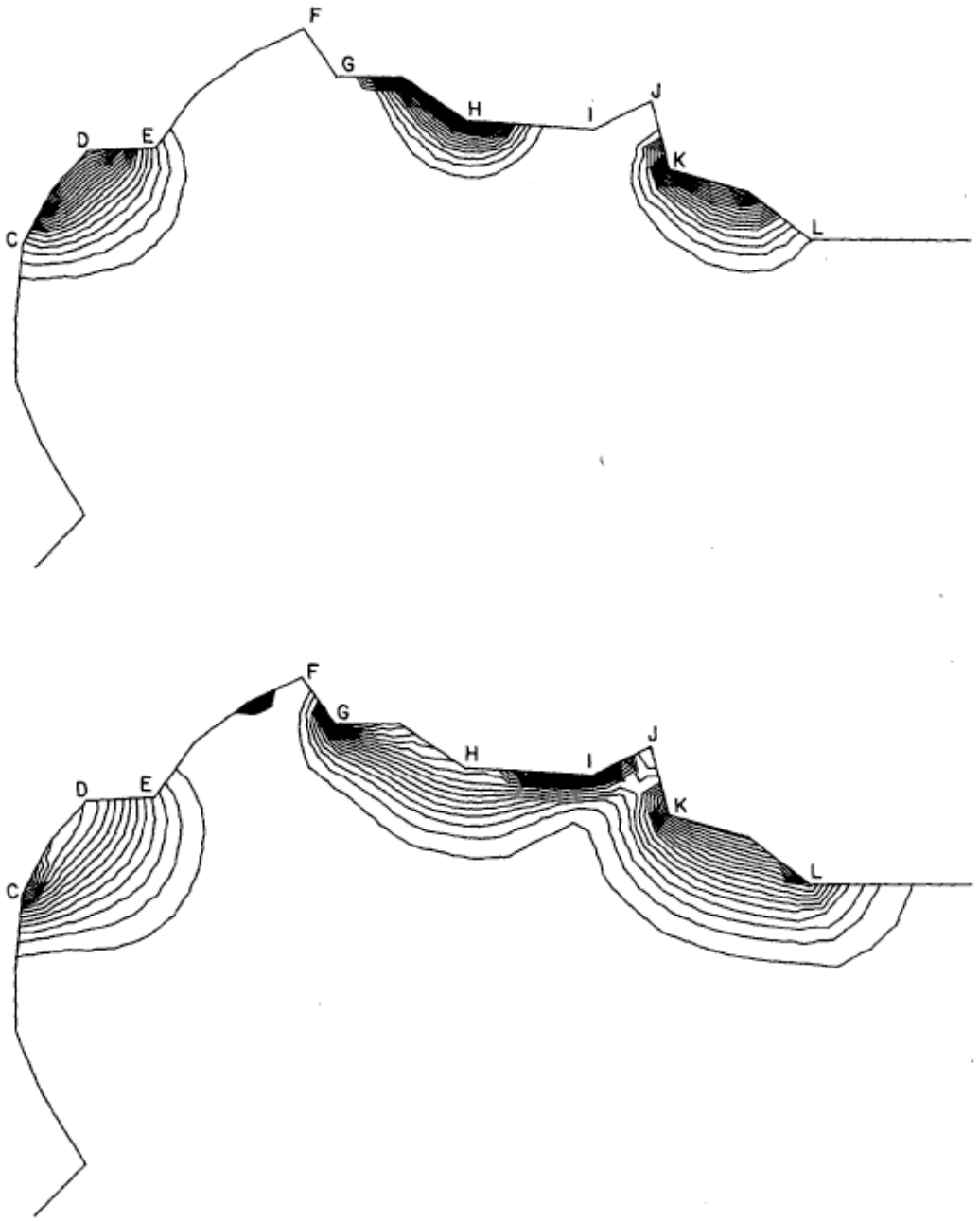
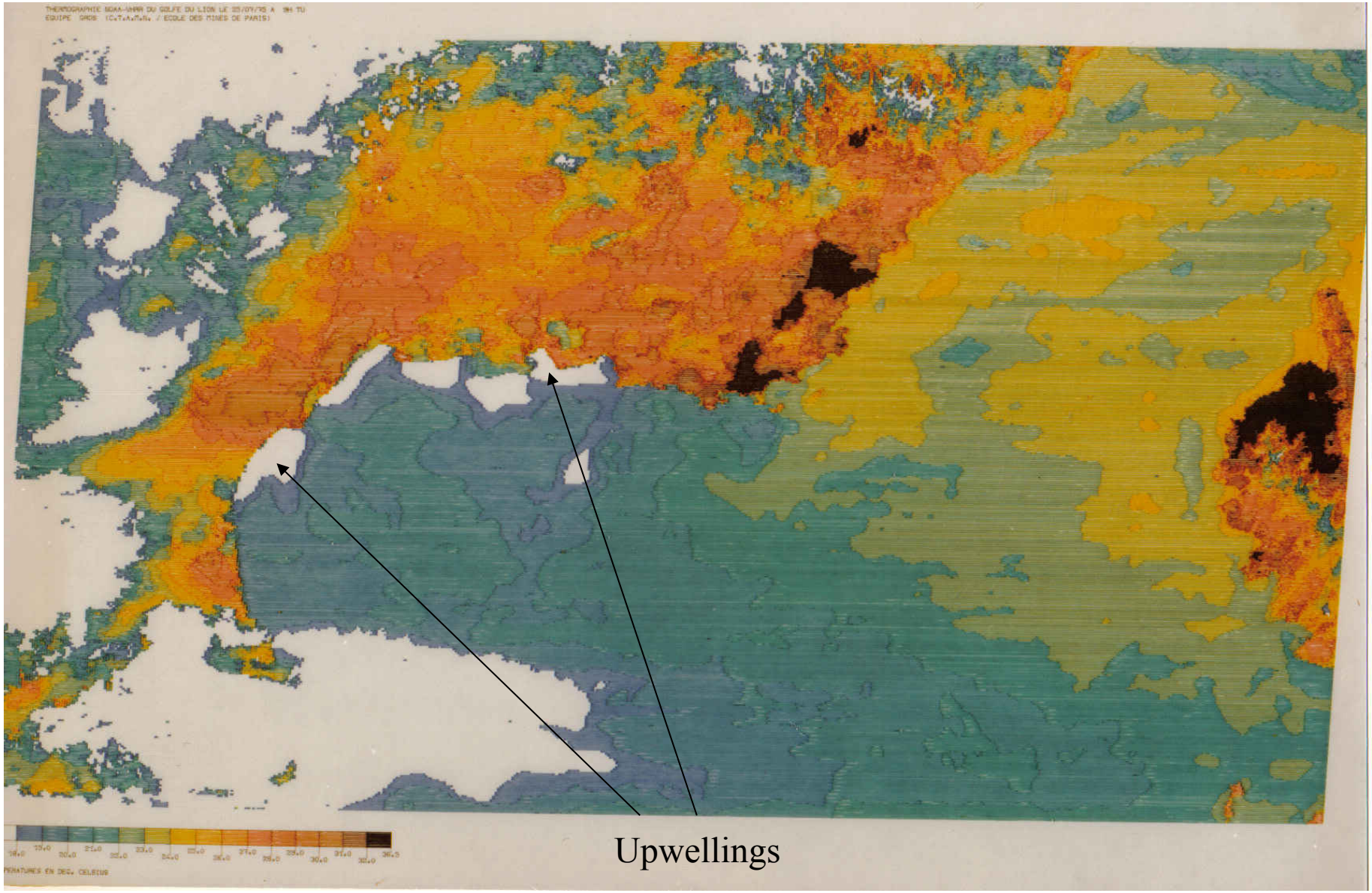


FIG. 15. Sea-surface temperature (a) for t = 30 h and (b) for 35 h after the onset of the wind. Isolines are actually isopycnal with a contouring interval of $\Delta\rho/\rho_0 = 10^{-4}$.

SST in the Gulf of Lion after a strong Mistral Gust



A noise-free finite element scheme for the two-layer shallow water equations

By BACH-LIEN HUA.[1] *Museum National d'Histoire Naturelle, 43 rue Cuvier, Paris 75005, France,*
and FRANCOIS THOMASSET, *Institut National de Recherche en Informatique et en Automatique, Domaine de Voluceau-Rocquencourt, BP 105, Le Chesnay 78150, France*

(Manuscript received July 13, 1982; in final form June 21, 1983)

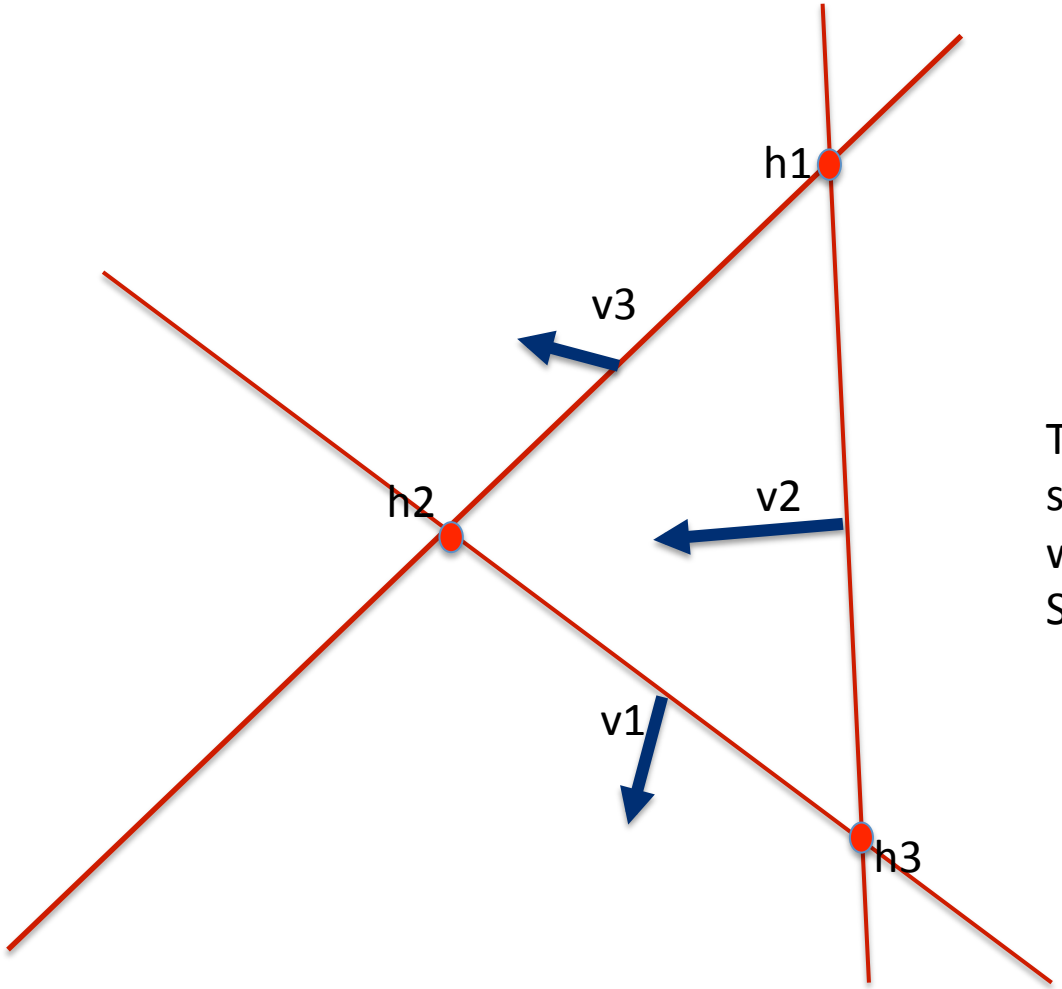
ABSTRACT

A semi-implicit time marching scheme is combined with triangular finite elements in space for the discretization of the two-layer shallow water equations. Velocity variables are approximated by so-called non-conforming linear elements, which have their nodes at mid-sides of the triangles. Height variables are approximated by linear conforming elements. The resulting discrete scheme is easily inverted and is free of two-grid oscillation problems. It is identical for a particular lattice to a finite difference scheme derived by Mesinger (1973)

Tellus (1984), *36A*, 157–165

Velocities are approximated by non conforming linear elements, at mid-side of triangles

Elevations are approximated by conforming linear elements, at the summits of triangles



They obtained a staggered grid similar to the Arakawa grid, which is very efficient for solving Shallow water equations.

After her thèse d'Etat (Ph.d.), Lien went to Woodshole for a while;
She worked with Melvin Stern, WB Owens, Jack Whitehead (WHOI)
Then with Dale Haighvogel, Jim Mc Williams at NCAR (Boulder)

She got an associate professor position at MNHN,

She discovered experimental works at sea with A. Colin de Verdière
During the tourbillon experiment
And moved to Brest at IFREMER

She was a great scientist, also fond of literature

Then, I met her episodically at meetings, where we talk about science, education, Life

OEDIPUS

Some years later (it was in the 1990 for the ocean science meeting in OAHU)
Lien and Daniel invited me at home; (They were on sabbatical in Hawai).

On a beautiful day, at sunset, we were seating on a beach
Daniel, my wife Marie Claire and Lien, having a great time,
chatting enjoying ourselves

Lien proposed to show me how to practice Aikido

She grasped my arm, bent her knees and I flew over her back and
Landed smoothly on the sand on by back

How could such a tiny young woman do such a thing to a tall big man like me?

I asked her to do it again in order to understand the trick .

And back to the sand again

She gently smiled;

Oedipus was over

She repeated the trick seven times

And the student

surpassed

the Master

I am very proud to have such a bright scientific daughter